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Maternal exposure to childhood maltreatment and risk of stillbirth

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Abstract

Purpose—To determine the association between maternal exposure to childhood maltreatment (CM) and risk of stillbirth (≥ 20 weeks' gestation).

Methods—Population-based case-control study from the Stillbirth Collaborative Research Network (SCRN) conducted in 2006–2008, and the follow-up study, SCRN-Outcomes after Study Index Stillbirth (SCRN-OASIS), conducted in 2009 in the United States. Cases (n = 133) included women who experienced a stillbirth, excluding stillbirths attributed to genetic/structural or umbilical cord abnormalities and intrapartum stillbirths. Controls (n = 500) included women delivering a healthy term live birth (excluding births <37 weeks gestation, neonatal intensive care unit admission, or death). CM exposure was measured using the Childhood Trauma Questionnaire, administered during the SCRN-OASIS study. Dichotomized scores for five subscales of CM

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(physical abuse, physical neglect, emotional abuse, emotional neglect, and sexual abuse) and an overall measure of CM exposure were analyzed using logistic regression.

Results—Generally, there was no association between CM and stillbirth, except for the emotional neglect subscale (OR: 1.93; 95% CI: 1.17, 3.19).

Conclusions—Childhood neglect is understudied in comparison to abuse and should be included in future studies of associations between CM and pregnancy outcomes, including stillbirth.

Keywords

African Americans; adult survivors of childhood trauma; child abuse and neglect; child maltreatment; stillbirth; stress; trauma

Introduction

Approximately 1 in 160 pregnancies ends in stillbirth in the United States, defined as a fetal death at or after 20 weeks' gestation.[1] The rate of stillbirth has plateaued in recent years, particularly for early stillbirths.[1] While some clinical risk factors for stillbirth have been identified, including some pregnancy disorders, obesity, and maternal age, relatively little research has focused on psychosocial determinants of stillbirth, particularly those which encompass early life adversity.[2] Childhood maltreatment (CM), defined as sexual, physical, or emotional abuse and/or neglect in childhood, is a prevalent stressor that has been associated with several health outcomes, such as hypertension, chronic pain, ischemic heart disease, and autoimmune diseases later in life.[3–6] A growing number of studies have found that childhood sexual abuse, a component of CM, is associated with increased risk of adverse pregnancy outcomes, including preterm labor and preterm birth.[7–12] However, few investigators have examined the relationship between CM and stillbirth.

CM may increase the risk for stillbirth via stress-related pathways in a manner similar to significant life events, which have been associated with stillbirth.[13–16] For example, stress is linked to preeclampsia and placental abnormalities, which are risk factors for stillbirth.[17, 18] Also, stress-related risky behaviors such as unhealthy coping devices, including overeating, smoking, and alcohol abuse, are associated with CM.[19, 20] These coping devices increase the risk of adverse health outcomes, such as obesity, depression, and hypertension, which have been associated with adverse pregnancy outcomes, including stillbirth.[19, 21–23] Additionally, CM is associated with common reproductive tract infections such as bacterial vaginosis and unsafe sexual practices that increase the risk of sexually transmitted infections, such as chlamydia, gonorrhea, and syphilis, which have also been associated with stillbirth.[24–31]

As previously reported, non-Hispanic black women may have a higher prevalence of CM and they experience a disproportionate burden of stillbirth, with a rate two times that of non-Hispanic white women.[1, 14, 32] If CM increases the risk of adverse pregnancy outcomes, the potentially higher prevalence of CM among non-Hispanic black women may explain some of the disproportionate burden of stillbirth among these women. Similarly, among Hispanic women, acculturation is associated with both CM and adverse pregnancy outcomes and the relationship between CM and stillbirth may differ depending on level of acculturation.[33–36]

A better understanding of life course stressors that may drive racial and ethnic disparities has been identified as a priority research area for perinatal outcomes, including stillbirth.[37]

This study tests the hypothesis that history of exposure to CM is associated with stillbirth. In addition, we assess whether different types of CM (physical abuse, sexual abuse, emotional abuse, physical neglect, and emotional neglect) have different associations with stillbirth, and if this varies with respect to race/ethnicity and acculturation.

