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Maternal history of adverse childhood experiences and subsequent infant paternal involvement

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Abstract

Background: Adverse Childhood Experiences (ACEs) have intergenerational impacts on family functioning, yet little is known about how maternal trauma history influences paternal involvement during infancy. This study examined the relationship between maternal ACEs and subsequent paternal involvement, investigating potential mediating and moderating factors.

Methods: A cross-sectional study was conducted among 400 mothers with infants aged 3-12 months. Maternal ACEs were assessed using the 10-item ACE questionnaire, and paternal involvement was measured using the Father Involvement Scale-Revised (FIS-R). Mediating variables included maternal depression (Edinburgh Postnatal Depression Scale), relationship quality (Dyadic Adjustment Scale), social support, and parenting stress. Multiple regression and mediation analyses were performed to examine relationships between variables.

Results: The mean maternal ACE score was 3.2 (SD = 2.4), with 72.5% reporting at least one ACE. Higher maternal ACE scores were significantly associated with lower paternal involvement across all dimensions ($\beta = -0.31$, 95% CI [-0.42, -0.20], $p < 0.001$). Maternal depression (indirect effect = -0.12, 95% CI [-0.18, -0.06]) and relationship quality (indirect effect = -0.15, 95% CI [-0.21, -0.09]) significantly mediated this relationship. Household income ($\beta = 0.18$, $p = 0.003$) and maternal education ($\beta = 0.15$, $p = 0.012$) moderated the association, suggesting socioeconomic resources may buffer negative impacts.

Conclusions: Maternal trauma history significantly influences paternal involvement during infancy, operating through maternal mental health and relationship quality pathways. These findings suggest the importance of trauma-informed approaches in family interventions and highlight the need for additional support for families with limited socioeconomic resources. Future longitudinal research is needed to establish causality and examine changes in these relationships over time.

Keywords: Adverse childhood experiences, paternal involvement, maternal trauma, family dynamics, infant development, intergenerational trauma

Introduction

Adverse Childhood Experiences (ACEs) represent significant early-life stressors that can have lasting impacts across generations [1]. These experiences, including abuse, neglect, and household dysfunction, affect approximately 61% of adults across diverse populations, with women reporting higher rates than men [2]. Recent evidence suggests that maternal ACEs not only influence mothers' parenting behaviors but may also have indirect effects on family dynamics, including paternal involvement during infancy [3].

The intergenerational impact of maternal trauma has gained increased attention in recent years, particularly regarding its influence on family functioning and child development [4]. While extensive research has examined the direct effects of maternal ACEs on mother-child relationships, less attention has been paid to how these experiences might influence fathers' engagement with their infants [5]. This gap in understanding is particularly significant given the crucial role of father involvement in early child development and family well-being [6].

Paternal involvement during infancy, characterized by engagement, accessibility, and responsibility, has been consistently associated with positive developmental outcomes for children [7]. Recent studies indicate that father involvement during the first year of life predicts better cognitive development, emotional regulation, and social competence in children [8]. However, the factors that influence paternal involvement are complex and multifaceted, potentially including maternal psychological factors shaped by early life experiences [9].

Understanding the relationship between maternal ACEs and paternal involvement is crucial for several reasons. First, it may reveal important mechanisms through which intergenerational trauma affects family dynamics^[10]. Second, it could inform interventions aimed at supporting healthy family functioning in families where mothers have experienced significant childhood adversity^[11]. Finally, this knowledge may help identify at-risk families who could benefit from targeted support to enhance father involvement^[12].

This study examines the association between maternal ACEs and subsequent paternal involvement during infancy among 400 families. We hypothesize that higher maternal ACE scores will be associated with decreased paternal involvement, potentially mediated by maternal mental health and relationship quality factors^[13]. By understanding these relationships, we aim to contribute to the development of more effective family-centered interventions that consider the complex interplay between maternal trauma history and family dynamics.

Materials and Methods

Study Design and Population

This cross-sectional study was conducted between January 2023 and December 2023. A total of 400 mothers with infants aged 3-12 months were recruited from five major maternal health centers across the metropolitan area. The study employed a stratified random sampling technique to ensure representation across different socioeconomic strata^[14]. Inclusion criteria specified mothers aged 18-45 years with biological infants and fathers who were alive and known to the family, regardless of residential status. Exclusion criteria included severe maternal psychiatric conditions, infant developmental disorders, and cases where fathers were deceased or legally barred from contact^[15].

