

California's Most Vulnerable Parents

Infant Birth Weight and Maltreatment of Adolescent Mothers

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This study builds upon prior research by exploring maternal maltreatment history as an independent predictor of low birth weight among infants born to teenage mothers. Specifically, it is the first to use population-based birth data linked to official child protection records to examine the effect of maternal maltreatment history on infant birth weight. Findings suggest that adolescents substantiated as victims of abuse or neglect were more likely to give birth to an infant of low birth weight than were sociodemographically similar adolescents who had not been maltreated. Although the increased risk was small and the mechanism unclear, these data suggest that maternal maltreatment may not only have consequences for the victim but may also contribute to intergenerational health disparities.

INTRODUCTION

In 2010, 1 of every 30 infants in the United States was born to a teenage mother.¹ Pregnancy during adolescence is associated with many later adversities for both mother and child,²⁻⁵ including low birth weight.⁶⁻⁸ Although the mechanisms remain unclear, low birth weight among infants born to teenage mothers may be attributable to adolescent health behaviors,⁹⁻¹⁰ access to health

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information and care,² or unmeasured maternal selection effects.¹¹ For example, among women of all ages, smoking is predictive of low birth weight^{12,13} and preterm delivery.¹⁴ Timing and duration of prenatal care is also associated with birth outcomes. Lack of prenatal care is associated with increases in preterm births (2.8 times higher for Black and White women),^{15,16} as is delayed receipt of prenatal care.¹⁷ Almost 25% of teen mothers do not receive prenatal care until their third trimester.²

Exposure to stress and adversity may have health consequences for pregnant women and their unborn children. Pregnant teens with a history of maltreatment may have a particularly acute vulnerability to poor birth outcomes. The traumatic stress associated with maltreatment not only increases the likelihood of substance use and engagement in other risk behaviors associated with infant birth weight,¹⁸⁻²⁰ but may also instigate physiological changes that affect the course and outcome of pregnancy.¹⁰ Although a history of maltreatment may amplify pregnancy risk, few studies have attempted to quantify this possible relationship.^{10,21} Studies that have examined maternal maltreatment and infant birth outcomes have relied on self-reported maltreatment history, used small community samples, and did not focus specifically on preadolescent/adolescent maltreatment among teen mothers. This study builds upon prior research by exploring maternal maltreatment history as an independent predictor of low birth weight among infants born to teenage mothers. Specifically, it is the first to use population-based birth data linked to official child protection records to examine the effect of maternal maltreatment history on infant birth weight.

METHODS

DATA SOURCES

This study used vital birth records matched to administrative child protective services (CPS) records for the state of California. Maternal information for all singleton infants born between 2007 and 2009 to mothers aged 12–19 years was extracted from state vital statistics birth records. These records were linked to CPS data to identify teenage mothers whose maltreatment cases had been substantiated following a CPS investigation (California Welfare & Institutions Code § 300). Linkages were established using probabilistic linkage software in which record pairs were deemed a match or nonmatch based on a formal statistical model.^{22,23} Match cut-points were determined through an extensive examination of linked records and a subsequent clerical review of a specified range of uncertain matches falling above and below match thresholds.^{24,25}

VARIABLES

For this analysis, teenage mothers were classified as maltreated if there was a CPS-substantiated report of maltreatment after age 10 and prior to giving birth. Maltreatment during preadolescence/adolescence was examined for both substantive and methodological reasons. Specifically, prior research indicates that timing of abuse may influence the effect of maltreatment on high-risk behavior, including sexual behavior and early childbearing, and that this effect is stronger when maltreatment occurs during adolescence compared to early childhood.²⁶⁻²⁹ Additionally, given California's transition to a new child protection data collection system in 1998, complete CPS records were only available for teen mothers back to the age of 10.

Low birth weight was based on a gestational weight threshold of 2,500 grams. To isolate the potential effect of maternal maltreatment, eight confounders were included: (1) maternal age (12–16 years, 17–19 years); (2) birth order (first birth, subsequent birth); (3) maternal race/ethnicity (White, Black, Latina, Asian/Pacific Islander, Native American); (4) cigarette smoking during pregnancy (yes, no); (5) prenatal care initiation (first trimester, second trimester, third trimester/no care); (6) birth payment method (private insurance, public insurance); (7) Women, Infant, Children (WIC) utilization (yes, no); and (8) infant gender (female, male).

ANALYSIS

Descriptive statistics were computed and X² tests used to compare the distribution of maternal maltreatment and other sociodemographic characteristics stratified by infant birth weight (< 2,500 g vs. ≥ 2,500 g). To examine the effect of maternal maltreatment on infant birth weight, a log Poisson regression model with a robust variance estimation was specified.³⁰⁻³¹ All analyses were conducted using StataSE software.³² Adjusted risk ratios (RRs) and corresponding 95% confidence intervals (CI) are reported.

RESULTS

Of the 153,743 singleton births to teenage mothers in California between January 1, 2007, and December 31, 2009, 7.1% (n = 10,866) were low birth weight (compared to 5.1% [p < .001] born to mothers older than 19). Among teenage mothers, 13.6% had been substantiated as a victim of maltreatment after age 10 and before giving birth. The proportion of low birth weight infants born to teenage mothers with a history of substantiated maltreatment was slightly higher than infants born to teens with no such history (14.7% vs. 13.5%, respectively, p < .001). Notable and statistically significant differences also emerged among other covariates. Younger maternal

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age and first birth were associated with an increased risk of low birth weight. Black and Asian/Pacific Islanders comprised a larger share of low birth weight infants than in the overall population of births to adolescent mothers. Infants born to mothers who smoked cigarettes during pregnancy were overrepresented among low birth weight infants; those born to teenage mothers receiving WIC benefits were underrepresented. Child gender and birth payment method were not associated with birth weight; subtle differences were observed by prenatal care.