Materials and Methods

The Stillbirth Collaborative Research Network's (SCRN) population-based case-control study and the SCRN-Outcomes after Study Index Stillbirth (SCRN-OASIS) study were conducted from 2006 – 2009. SCRN enrollment occurred between March 2006 and September 2008 from 59 hospitals representing five catchment areas of the United States: Rhode Island and counties in Massachusetts, Georgia, Texas, and Utah. Investigators chose hospitals to obtain a sample of at least 90% of all deliveries to residents in each area. The final cohort included 663 women with a stillbirth (cases) and 1,932 women with a live birth (controls) selected through a stratified random method.[38] The study was approved by the Institutional Review Board at each study site. In 2009, women who had consented to future contact in SCRN and could be reached for follow-up underwent an extensive telephone interview in English or in Spanish between six months and three years after the index delivery.[16] CM was assessed during this SCRN-OASIS interview using the Childhood Trauma Questionnaire (CTQ), a 28-item self-report that yields scores for five subscales: physical abuse, sexual abuse, emotional abuse, physical neglect, and emotional neglect, and a 3-item minimization/denial score.[39, 40] The CTQ has been translated to Spanish, used in diverse populations, and administered over the telephone.[41–44]

For this analysis, we excluded multiple gestations, stillbirths attributed to genetic/structural or umbilical cord abnormalities, and intrapartum stillbirths because they are unlikely to cause CM-related stillbirth via a stress-related pathway and intrapartum stillbirths may instead reflect quality and timing of care.[45] Controls excluded infants with a gestational age <37 weeks, those admitted to a neonatal intensive care unit, and those who died since they represent adverse outcomes that may be affected by CM.[46] We also excluded individuals with a missing CTQ. Individuals missing ≥2 responses on a subscale were excluded from analysis of that scale. We imputed missing values for individuals missing one question on a subscale by using the average of the subscale. Our final sample included 133 stillbirths and 500 healthy term live births (Figure 1).

The SCRN study design requires a weighted analysis to account for differential consent, determined from characteristics documented for all eligible, screened deliveries, and sampling methods.[38] Due to substantial loss to follow-up in the SCRN-OASIS study (53% in cases, 58% in controls), the SCRN weights could not be directly applied to this population (Figure 1). To adjust for loss to follow-up and to apply the SCRN study weights, we calculated a stabilized inverse probability weight to relate the SCRN-OASIS study population to the SCRN population. For this weight, we used factors related to participation in SCRN-OASIS (case/control status, maternal race/ethnicity, maternal education, maternal

smoking status, insurance, and study site). We multiplied the stabilized inverse probability weight by the original study weight. This product was then multiplied by a separate constant for cases and controls so that the sum of the weights in each group was the same as in the original SCRN study.

Based on scoring guidelines, CM subscale scores CM were categorized as none to minimal, low to moderate, moderate to severe, and severe to extreme.[39] Because CM is a sensitive topic and some research suggests that participants may be less comfortable disclosing such topics via a telephone interview, we chose the most sensitive cut point to dichotomize the exposure variable, comparing the "none to minimal" category to a combined category reflecting "low to extreme" exposure.[47, 48] We also calculated a summary variable of overall CM exposure (any vs. none) using these dichotomous values.

We evaluated differences in covariates, including hypothesized mediators, and types of CM, between stillbirths and live births using Rao-Scott chi-square tests (Figure S1). In order to evaluate differential social determinants of stress experienced by non-Hispanic white women, non-Hispanic black women, and Hispanic women, we evaluated the distribution of CM stratified by race/ethnicity. Within the Hispanic group, we further stratified by language of the follow-up interview as a proxy for acculturation.

We used logistic regression models to assess the associations between types of CM and stillbirth in the total and stratified populations. We evaluated maternal education, as a proxy for childhood socioeconomic status, and maternal age as potential confounders based on the proposed relationships between variables (Figure S1). We did not evaluate variables such as smoking and obesity as confounders because we hypothesized that these variables were on the causal pathway. We conducted confounding assessment using the backwards change in estimate approach. We also evaluated time between index delivery and follow-up interview as a covariate due to the wide range in follow-up times (six months to three years).