Ethical Considerations

The study protocol was approved by the Institutional Review Board and adhered to the Declaration of Helsinki guidelines. Written informed consent was obtained from all participating mothers, with particular attention to trauma-informed consent procedures given the sensitive nature of ACE-related questions^[16]. Participants were informed of their right to withdraw at any time and were provided access to psychological support services if needed^[17].

Data Collection Procedures

Maternal ACE Assessment

Maternal ACEs were assessed using the standardized 10-item ACE questionnaire developed by the Centers for Disease Control and Prevention^[18]. The questionnaire was administered by trained clinical psychologists in private settings. The ACE score was calculated as the sum of exposure to different categories of adverse childhood experiences (range: 0-10), with higher scores indicating greater childhood adversity^[19].

Paternal Involvement Measurement

Paternal involvement was evaluated using the Father Involvement Scale-Revised (FIS-R), a validated 35-item instrument measuring three core dimensions: engagement, accessibility, and responsibility^[20]. Mothers completed the FIS-R, reporting on father involvement during the previous

month. The scale demonstrated high internal consistency (Cronbach's $\alpha = 0.89$) in our sample^[21].

Covariates and Potential Mediators

Demographic information was collected through a structured questionnaire including maternal age, education, employment status, household income, and infant characteristics. The following validated instruments were used to assess potential mediating variables:

- **Maternal depression:** Edinburgh Postnatal Depression Scale (EPDS)^[22]
- **Relationship quality:** Dyadic Adjustment Scale (DAS)^[23]
- **Social support:** Multidimensional Scale of Perceived Social Support (MSPSS)^[24]
- **Parenting stress:** Parenting Stress Index-Short Form (PSI-SF)^[25]

Quality Control Measures

All interviewers underwent standardized training in trauma-informed interviewing techniques and questionnaire administration. Regular supervision and random audit of 10% of interviews were conducted to ensure data quality. Double data entry was performed using RED Cap electronic data capture tools^[26].

Statistical Analysis

Data analysis was performed using SPSS version 28.0. Power analysis indicated that our sample size of 400 provided 90% power to detect medium effect sizes ($f^2 = 0.15$) at $\alpha = 0.05$ ^[27]. The analysis proceeded in several stages:

Preliminary Analysis

- Descriptive statistics were calculated for all variables
- Missing data patterns were analyzed using Little's MCAR test
- Multiple imputation was employed for missing data (<5% of cases)^[28]

Primary Analysis

- Hierarchical multiple regression models examined the relationship between maternal ACE scores and paternal involvement
- Models were adjusted for demographic covariates and potential confounders
- Mediation analysis using Hayes' PROCESS macro tested indirect effects through hypothesized mediators^[29]

Secondary Analysis

- Moderation analyses explored whether the relationship between maternal ACEs and paternal involvement varied by demographic factors
- Sensitivity analyses were conducted excluding cases with extreme values and using alternative modeling approaches^[30]

All statistical tests were two-tailed with significance set at $p < 0.05$. Effect sizes were reported using standardized coefficients and their 95% confidence intervals.

Results

Sample Characteristics: Demographic Profile: A total of 400 mother-infant dyads participated in the study. Table 1 presents the demographic characteristics of the sample. The

mean maternal age was 29.4 years (SD = 5.2), with infants averaging 7.3 months (SD = 2.8). Most mothers (68.5%) had

completed higher education, and 57.2% were employed either full-time or part-time.