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RESULTS (continued)

Maternal maltreatment history was associated with a 10% increased risk of low birth weight (RR: 1.10; 95% CI: 1.04, 1.16). Maternal smoking, prenatal care, and other confounders modestly attenuated the association between maternal victimization and infant birth weight; yet after adjusting for these other factors, the risk of

low birth weight was 6% greater among infants born to adolescent mothers with a maltreatment history (RR: 1.06; 95% CI: 1.01, 1.12). Bivariate associations observed for other covariates remained in the multivariable model, with the largest relative differences in birth weight associated with race/ethnicity, cigarette smoking, and receipt of WIC benefits.

TABLE 1

Demographic Characteristics and Adjusted Relative Risk of Low Birth Weight among Infants born to Adolescent Mothers in California, 2007–2009

	Normal Birth Weight (≥ 2500g)		Low Birth Weight (< 2500g)		X ² Test	Adjusted Risk of Low Birth Weight	
	N=142,720		N=10,161			N=139,179	
	n	%	n	%		Adj. RR	95% CI
Maternal Maltreatment History							
Non-victim	123,485	86.4%	8,664	85.3%	p < .001	Ref.	---
Victim of abuse/neglect	19,235	13.5%	1,497	14.7%		1.06*	(1.01, 1.13)
Maternal Age at Birth							
12–16 years	22,345	15.7%	1,749	17.2%	p < .001	1.09**	(1.04, 1.15)
17–19 years	120,375	84.3%	8,412	82.8%		Ref.	---
Birth							
First birth	117,729	82.6%	8,612	84.9%	p < .001	1.17***	(1.11, 1.24)
Subsequent birth	24,887	17.5%	1,534	15.1%		Ref.	---
Race/Ethnicity							
White	19,706	14.0%	1,272	12.8%	p < .001	Ref.	---
Black	11,750	8.4%	1,358	13.7%		1.84***	(1.70, 2.00)
Latino	104,482	74.5%	6,861	68.8%		1.13***	(1.06, 1.20)
Asian/Pacific Islander	3,474	2.5%	415	4.2%		1.87***	(1.67, 2.09)
Native American	899	0.6%	63	0.6%		1.12	(0.86, 1.45)
Smoked During Pregnancy							
Yes	4,043	2.9%	373	3.8%	p < .001	1.30***	(1.17, 1.45)
No	134,782	97.1%	9,454	96.2%		Ref.	---
Initiation of Prenatal Care							
First trimester	95,297	68.5%	6,660	68.3%	p < .001	Ref.	---
Second trimester	17,316	12.5%	1,136	11.7%		0.93*	(0.87, 0.99)
Third trimester / No Care	26,515	19.1%	1,951	20.0%		0.99	(0.94, 1.04)
Birth Payment Method							
Public	115,983	82.2%	8,261	82.1%	p = .825	1.09**	(1.03, 1.15)
Private	25,090	17.8%	1,788	17.9%		Ref.	---
Received WIC							
Yes	117,690	84.5%	7,809	79.4%	p < .001	Ref.	---
No	21,540	15.5%	2,021	20.6%		1.39***	(1.32, 1.46)
Child sex							
Female	69,446	48.7%	5,030	49.5%	p = .100	Ref.	---
Male	73,274	51.3%	5,131	50.5%		0.98	(0.94, 1.02)

Notes: Summed counts may not equal column totals due to missing values for some variables.

*p < .05; **p < .01; ***p < .001

CI = confidence interval; Adj. RR = adjusted risk ratio; Ref = reference group

The proportion of cases with missing values for a given variable ranged from 0% (child sex) to 3.2% (prenatal care).

DISCUSSION

SUMMARY

This was the first population-based study to validate the relationship between officially substantiated maternal maltreatment and low birth weight among infants born to teenage mothers. Previous research has demonstrated that child maltreatment is associated with negative outcomes during both childhood³³⁻³⁵ and adulthood.³⁵⁻³⁹ The results of this study suggest that the consequences of maltreatment may also be intergenerational. Although the magnitude of the effect was small relative to other established risk factors, maternal maltreatment history emerged as a significant and independent hazard for an already high-risk population of infants born to teenage mothers.

Previous research has demonstrated that child maltreatment is associated with negative outcomes during both childhood and adulthood.

LIMITATIONS

There are several limitations that must be noted. First, complete data for maltreatment after age 10 was available for examination; the number of mothers who experienced earlier maltreatment and how maltreatment prior to age 10 may have affected infant birth weight is unknown. Second, these data do not address the potential mechanisms by which maternal maltreatment affects birth weight. Third, other risk factors, such as prenatal drug or alcohol exposure, which may affect birth weight, were unavailable in the data. Last, the data included only a crude measure of maternal socioeconomic status (i.e.,

birth payment method) and therefore do not capture community-level poverty information. As such, it is unknown whether other measures of poverty would have moderated the observed relationship between maltreatment and birth weight.

These findings suggest maltreatment not only affects the health and emotional well-being of individual victims but also contributes to intergenerational health disparities.

CONCLUSIONS

The finding of a relationship between maltreatment history and infant birth weight aligns with research that similarly suggests that abuse and other adversities negatively affect health and well-being throughout the life course.³⁶⁻⁴⁰ The association between a history of maltreatment victimization and infant birth weight may reflect physiological changes or chronic maternal stress responses. Regardless of the mechanism and despite the modest effect relative to other risk factors, these findings are provocative in that they suggest maltreatment not only affects the health and emotional well-being of individual victims but also contributes to intergenerational health disparities. Future research is needed to explicate the relationship by which maltreatment affects maternal and child health, framing maltreatment as an adverse exposure that may influence the uterine environment.

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