

Maternal Adverse Childhood Experience and Infant Health: Biomedical and Psychosocial Risks as Intermediary Mechanisms

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Objective To assess the mechanisms accounting for the transfer of risk from one generation to the next, especially as they relate to maternal adverse childhood experiences and infant physical and emotional health outcomes.

Study design Participants were 501 community mother-infant dyads recruited shortly after the birth and followed up at 18 months. Mothers retrospectively reported on their adverse childhood experiences. The main outcome measures were parent-reported infant physical health and emotional problems. Potential mechanisms of intergenerational transmission included cumulative biomedical risk (eg, prenatal and perinatal complications) and postnatal psychosocial risk (eg, maternal depression, single parenthood, marital conflict).

Results Four or more adverse childhood experiences were related to a 2- and 5-fold increased risk of experiencing any biomedical or psychosocial risk, respectively. There was a linear association between number of adverse childhood experiences and extent of biomedical and psychosocial risk. Path analysis revealed that the association between maternal adverse childhood experiences and infant physical health operated specifically through cumulative biomedical risk, while the relationship between adverse childhood experiences and infant emotional health operated specifically through cumulative psychosocial risk. This pattern was not explained by maternal childhood disadvantage or current neighborhood poverty.

Conclusions Maternal adverse childhood experiences confer vulnerability to prenatal, perinatal, and postnatal psychosocial health. The association between adverse childhood experiences and offspring physical and emotional health operates through discrete intermediary mechanisms. (*J Pediatr* 2017;■■■■■■■■■).

Frequent, prolonged activation of biological stress regulatory systems as a function of adverse childhood experiences is believed to have lifelong consequences for physical and psychological health.¹ Experiences such as child maltreatment and family dysfunction have been associated with adult psychopathology.^{2,3} However, there is little research explicitly examining the effects of maternal adverse childhood experiences on the accumulation of biological risk in the prenatal and perinatal period, as well as psychosocial risks in the immediate postpartum period. Most studies have investigated associations between singular sources of maternal adversity (eg, physical abuse) on negative outcomes, with mixed results.⁴⁻⁸ One explanation for this is that singular adverse events may not reliably predict outcomes as the clustering of risks is common. For instance, 21% of American children <6 years of age have experienced 3 or more sociodemographic risks. These risk clusters have been shown to predict infant outcomes better than individual risks^{5,9} but little is known about the transmission from maternal adversity to negative child outcomes.

In the biomedical domain, adverse childhood experiences have been shown to be associated with an increased risk of perinatal complications, including gestational diabetes, preeclampsia, short gestation, and low birth weight, which increase the risk for infant health problems.¹⁰⁻¹² In the psychosocial domain, an accumulation of adverse childhood experiences has been linked to depression and broad indices of psychosocial risk, including teen pregnancy, socioeconomic and family problems, and marital discord.¹³⁻¹⁶ These problems have, in turn, been linked to poor child adaptation, including emotional and behavioral dysregulation.¹⁶⁻¹⁸ Further, it has been suggested that it is the accumulation of multiple risks, rather than the type or severity of individual risks, that are particularly detrimental for individual health and adaptation.¹⁹

The purpose of this study was to examine relations between adverse childhood experiences, biomedical and psychosocial risk, and children's physical and emotional health in their second year of life. It was expected that mothers' adverse childhood experiences would be associated with children's physical and emotional health via 2 intermediary mechanisms: cumulative biomedical and psychosocial risk.

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Table II. Number of adverse childhood experiences and risk of any biomedical or psychosocial problem

Number of adverse childhood experiences	Percent of total sample	Biomedical risks			Psychosocial risks		
		Percent of sample	OR [95% CI]	OR-adj* [95% CI]	Percent of sample	OR [95% CI]	aOR-adj* [95% CI]
0	47.3 (237)	44.4	1.0 (ref)	1.0 (ref)	39.0	1.0 (ref)	1.0 (ref)
1	21 (105)	17.5	.85 [.51-1.41]	.85 [.51-1.43]	22.5	1.60 [†] [1.01-2.55]	1.70 [†] [1.07-2.78]
2	12.0 (60)	11.9	1.08 [.59-1.98]	1.09 [.59-2.01]	12.6	1.53 [.86-2.70]	1.50 [.81-2.78]
3	6.8 (34)	6.9	1.11 [.51-2.40]	1.17 [.54-2.55]	5.6	1.01 [.48-2.12]	1.34 [.61-2.95]
>4 ^{§,¶}	13.0 (65)	19.4	2.12 [‡] [1.21-3.71]	2.18 [‡] [1.22-3.89]	20.3	4.27 [¶] [2.33-7.80]	4.46 [‡] [2.34-8.50]
Linear trend			F = 5.71 (df = 499), P = .017			F = 18.823 (df = 499), P < .001	

*Adjusted for maternal age and Canadian-born status.