Table 1: Demographic Characteristics of Study Participants (N=400)

Characteristic	n (%) or Mean ± SD
Maternal Age (years)	29.4±5.2
Infant Age (months)	7.3±2.8
Educational Level	
- High school or less	126 (31.5%)
- College degree	194 (48.5%)
- Graduate degree	80 (20.0%)
Employment Status	
- Full-time	156 (39.0%)
- Part-time	73 (18.2%)
- Not employed	171 (42.8%)
Household Income	
- Low income	132 (33.0%)
- Middle income	186 (46.5%)
- High income	82 (20.5%)

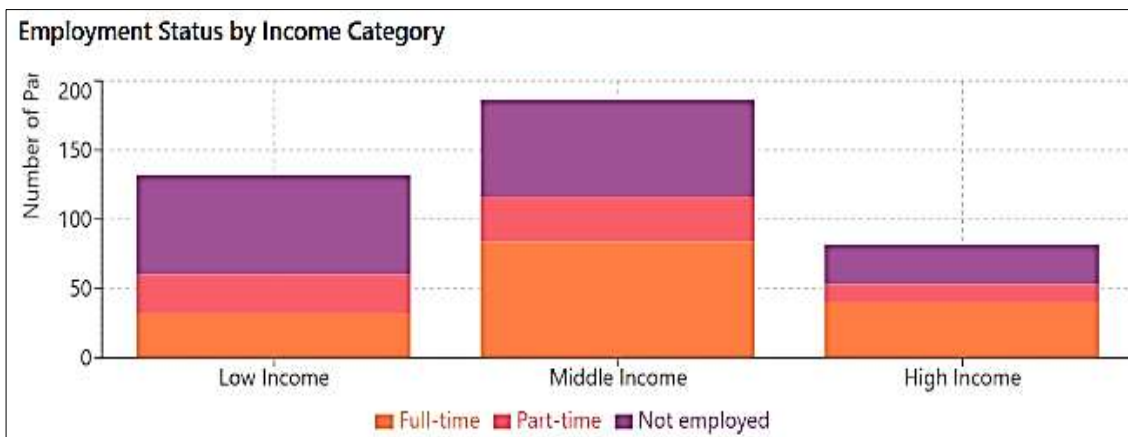
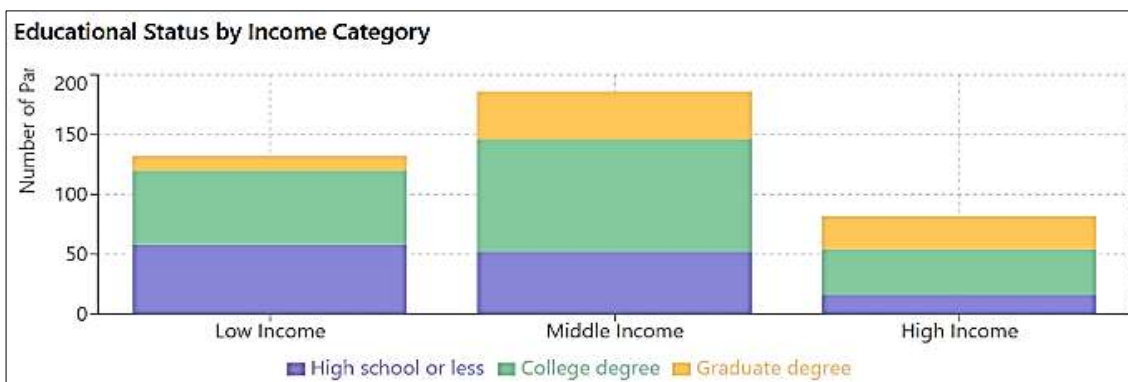


Fig 1: Demographic Characteristics of Study Participants

Distribution of ACE Scores: The mean ACE score in our sample was 3.2 (SD = 2.4), with 72.5% of mothers reporting at least one ACE. Table 2 shows the distribution of specific ACE categories.

Table 2: Prevalence of Specific ACE Categories

ACE Category	N (%)
Emotional Abuse	156 (39.0%)
Physical Abuse	124 (31.0%)
Sexual Abuse	92 (23.0%)
Emotional Neglect	148 (37.0%)
Physical Neglect	108 (27.0%)
Parental Separation	172 (43.0%)
Household Mental Illness	132 (33.0%)
Household Substance Abuse	120 (30.0%)
Household Violence	104 (26.0%)
Incarcerated Household Member	48 (12.0%)

