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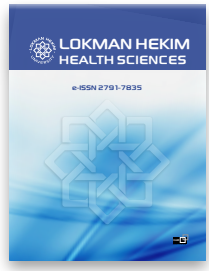

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ORIGINAL ARTICLE

The Effect of Adverse Childhood Events on Prenatal Attachment

Çocukluk Çağı Olumsuz Yaşantılarının Prenatal Bağlanmaya Etkisi

Ayfer Öztünç[1], Fadime Bayrı Bingöl[2]

[1]Department of Midwifery, Master's Degree, Marmara University, İstanbul, Türkiye
[2]Department of Midwifery, Marmara University, Faculty of Health Sciences, İstanbul, Türkiye

Abstract

Introduction: Adverse childhood events (ACEs) profoundly affect psychological health, yet their influence on maternal-fetal attachment remains unclear. This study investigates how childhood trauma impacts prenatal bonding, with two aims: (1) to clarify the ACEs-attachment relationship during pregnancy, and (2) to guide preventive interventions by assessing how trauma may disrupt early mother-infant bonding.

Methods: Pregnant women (aged 18-35) receiving care at a state hospital in Istanbul (January-December 2024) were attended the study. Data were collected using: (1) a demographic questionnaire, (2) the Adverse Childhood Events-Turkish Scale (ACE), and (3) the Prenatal Attachment Inventory (PAI). Statistical analyses included descriptive statistics, nonparametric tests (Mann-Whitney U, Kruskal-Wallis), parametric tests (t-tests, ANOVA with post-hoc analyses), and linear regression to examine ACEs' predictive effect on attachment.

Results: The study included 602 pregnant women. The mean age of participants was 25.67 (±3.81) years old, with a mean gestational age of 31.07 (±7.15) weeks; 77.6% had at least a high school education. Smoking and psychiatric history correlated strongly with ACEs ($p<0.001$). Marriage type, pregnancy planning, and fetal gender significantly affected attachment ($p<0.005$). Notably, women with divorced parents had higher attachment scores ($p=0.006$). Contrary to expectations, ACE-exposed women showed stronger prenatal attachment (66.81±10.23) versus non-exposed women (64.60±11.39; $p=0.036$). Regression analysis showed that ACEs minimally predicted attachment ($R^2=0.007$, $p=0.036$), and this association was no longer significant after adjusting for psychosocial factors ($p=0.079$). Planned pregnancy, love marriage and knowledge of fetal gender were associated with higher attachment.

Discussion and Conclusion: Regression models showed ACEs had a minimal and clinically negligible effect on prenatal attachment, which became non-significant when psychosocial factors were included.

Keywords: Childhood trauma; Mother-fetus relationship; Post-traumatic growth

Pregnancy is a significant and transformative phase in a woman's life, involving numerous physiological, psychological and hormonal changes.[1] It is not merely a biological process but also includes restructuring identity,

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Correspondence: Ayfer Öztünç, Msc. Yüksek Lisans, Marmara Üniversitesi, Sağlık Bilimleri Enstitüsü, Ebelik Programı, Türkiye
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changing relationships, and fostering emotional maturity. While this period is widely regarded as one of life's major transitions, it can also involve emotional vulnerability due to biological and environmental stressors.[2] Moreover, it increases susceptibility to new or recurring mental health challenges.[3]

Adverse childhood events (ACEs) are traumatic events that affect physical, emotional, and social development, with long-term psychological and physiological consequences.[4] They include abuse, neglect, domestic violence, and family instability. ACEs significantly shape future relationship patterns and attachment styles, particularly if experienced in early life.[5] Research shows these effects continue into adulthood, especially in the transition to motherhood. For instance, 20% of first-time pregnant women reported a history of abuse, and 65% of them experienced PTSD, depression, or both during pregnancy.[6] Furthermore, ACEs are strongly linked to morbidities during pregnancy and the postpartum period.[7] Negative childhood experiences can impair emotional regulation, attachment and caregiving behaviours in adulthood. However, some individuals demonstrate post-traumatic growth, forming stronger bonds with their children as a compensatory mechanism.[8]