Given the potential for exposure misclassification, we conducted a probabilistic bias analysis on the weighted summary data. Bias parameters were informed by the minimization/denial scale. This scale consists of three statements that are used to identify individuals with a tendency to give socially desirable responses or individuals who may be underreporting CM.[39, 49] Due to uncertainty in estimating bias parameters, trapezoidal distributions were used.[50] Based on the distribution of scores, the sensitivity among stillbirths and live births was assumed to fall between 0.60 and 1.00 (Table S1). The upper and lower modes specified in the trapezoidal distribution were altered for stillbirth and live births to reflect potential differential reporting. Since false positives are not perceived to be an issue in this study, the specificity ranged between 0.95 and 1.00. As the minimization/denial scale indicates general underreporting and is not specific to each type of CM, we used the same bias parameters for each type. Sensitivities and specificities were correlated since the proportion of underreporting was not substantially different between stillbirths and live births.

All statistical tests used a p-value of <0.05 to determine statistical significance. Analyses were performed using SAS, version 9.4 (SAS Institute INC., Cary, North Carolina) and

SUDAAN version 11.0 (Research Triangle Institute, Research Triangle Park, North Carolina).[51]

Results

The results reported in this analysis reflect unadjusted models because there was no meaningful difference between unadjusted models and those adjusted for covariates using the backwards change in estimate approach (results not shown). Women with healthy term live births were more likely than women with stillbirths to be non-Hispanic white, have at least some college education, be married, have a BMI within the normal range, have insurance, and not have an intervening pregnancy (Table 1). There was no difference in the distribution of maternal age, depression score at the time of the follow-up interview, smoking, alcohol or drug use, and any of the significant life events between women with stillbirths and those with healthy term live births.

Women with stillbirths were not more likely than women with healthy term live births to report having experienced any CM (Table 2). However, women with stillbirths were more likely to report emotional neglect (p-value=0.02). When stratified by maternal race/ethnicity, Hispanic women had the highest proportion reporting emotional and physical neglect, especially among those who experienced a stillbirth and completed the follow-up interview in Spanish (emotional neglect: 78.5%; physical neglect: 84.7%; Table 3). Among healthy term live births, non-Hispanic white women had the highest proportion reporting none or minimal abuse or neglect for every subscale in comparison to non-Hispanic black women and Hispanic women. Consequently, non-Hispanic white women with a healthy term live birth had a lower proportion of women who reported experiencing at least one type of CM than non-Hispanic black women and Hispanic women. For example, 42.4% of non-Hispanic black women, 31.1% of Hispanic women, and 15.0% of non-Hispanic white women reported childhood exposure to sexual abuse.

The odds ratio (OR) for any CM experienced among the total population was 1.11 (95% confidence interval [95% CI]: 0.70, 1.74) (Table 4). The OR for emotional neglect among the total population was 1.93 (95% CI: 1.17, 3.19); stratified results were consistent in the direction of the association. However, the only significant stratified result was for Hispanic women interviewed in Spanish. The ORs for emotional abuse, physical abuse, physical neglect, and sexual abuse were not statistically significant in either the total or stratified populations. Additionally, tests of interaction between maternal race/ethnicity and each of the types of CM were not statistically significant. These findings were consistent in a sensitivity analysis that included preterm births in the control group (results not shown).

The minimization/denial score indicated that 46.3% of women with stillbirths and 51.2% of women with healthy term live births might be underreporting their exposure to CM (Table 2). Assuming the bias model and parameters used are correct, the ORs and simulation intervals presented in Table S2 reflect estimates adjusted for this potential underreporting through probabilistic bias analysis. The ORs from this analysis were not meaningfully different from those obtained in the total or stratified populations (Table S2). Many of the

simulation intervals did not include the null, likely due to the shift in the distribution of exposure that occurs when correcting for underreporting.

Discussion

Overall, there was no association between CM and stillbirth, except for the emotional neglect subscale. Although not statistically significant, there is a suggestion that the magnitude and direction of the association may differ with respect to type of abuse or neglect, race/ethnicity, and level of acculturation. Neglect subscales were the only subscales where the ORs were consistently above 1.0 across all race/ethnicity groups. Notably, the ORs for non-Hispanic white women were consistently greater than 1.0 for all types of abuse and neglect evaluated, but this was not the case for either non-Hispanic black women or Hispanic women.