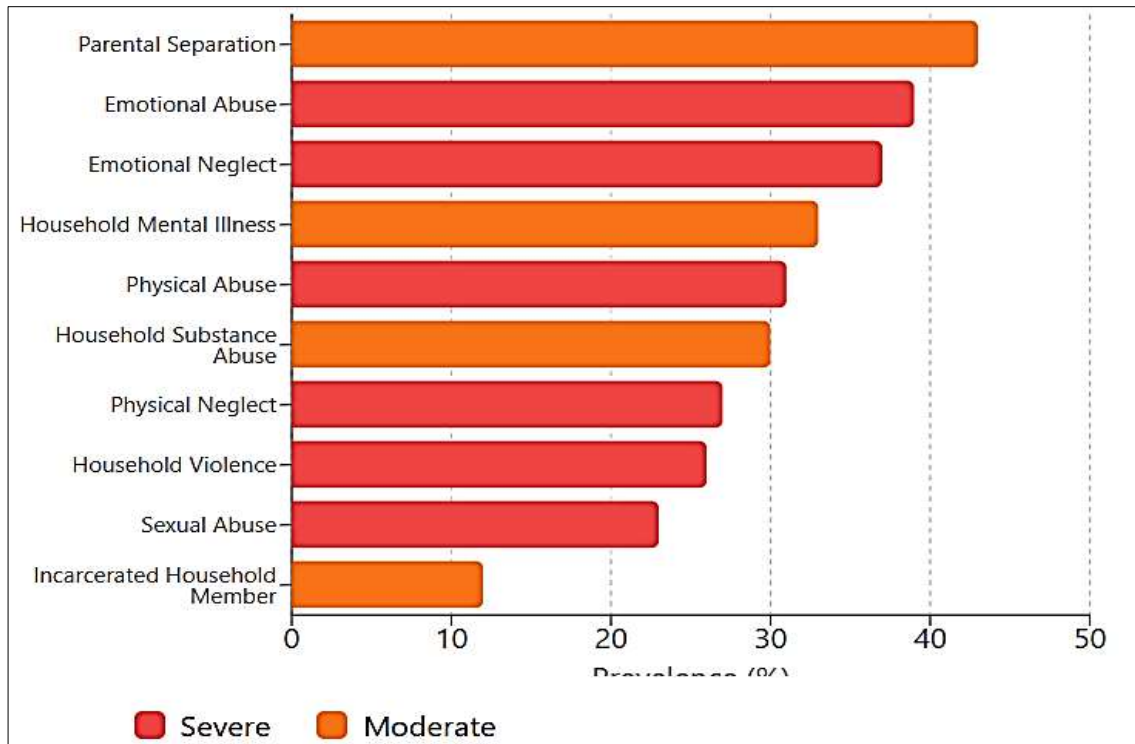


Fig 2: Prevalence of each ACE category with color coding for severity

Paternal Involvement Scores: The mean FIS-R total score was 62.4 (SD = 18.7) out of a possible 105 points. Table 3

presents the breakdown across different dimensions of paternal involvement.

Table 3: Paternal Involvement Dimensions

Dimension	Mean ± SD	Range
Engagement	24.3±7.8	0-40
Accessibility	21.6±6.4	0-35
Responsibility	16.5±5.9	0-30