Childhood trauma is linked to increased vulnerability to mental health issues during pregnancy and postpartum.[9] These findings highlight the need for preventive interventions that consider intergenerational effects of early trauma. Prenatal attachment -rooted in Bowlby's attachment theory- refers to the emotional bond between a pregnant woman and her fetus. It plays a crucial role in maternal identity and predicts postnatal bonding and infant outcomes.[10,11] This attachment begins in pregnancy and deepens after birth.[10,12–14] However, mothers with traumatic childhoods may face challenges in forming healthy attachments with their children and may unintentionally display negative parenting behaviors.[6] ACE exposure has been associated with disrupted caregiving behaviors, including emotional distancing, hypervigilance, or inconsistent parental responses, which may impair secure attachment development in the offspring.[15] A mother's trauma history may reduce her capacity to bond emotionally with her baby.[2] This finding was corroborated in a longitudinal study of 33 pregnant women who had been subjected to domestic violence. The results of the study indicated that pregnant women who had previously experienced domestic violence during childhood -regardless of whether they had similar experiences during adulthood- exhibited significantly lower levels of prenatal attachment quality with the fetus.[16] Furthermore, the presence of a robust prenatal attachment may serve as a protective factor, potentially mitigating the intergenerational transmission of adverse events.[9]

Despite the extensive research on the relationship between ACEs and subsequent psychological outcomes, there is a paucity of studies examining the impact of ACEs on prenatal attachment and the potential mediating mechanisms involved. It is hypothesized that the findings will elucidate the relationship between the frequency of ACEs and prenatal attachment levels. The development of preventive intervention programs, informed by these findings, is expected to benefit both mother-infant relationships and public health. The present study aims to address this significant lacuna in the extant literature by examining the effects of adverse events in childhood on prenatal attachment during pregnancy and the factors that play a role in this relationship.

Materials and Methods

This study employed a quantitative, cross-sectional, descriptive and correlational design, and was conducted at the Marmara Obstetrics and Gynecology Hospital in Istanbul, Türkiye, between January and December 2024. The study population consisted of all pregnant women who applied to the hospital during this period.

The sample size was calculated using G*Power 3.1.9 (Universität Düsseldorf, Germany), based on a one-way analysis of variance (ANOVA) with an alpha level of 0.05, statistical power of 0.95, and a medium effect size (f=0.25), as suggested by Cohen. According to these parameters, the required sample size was approximately 252 participants. In this study, data were collected from 602 pregnant women, which far exceeds the minimum requirement and enhances the statistical power and generalizability of the findings.

Pregnant women were recruited during routine antenatal visits if they met the inclusion criteria: aged 18–35 years, able to speak and understand Turkish, married and living with their spouse, primiparous, in their second or third trimester, not diagnosed with high-risk pregnancy, and willing to participate. Women who did not complete or returned incomplete questionnaires were excluded.

Data Collection Tools

The researcher administered the Information Form, the ACE-Turkish Form and the Prenatal Attachment Inventory (PAI) to pregnant women who met the inclusion criteria and agreed to participate in the study. The data were collected in person and took an average of 10 minutes from the participants.

Information Form

As a consequence of the literature review, a personal information form consisting of 20 questions was developed.[9,17–19] The form encompasses a range of sociodemographic characteristics of the participants, including age, educational attainment, marriage type, family type, employment status, and income. Additionally, it gathers information on smoking, alcohol, and substance use habits; medical and obstetric histories; and any history of trauma.

Adverse Childhood Events-Turkish Form (ACE)

The Turkish adaptation of the scale was conducted by Ulukal in 2018. Concurrently, Gündüz, Yaşar[20] undertook reliability and validity tests. The ACE-Turkish Form, a self-report scale consisting of 10 items, employs a yes-no format to investigate adverse events prior to the age of 18. The questions, which are exclusively affirmative, are left blank in the absence of a response. The scale ranges from 0 to 10, with 0 representing the lowest possible score and 10 representing the highest. An increase in score is indicative of an increase in ACEs. It is important to note that a cut-off value has not been established. In the reliability and validity study conducted by Gündüz et al.,[20] Cronbach's alpha value was determined to be 0.74. In this study, the cronbach alpha value of the scale was found to be 0.72.

Prenatal Attachment Inventory (PAI)

The original scale was developed by Muller.[10] The scale comprises 21 items and was developed to explain the feelings, thoughts and situations experienced by women during pregnancy and to determine the level of attachment of the woman to her baby in the prenatal period. This inventory was adapted to Turkish and validity and reliability tests were conducted. The scale is a four-point Likert scale and each item is scored between 1 and 4. It is scored as 1=Never, 2=Sometimes, 3=Frequently, 4=Always. The lowest score in the scale was 21 and the highest score was 84. Cronbach's alpha reliability coefficient of 0.84 indicates that the scale items are consistent with each other and test attachment in the prenatal period.[11] In this study, the cronbach alpha value of the scale was found to be 0.90.