†P < .05.

‡P < .01.

§Number (%) of women with 4 adverse childhood experiences: 31 (6.2), 5 adverse childhood experiences: 13 (2.6%) 6 adverse childhood experiences: 8 (1.6%) 7 adverse childhood experiences: 8 (1.6), 8 adverse childhood experiences: 2 (0.4), and 9 adverse childhood experiences: 3 (0.6).

¶P < .001.

Methods

This study was part of an ongoing longitudinal study (Kids, Families, Places study) that aimed to investigate genetic and environmental influences on children's developmental health. Multiparous women were eligible if they gave birth in the cities of Toronto and Hamilton from 2006 to 2008 and had been contacted by the Healthy Babies Healthy Children public health program (run by Toronto and Hamilton, Ontario, Public Health Units). Inclusion criteria were (1) English-speaking mother; (2) a newborn weighing at least 1500 g; (3) 1 or more children less than 4 years old in the home; and (4) agreement to the collection of observational and biological data. When the children were 2 and 18 months of age, mothers in each family participated in a 2-hour home interview conducted by trained interviewers. The University of Toronto Research Ethics Board approved all procedures, including informed consent.

When infants were 2 months old, mothers were asked to answer a series of questions pertaining to family dysfunction and victimization before the age of 16 years (Table I; available at www.jpeds.com). Sexual and physical victimization was assessed using an adapted version of a self-report measure of childhood exposure to violence for adults (Childhood Experience of Violence Questionnaire),²⁰ which shows good reliability and validity.²¹ Scores ranging from 0 to 10 were summed, and the distribution of scores is shown in Table II. As in other studies on childhood adversity,² few individuals existed in the upper tail of the distribution; thus, scores of ≥ 4 were combined to reflect "4 or more" adverse childhood experiences.

An objective proxy for low current socioeconomic status was created by extracting census data on the current socioeconomic state of all families. Current neighborhood-level disadvantage was assessed as the proportion of families in the neighborhood with low income (below the poverty line) before tax. This variable was normally distributed and standardized, with a higher score indicating more disadvantage.

At infant age 2 months, mothers reported on prenatal and perinatal risk factors (Table III). A single item was used to assess the presence/absence (0 = absent; 1 = present) of each risk factor. A count of these biomedical risks was computed. The presence of 1 or more biomedical risks was reported by 32.0% of

Table III. Characteristics of study sample

Characteristics	n	Mean or %
Maternal age, y (mean, SD)	501	32.7 (4.9)
Educational attainment (mean, SD)	500	15.3 (2.7)
Marital status (%)		
Married or cohabitating	469	93.6
Single (never been married)	22	4.4
Divorced/separated/widowed	10	2.0
Ethnicity (%)		
White	283	56.5
Black	46	9.2
East Asian	60	12.0
South Asian	73	14.6
Other	39	7.7
Type of adverse childhood experience (%)		
Mother mental illness	91	18.8
Father mental illness	68	14.0
Mother drug/alcohol problem	20	4.0
Father drug/alcohol problem	59	11.8
Parent went to jail	15	3.0
Nonintact family	108	21.6
Experience sexual abuse	49	10.0
Experience physical abuse	96	19.6
Witness inter-parental verbal abuse	105	21.0
Witness inter-parental physical abuse	52	10.4
At least 1 adverse childhood experience	264	52.3
Biomedical risk (%)		
Diabetes during pregnancy	30	6.0
Hypertension during pregnancy	23	4.6
Thyroid problems during pregnancy	16	3.2
Loss of fetal movement during pregnancy	58	11.6
Injury to abdomen during pregnancy	7	1.4
Infant need for intensive care after birth	23	4.6
Infant need for oxygen/ventilation	20	4.0
Infant transfer to a specialized hospital	2	.40
Low birth weight (<2500 g)	18	3.6
Short gestation (<37 wk)	20	4.0
At least 1 risk	160	32.0
Psychosocial risk		
Single parent	32	6.4
Teenage mother	31	6.3
Low family income (<\$20 000)	45	9.5
Low maternal education (\leq high school)	90	18.0
Maternal depression (clinical level ≥ 16)	83	16.8
Marital conflict (+1 SD above mean)	96	21.8
At least 1 risk	231	46.1
Child variables (18 mo, n = 397)		
Age in y (mean, SD)	397	1.60 (.16)
Female sex (%)	247	49.3
Physical health problems (scale 1-5)(mean SD)	381	1.56 (.82)
Emotional problems* (mean, SD)	388	-.15 (.67)

*This is a standardized composite score, hence, the negative mean.

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