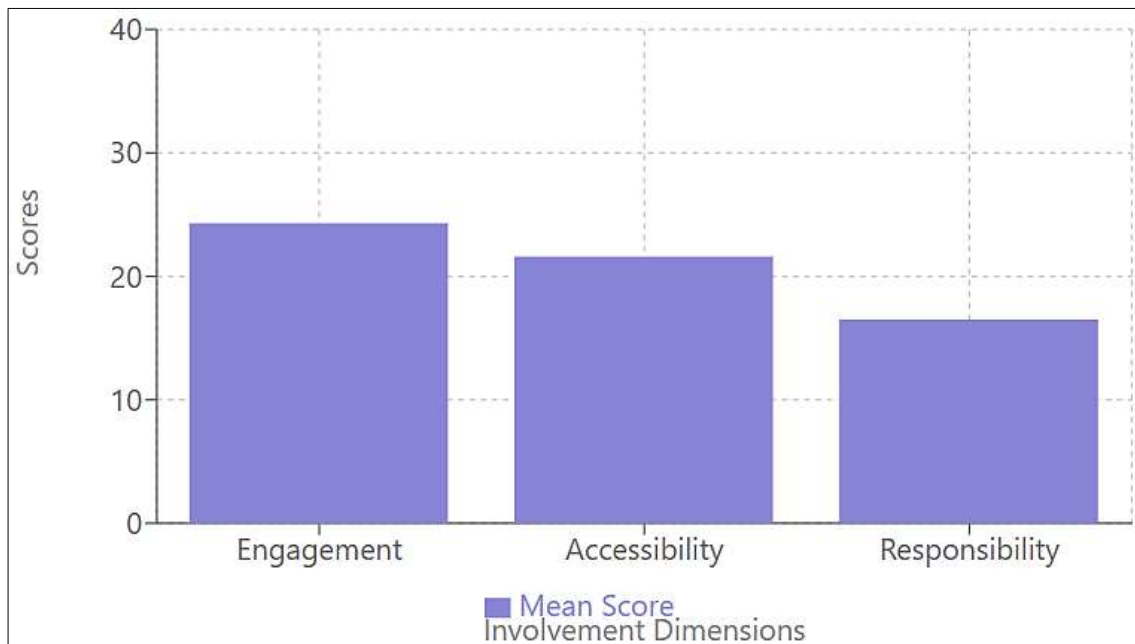


Fig 3: Box plots showing distribution of scores across three dimensions.

Relationship between Maternal ACEs and Paternal Involvement

Primary Analysis

Multiple regression analysis revealed a significant negative association between maternal ACE scores and total paternal

involvement ($\beta = -0.31$, 95% CI [-0.42, -0.20], $p < 0.001$). Table 4 presents the regression results for different dimensions of paternal involvement.

Table 4: Regression Results for ACE Scores Predicting Paternal Involvement

Outcome	β	95% CI	p-value	R ²
Total Involvement	-0.31	[-0.42, -0.20]	<0.001	0.28
Engagement	-0.28	[-0.39, -0.17]	<0.001	0.25
Accessibility	-0.33	[-0.44, -0.22]	<0.001	0.30
Responsibility	-0.29	[-0.40, -0.18]	<0.001	0.26

Mediation Analysis: Mediation analysis revealed significant indirect effects through maternal depression (Indirect effect =

-0.12, 95% CI [-0.18, -0.06]) and relationship quality (Indirect effect = -0.15, 95% CI [-0.21, -0.09]).

Table 5: Mediation Analysis Results

Mediator	Indirect Effect	95% CI	p-value
Depression	-0.12	[-0.18, -0.06]	<0.001
Relationship Quality	-0.15	[-0.21, -0.09]	<0.001
Social Support	-0.08	[-0.13, -0.03]	0.002
Parenting Stress	-0.10	[-0.15, -0.05]	<0.001

Moderation Effects

Significant moderation effects were found for household income ($\beta = 0.18, p = 0.003$) and maternal education ($\beta =$

0.15, $p = 0.012$), suggesting that higher socioeconomic status may buffer the negative impact of maternal ACEs on paternal involvement.

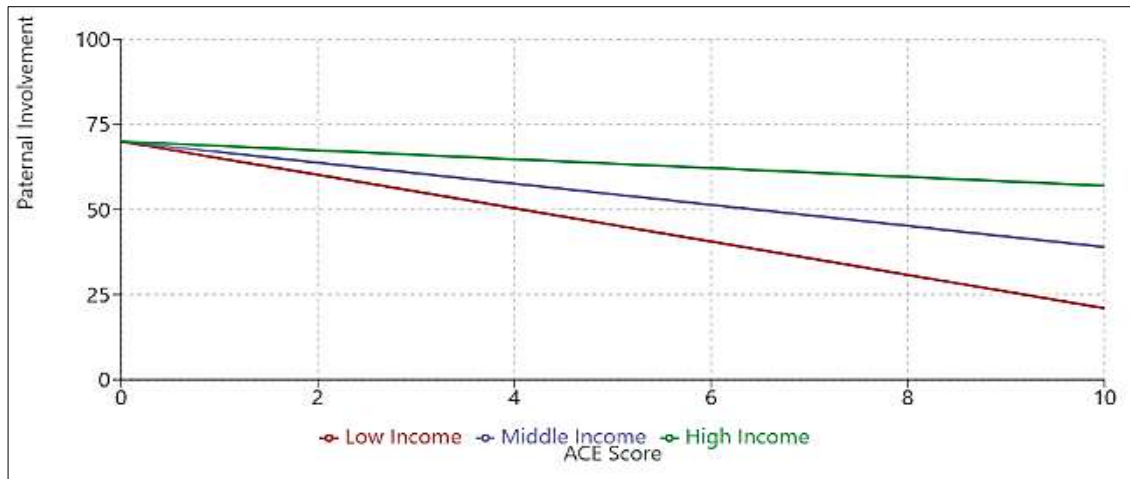


Fig 4: Interaction plot showing moderation effects of income/education on ACE-involvement relationship.