Statistical Analysis

The data were analyzed using the SPSS 27.0 statistical software package (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as mean±standard deviation or median (min–max), depending on the distribution of the data. Normality of distribution was tested using both the Kolmogorov–Smirnov and Shapiro–Wilk tests. Homogeneity of variances was evaluated using Levene's test.

For comparisons between groups:

Parametric tests (Independent samples t-test, one-way ANOVA were used when assumptions met.

Non-parametric tests (Mann-Whitney U and Kruskall Wallis) were used when assumptions were violated.

Post-hoc comparisons were conducted using the Tukey HSD only. The LSD test was not used, to control Type 1 error.

The effect size was calculated using Pearson's r, Cohen's d and Eta squared (η^2) coefficients. Importantly, effect size represents the magnitude of a relationship or difference, independent of statistical significance. It provides practical interpretation beyond p-values. According to Cohen,[21] values of 0.2 are indicative of a small effect size, 0.5 of a medium effect size, and 0.8 of a large effect size. Similarly, the eta square value is 0.01 for a small effect size, 0.06 for a medium effect size, and 0.14 for a large effect size.[22] Finally, the r value is 0.1 for a small effect size, 0.3 for a medium effect size, and 0.5 for a large effect size.[23] Finally, the relationship between ACE scores and PAI scores was examined using linear regression analysis.

Ethical Aspects of the Study

Before starting the study, approval was obtained from the Ethics Committee of Marmara University Institute of Health Sciences (21.06.2023-72). The purpose, method and contributions of the research were explained to the women who met the inclusion criteria and their verbal consent was obtained, and it was stated that they could leave the research at any time and data were collected by face-to-face interview in a room where privacy was ensured. All articles in the Helsinki Declaration Principles were considered as a whole and the research was conducted by taking these articles into consideration.

Results

The study included 602 pregnant women who met the research criteria. The basic demographic characteristics are given as follow.

Participants (N=602) averaged 25.67 (±3.81) years, with 77.6% having ≥high school education. Most were in

Table 1. Sociodemographic data of pregnant women who participated in the study (n=602)

	n	%		n	%
Age (mean±SD)	25.67±3.81 (min=18, max=35)		Has she ever received a psychiatric diagnosis?		
Marriage age (mean±SD)	23.94±3.58 (min=17, max=35)		No	591	98.2
Gestational week (mean±SD)	31.07±7.15 (min=14, max=41)		Yes	11	1.8
Education			Has she ever taken psychiatric medication?		
Primary school	30	5	No	584	97
Secondary school	104	17.3	Yes	18	3
High school	214	35.5	Any miscarriage/curettage?		
Associate degree	108	17.9	No	552	91.7
Bachelor's degree	132	21.9	Yes	50	8.3
Advanced degree	14	2.3	Is the pregnancy planned?		
Marriage type			No	130	21.6
Love marriage	499	82.9	Yes	472	78.4
Arranged marriage	103	17.1	Mode of conception		
Family type			Spontaneous	584	97
Small	467	77.6	Treatment pregnancy	18	3
Big	135	22.4	Baby's gender		
Does she have a regular job?			Unknown	81	13.5
No	432	71.8	Female	246	40.9
Yes	170	28.2	Male	275	45.7
Does the husband have a regular job?			Are there any diseases that require medical follow-up before pregnancy?		
No	38	6.3	No	559	92.9
Yes	564	93.7	Yes	43	7.1
Economic situation			Are there any diseases that require medical follow-up in this pregnancy?		
Income<Expenditure	139	23.1	No	539	89.5
Income=Expenditure	394	65.4	Yes	63	10.5
Income>Expenditure	69	11.5	Is there anything bad that happened during this pregnancy (accident, loss, etc.)?		
Does she smoke?			No	594	98.7
No	541	89.9	Yes	8	1.3
Yes	61	10.1			

SD: Standard deviation; Min: Minimum; Max: Maximum.

love marriages (82.9%), small families (77.6%), and had income = expenses (65.4%). Few reported psychiatric histories (diagnosis: 1.8%; medication: 3%) or unplanned pregnancies (21.6%) (Table 1).

Descriptive statistics of the scales are presented below. The ACE scores of the pregnant participantsranged from 0 to 9. The distribution was as follows; 75.2% (453) reported no ACEs, 12% (72) reported 1 event, 5.3% (32) reported 2 events, 3% (18) reported 3 events, 2.8% (17) reported 4 events, and 1.7% (10) reported 5 or more ACEs. Given the non-normal distribution of ACE scores, the data are reported as median (IQR): 0.00 (0.00–0.00). The mean total score of the PAI was found to be 65.15 (±11.14, 22–84).

Table 2. Comparison of mean ACE scores according to descriptive characteristics

		Mean±SD	Median (IQR)
Smoking			
None	541	0.48±1.15	0.00 (0.00–0.00)
Exist	61	1.02±1.48	0.00 (0.00–1.50)
Statistical value		U=12535; Z: -4.07; p<0.001; r=-0.17	
Has she ever received a psychiatric diagnosis?			
No	591	0.48±1.13	0.00 (0.00–0.00)
Yes	11	3.09±1.64	3.00 (2.00–4.00)
Statistical value		U=452; Z: -6.48; p<0.001; r=-0.26	
Has she ever taken psychiatric medication?			
No	584	0.48±1.13	0.00 (0.00–0.00)
Yes	18	2.22±1.80	2.00 (1.00–4.00)
Statistical value		U=1852; Z: -6.19; p<0.001; r=-0.25	

ACE: Adverse Childhood Events-Turkish Form; SD: Standard deviation; IQR: Interquartile range. Mann–Whitney U test was used. Effect size: r. Significance: p<0.05. ACE scale consists of 10 binary items, total scores ranging from 0 to 10.

Table 3. Comparison of mean PAI scores according to descriptive characteristics

		Mean±SD
Marriage type		
Love marriage	499	65.98±10.98
Arranged marriage	103	61.13±11.13
Statistical value	t=4.07; p<0.001; d=0.44	
Is the pregnancy planned?		
No	130	62.68±11.82
Yes	472	65.83±10.87
Statistical value	t=-2.87; p=0.004; d=0.28	
Gender of the baby		
Unknown	81	60.98±13.01
Female	246	65.53±10.79
Male	275	66.03±10.62
Statistical value	Welch F=5.16; p=0.006; η^2=0.02	
	PostHoc: Female>Unknown (p=0.004), d=0.40	
	PostHoc: Male>Unknown (p<0.001), d=0.45	

PAI: Prenatal Attachment Inventory; SD: Standard deviation. Welch ANOVA and paired t-tests were used. Effect size is given as Cohen's d. Significance level is p<0.05. The PAI consists of 21 items scored on a 4-point Likert scale, with total scores ranging from 21 to 84.

ACE and Attachment Patterns

ACE Prevalence

24.8% reported ≥1 ACE. Mann-Whitney U tests showed that pregnant women who smoked had significantly higher ACE scores compared to non-smokers (U=12535, p<0.001, r=-0.17). Similarly, participants with a history of psychiatric diagnosis (U=452, p<0.001, r=-0.26) or medication use (U=1852, p<0.001, r=-0.25) reported significantly higher ACE scores (Table 2).

Prenatal Attachment

Independent samples t-tests revealed that PAI scores were significantly higher among women in love marriages (M=65.98, SD=10.97) than in arranged marriages (M=61.13, SD=11.13), t=4.073, p<0.001, with a medium effect size (Cohen's d=0.44). Likewise, participants with planned pregnancies had higher attachment scores (M=65.83, SD=10.86) compared to those with unplanned pregnancies (M=62.68, SD=11.81), t=-2.871, p=0.004, d=0.28. One-way ANOVA showed significant differences in PAI scores according to whether participants knew the baby's gender (WelchF=5.16, p=0.006, η^2=0.02). Tukey post hoc tests indicated that those who knew they were expecting a male fetus had higher attachment scores than those who did not know the baby's gender (p<0.001, d=0.45), and those expecting a female fetus also had higher scores than those who were unaware of the gender (p=0.004, d=0.40) (Table 3).