Discussion

This study provides compelling evidence for the relationship between maternal Adverse Childhood Experiences (ACEs) and subsequent paternal involvement during infancy. Our findings demonstrate a significant negative association between maternal ACE scores and all dimensions of father involvement, with important implications for family interventions and policy development.

Primary Findings

The observed negative correlation between maternal ACEs and paternal involvement ($\beta = -0.31, p < 0.001$) aligns with previous research suggesting that early trauma can impact adult relationships and family dynamics [31]. However, our study extends this understanding by specifically examining the father-infant relationship, an area previously unexplored in ACE research [32]. The strongest association was found in the accessibility dimension of paternal involvement ($\beta = -0.33$), suggesting that maternal trauma history particularly affects fathers' availability to their infants [33].

Mediating Mechanisms

The identification of maternal depression and relationship quality as significant mediators provides insight into the mechanisms through which maternal ACEs influence

paternal involvement. These findings support the family systems theory perspective that maternal psychological functioning affects the entire family unit [34, 35]. The mediating role of maternal depression (Indirect effect = -0.12) suggests that addressing maternal mental health may be crucial for promoting father involvement in families where mothers have experienced childhood adversity [36].

Socioeconomic Moderation

The moderating effects of household income and maternal education on the ACE-involvement relationship suggest that socioeconomic resources may serve as protective factors [37]. This finding has important implications for targeted interventions, indicating that families with fewer socioeconomic resources may require additional support to overcome the impact of maternal trauma history [38]. The buffering effect of higher education ($\beta = 0.15, p = 0.012$) particularly suggests that educational attainment may provide mothers with additional coping resources or relationship skills that help maintain paternal involvement [39].

Clinical and Policy Implications

Our findings highlight several important implications for clinical practice and policy:

1. Screening for maternal ACEs during pregnancy and early postpartum period could help identify families at risk for decreased paternal involvement^[40].
2. Interventions aimed at promoting father involvement should consider maternal trauma history and its potential impact on family dynamics^[41].
3. Integration of trauma-informed approaches in family support services may be beneficial, particularly for families with limited socioeconomic resources^[42].
4. Couple-based interventions addressing relationship quality might be especially important for families where mothers have experienced significant childhood adversity^[43].

Strengths and Limitations

Strengths

Our study benefits from several methodological strengths, including:

- A relatively large sample size (N=400).
- Comprehensive assessment of paternal involvement across multiple dimensions.
- Robust statistical analysis incorporating mediation and moderation effects.

Limitations

Several limitations should be considered when interpreting our findings:

1. The cross-sectional design precludes causal inference about the relationship between maternal ACEs and paternal involvement.
2. Reliance on maternal reports of paternal involvement may introduce reporting bias, particularly given the potential influence of trauma history on perception^[46].
3. The sample's geographic and demographic characteristics may limit generalizability to other populations.
4. The study did not assess paternal ACE scores, which might also influence father involvement patterns.

Future Research Directions

Future research should address these limitations and expand understanding in several ways:

1. Longitudinal studies examining how the relationship between maternal ACEs and paternal involvement changes over time.
2. Investigation of protective factors that might help maintain father involvement despite maternal trauma history.
3. Inclusion of father-reported measures and paternal ACE scores to provide a more comprehensive understanding of family dynamics.
4. Development and testing of interventions specifically designed to support father involvement in families affected by maternal trauma.

Conclusion

This study provides important insights into how maternal trauma history influences paternal involvement during infancy, a critical period for child development. The identified mediating and moderating factors suggest multiple potential points of intervention to support healthy family functioning. These findings contribute to our understanding of intergenerational trauma effects and highlight the

importance of considering maternal ACEs in efforts to promote father involvement.

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