ACE-PAI Association

Among the ACE items, parental separation (Item 6) was associated with significantly higher PAI scores (t=-2.78, d=0.41, p=0.006). Although several other ACE items showed elevated means in the "yes" group, differences were not statistically significant. Overall, women with at least one

Table 4. Comparison of mean PAI scores according to ACE item variables

ACE	n	Mean±SD	Stats (t, d)	p	ACE	n	Mean±SD	Stats (t, d)	p
Item -1			t=-2.10	0.528	Item -6			t=-2.78; d=0.41*	0.006
No	529	65.04±11.21			No	551	64.76±11.22		
Yes	73	65.92±10.66			Yes	51	69.27±9.46		
Item -2			t=-1.88	0.065	Item -7			t=-1.28	0.211
No	555	64.95±11.31			No	579	65.07±11.27		
Yes	47	67.51±8.75			Yes	23	67.04±7.03		
Item -3			t=-1.06	0.290	Item -8			t=-0.12	0.905
No	589	65.07±11.10			No	591	65.14±11.18		
Yes	13	68.38±13.19			Yes	11	65.55±9.05		
Item -4			t=-1.30	0.196	Item -9			t=-0.82	0.412
No	552	64.97±11.29			No	583	65.08±11.21		
Yes	50	67.10±9.25			Yes	19	67.21±8.91		
Item -5			t=-0.88	0.404	Item -10			t=-0.94	0.357
No	593	65.12±11.20			No	579	65.08±11.25		
Yes	9	67.00±6.29			Yes	23	66.70±7.92		
The general presence of ACE								t=-2.10	
There's no ACE			453	64.60±11.39				d=0.20*	
There's at least one ACE			149	66.81±10.23				p=0.036	

PAI: Prenatal Attachment Inventory; ACE: Adverse Childhood Events-Turkish Form; SD: Standard deviation. Independent samples t-tests were used. Normality and homogeneity of variance assumptions were met (p>0.05). Effect sizes reported as Cohen's d. *: Cohen's d effect sizes are reported only for statistically significant comparisons (p<0.05).

Table 5. Univariate linear regression according to the presence of ACE on PAI

	B	SE	β	t	p	95% CI	R^2
Constant	64.60	0.52	–	123.75	<0.001	63.58, 65.63	
ACE present	2.21	1.05	0.085	2.10	0.036	0.14, 4.27	0.007

ACE: Adverse Childhood Events-Turkish Form; PAI: Prenatal Attachment Inventory; SE: Standard error; CI: Confidence interval. Model Summary: F(1,600)=4.42, p=0.036, Adjusted R^2=0.006, DW=1.98. Simple linear regression was conducted with ACE presence (yes/no) as the predictor and PAI score as the outcome. Model assumptions were checked: Durbin-Watson (DW)=1.98 (no autocorrelation), VIFs=1 (no multicollinearity). Statistical significance was set at p<0.05.

ACE reported slightly higher PAI scores than those without ACE exposure, although the effect was minimal (t=-2.10, d=0.20, p=0.036) (Table 4).

Regression Analyses

Two linear regression models were tested to examine the relationship between ACEs and prenatal attachment.

In the first model, ACE was entered as a categorical variable without any control variables. This univariate regression was statistically significant (F(1, 600)=4.415, p=.036), but the explained variance was minimal (R^2=.007). Participants with high ACE exposure had slightly higher prenatal attachment scores (B=2.205, 95% CI [0.144, 4.266], p=0.036), though the effect was weak (β=.085) (Table 5).

In the multivariate model, ACE was entered alongside psychosocial covariates: type of marriage, pregnancy planning, and knowledge of fetal gender. This model was statistically significant overall (F(4, 597)=10.53, p<0.001) and accounted for a larger proportion of the variance in prenatal attachment (R^2=.066). In this adjusted model, ACE was no longer a statistically significant predictor (B=1.80, 95% CI [-0.21, 3.82], p=0.079, β=0.07). Planned pregnancy (B=3.16, 95% CI [1.006, 5.27], p=0.003, β=0.18), knowledge of fetal gender (B=4.47, 95% CI [1.92, 7.01], p=<0.001, β=0.14) and love marriages (B=4.70, 95% CI [2.41, 7.00], p<0.001, β=0.16) were associated with higher prenatal attachment. Although the inclusion of these psychosocial variables significantly improved model fit, the

Table 6. Adjusted linear regression model (ACE + Covariates)

	B	SE	β	t	p	95% CI	R^2
Constant	42.12	3.73	–	11.28	<0.001	34.79, 49.45	
ACE present	1.80	1.03	0.07	1.76	0.079	-0.21, 3.82	
Pregrancy planning	3.16	1.07	0.11	2.95	0.003	1.06, 5.27	0.066
Gender knowing	4.47	1.30	0.14	3.45	<0.001	1.92, 7.01	
Marriage type	4.70	1.71	0.16	4.02	<0.001	2.41, 7.00	

ACE: Adverse Childhood Events-Turkish Form; SE: Standard error; CI: Confidence interval. Model Summary: $F(4,597)=10.53$, $p<0.001$, Adjusted $R^2=0.06$, DW=2.09. Reference categories: ACE (Absent), Marriage type(arranged), Pregnancy Planning (Unplanned), Gender Knowledge (Unknown). Durbin-Watson=2.09 confirmed no autocorrelation. All variance inflation factors (VIF) were <1.02, indicating no multicollinearity concerns. Statistical significance was set at $p<0.05$.

overall explained variance remained modest (Table 6). This indicates that ACE and these covariates together explained only 6.6% of prenatal attachment variance and that there were important unmeasured effects. Although the regression model was statistically significant, the explained variance was very low ($R^2=0.066$), indicating a minimal effect size despite the large sample of 602 participants.

Discussion

In this study, the association between ACEs and prenatal attachment levels was analyzed. While statistical analysis revealed a significant correlation, the effect size suggested minimal clinical implications ($R^2=0.007$ in unadjusted models, increasing to only 0.066 with psychosocial covariates). This distinction between statistical and clinical significance is critical, as it implies that although the relationship exists in large samples, it may not hold meaningful impact at the individual or clinical level. While these results are similar to some studies in the literature, they contradict some others. In the following, these findings are discussed in detail and possible explanations are presented.

In our initial model, ACE was found to be a statistically significant predictor of prenatal attachment (B=2.21, p=0.036), although the explained variance was minimal (<1%). However, when additional psychosocial variables such as marriage type, pregnancy planning, and gender knowledge were included in the model, the association between ACE and attachment was no longer statistically significant (p=0.079). This finding suggests that the effect of childhood adversity on prenatal attachment may be weak and largely overshadowed by more proximal psychosocial factors. Although statistically significant, the small effect size ($R^2=0.066$) implies that targeting ACEs alone may have minimal clinical impact on enhancing prenatal attachment. The limited variance explanation aligns with attachment theory's tenet that bonding is shaped by complex, interacting factors.[5] Therefore, ACEs alone do not appear to meaningfully explain variations in prenatal attachment, and their predictive value may be conditional on other contextual variables.

Nevertheless, the observation that attachment was slightly higher in pregnant women with ACEs may still hold theoretical value and can be interpreted through the lens of posttraumatic growth.[24] Traumatic events may increase parenting motivation in some individuals and make them want to treat their own children differently. Some individuals may form stronger emotional bonds after negative events, and this may increase prenatal attachment.[8] This aligns with studies suggesting that certain individuals, particularly those with high emotional resilience, may develop increased empathy and caregiving motivation following adversity.[25]

Our findings are consistent with studies showing weak associations between childhood traumas and attachment.[26,27] However, some studies have reported that attachment decreases with increasing traumatic events.[2,16] This difference may be due to study populations, scales used or cultural factors. For instance, a study which included mothers from eight middle-income countries, demonstrated that the relationship between ACEs and prenatal attachment varied across countries—positive in Pakistan, negative in Vietnam, and nonsignificant elsewhere—highlighting the moderating role of culture and context[9] This suggests that cultural or environmental factors may moderate ACE-Prenatal Attachment dynamics.

In our study, participants who reported that their parents separated/divorced in childhood had significantly higher prenatal attachment scores. This unexpected result may be explained by the mechanism of 'compensatory attachment'. Individuals who experience emotional neglect may be trying to compensate for past deficiencies by establishing a stronger bond with their own children.[5] In a similar vein, those who reported physical abuse exhibited a tendency

towards higher attachment scores. These observations suggest that adversity may not always impair attachment; instead, in certain psychosocial contexts, it may elicit compensatory emotional investment in the unborn child. These findings suggest that the effect of trauma on attachment is heterogeneous and may strengthen attachment in some cases.

When the predictors of childhood ACEs were analyzed, smoking and the history of psychiatric treatment were found to be prominent. In our study, smoking and the history of psychiatric treatment (diagnosis and medication) were found to be significantly associated with ACEs. Results show that pregnant smokers, pregnant women with psychiatric diagnosis and pregnant women taking psychiatric medication reported significantly higher ACE scores. These findings are in line with the literature showing a strong link between substance use and psychiatric morbidity and childhood traumas.[4,26,28,29]

However, these factors were not directly related to prenatal attachment, reflecting the complex nature of the effect of trauma on attachment. This dissociation may suggest that while ACEs influence risk factors such as psychiatric morbidity and substance use, the pathway to prenatal attachment is more nuanced and may be mediated or moderated by resilience, social support, or current emotional states.[9] This finding suggests the potential involvement of mediating factors in the relationship between trauma events and attachment. From a clinical perspective, it is recommended that attachment processes be evaluated independently of other factors in pregnant women with a history of childhood trauma who smoke or are receiving psychiatric treatment.

Our study showed that prenatal attachment is more strongly associated with current psychosocial factors than ACEs:

- Pregnant women in love marriages had higher attachment scores than those in arranged marriages. This may be interpreted as emotional intimacy between spouses supports prenatal attachment.[10]
- The present study found that planned pregnancies were associated with higher levels of attachment than unplanned pregnancies. This finding lends further support to Rubin[12] theories on the relationship between pregnancy planning and attachment. The significance of planned pregnancy in reflecting the psychological preparedness of expectant mothers is noteworthy.
- Knowing the gender of the baby increased attachment. This result suggests that learning the gender of the baby creates a concrete representation in the expectant mother and facilitates attachment.

In our study, ACEs slightly increased prenatal attachment instead of weakening it, which contradicts some studies in the literature:

1. Cultural Factors: Strong family ties in Turkish society may buffer the effect of traumatic events on attachment.
2. Sample Characteristics: The exclusion of high-risk pregnant women in our study may have led to a stronger attachment in a healthier population.
3. Measurement Tools: It is possible that the scales used (PAI and ACE) may yield different results in different cultures.

Another possibility is the role of unmeasured variables such as prenatal depression, which has been shown to mediate the relationship between ACEs and attachment[9] and was not assessed in this study.

Pregnancy counselling should focus on factors such as marriage type and pregnancy planning. It is important to perform ACE screening in pregnancy follow-up, and interventions that support attachment should be developed especially in unplanned pregnancies. Given the evidence that prenatal depression is both prevalent and modifiable, targeted psychological support during pregnancy may reduce the intergenerational transmission of risk.[9]

It should be kept in mind that attachment may be artificially high in pregnant women with a history of trauma, in-depth assessment should be performed, and psychosocial support programmes should be developed for pregnant women with a history of trauma. Since learning the gender of the baby may support attachment, the use of early gender determination in clinical practice may be encouraged.

Given that negative, positive and insignificant effects of ACEs on foetal attachment have been observed among woman, it is an important area for future research to consider cultural and other factors that play a role in this relationship when examining its effect on attachment. Longitudinal studies can examine how prenatal attachment evolves into postnatal attachment. With qualitative studies, attachment experiences of traumatised mothers can be analyzed in depth.

Limitations

Limitations of the study include the inability to make causal inferences due to its cross-sectional design. In addition, since the sample was collected from women who applied

to a public hospital in Istanbul, it cannot be generalised to all pregnant women. Another limitation is the low explained variance, which highlights the need to include additional determinants in future research. The weak explanatory power of ACEs emphasizes their distant role in prenatal attachment compared to close psychosocial factors. The data collection tools used in the research are based on self-report.

Conclusion

The present study examined the relationship between ACE and prenatal attachment and evaluated the factors that may affect this relationship. The findings indicated a significant yet modest association in the unadjusted model. This effect became nonsignificant when psychosocial variables were considered, highlighting their stronger influence. Overall, factors such as planned pregnancy, love marriage and knowing the baby's gender had a greater impact. These results show that prenatal attachment is shaped more by current psychosocial conditions and perceptions than by childhood traumas. Yet, the explained variance remained low, implying other potential influences. Clinically, it emphasises the importance of psychosocial assessment during pregnancy. Despite small effect sizes, targeted support for at-risk groups remains important. For pregnant women with childhood trauma, psychoeducation and counsellingshould be offered to support attachment. Supporting pregnancy planning and partner communication may also foster bonding. Such efforts are essential to protect both maternal and infant health.

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