Only one other study has evaluated a similar association of CM and fetal loss. Hillis et al. (2004) analyzed data from a retrospective cohort study of adult women and reported that the risk of fetal death for first and second pregnancies increased as the number of adverse childhood experiences increased.[32] Women in the Hillis et al. study were predominantly non-Hispanic white (77%) and college educated (72%), which may help explain the conflicting results. Further, Hillis et al. (2004) used a version of the Adverse Childhood Experiences scale, which measures a somewhat different construct of CM than that measured by the CTQ, with eight categories: three related directly to the child (verbal abuse, physical abuse, and sexual abuse) and five related to the environment in which the child grew up (intimate partner violence, household substance abuse, mental illness in household, incarcerated household member, and parental separation or divorce). The CTQ does not capture situations that may lead to a stressful environment for the child, such as separation or divorce. However, the CTQ captures both emotional and physical neglect, which are omitted from the Hillis et al. study and from many studies examining the effects of adverse childhood experiences.[52]

Despite lack of statistical significance, the variation in observed associations between women of different racial/ethnic groups and levels of acculturation merit discussion. Cultural differences may play an important role in this variation. Non-Hispanic black individuals are more likely than members of other groups to be punished physically, and studies suggest that their experience of physical punishment has a different psychological impact than it does in other populations.[53–55] In the CTQ, psychological impact is not assessed, so that physical punishment may over-estimate physical abuse in a non-Hispanic black population.[56]

Another concern is that baseline exposure to non-measured stressors, including chronic exposure to racism and discrimination, may affect the impact of early life stressors on reproductive health.[57] The high prevalence of these exposures in non-Hispanic black women may make it difficult to discern the effect of abuse in a chronically stressed population, thereby resulting in smaller effect sizes.[57] A study evaluating abuse in childhood and adulthood in relation to preterm delivery also reported stronger relationships in white/other women (OR: 1.6; 95% CI: 1.1, 2.5) as compared to African-American women (OR: 0.8; 95% CI: 0.4, 1.5).[58]

The influence of additional stressors may also be relevant to the differences in ORs for Hispanic women who were interviewed in English versus Spanish. English-interviewed women had ORs similar to those of non-Hispanic black women, while the ORs for women who were interviewed in Spanish were more similar, and in some cases much larger in magnitude, than those for non-Hispanic white women. This was particularly true for the neglect subscales. It is plausible that English-interviewed Hispanic women, who have lived as minorities in the United States for several years or their entire lives, have experienced more instances of discrimination than Spanish-interviewed women, all of whom spent some of their lives not as minorities in the United States.[59] However, these results should be interpreted with caution due to the small sample sizes for the stratified populations.

Strengths of this study include the relatively large sample size and sampling methods used to ensure a diverse population. Nonetheless, the sample size may have been too small to identify subtle differences, especially in stratified analyses. Another strength is that CM was evaluated using a validated questionnaire (CTQ) administered by trained interviewers using a standard protocol. Additionally, stillbirth cases with causes unlikely to be related to stress were excluded from the analysis. Analytic strengths also include adjustment for selection bias, loss to follow-up, and exposure misclassification.

An important limitation of our study is the substantial loss to follow-up (>50% in cases and controls) that occurred in the SCRN-OASIS study. We accounted for this using stabilized inverse probability weights based on characteristics deemed related to participation in the follow-up study. However, we were limited to characteristics evaluated in the SCRN study and it is possible that unmeasured factors influenced participation, which would limit our ability to control for bias introduced due to loss to follow-up.

Another limitation is possible underreporting of the exposure. Underreporting is more common than over-reporting, so our results may underestimate the true prevalence.[60] Additionally, the CTQ is designed to be self-administered, and employing a telephone interview may have contributed to underreporting due to the respondent's perceived lack of privacy and/or confidentiality. For this reason, we used the most sensitive cut point to dichotomize the exposures. We also conducted a probabilistic bias analysis to quantify the potential impact of underreporting and the results were consistent with our main findings. However, types of CM may have different rates of underreporting, which we were unable to account for in our bias analysis.

Recall bias is also a concern in this analysis. Since the CTQ was completed after the index delivery, responses could be affected by the outcome of the delivery. However, based on the minimization/denial scores, underreporting seems to have been similar irrespective of pregnancy outcome (Table 2). Additionally, a study evaluating test-retest reliability of the CTQ in pregnant women (before and after delivery) found at least moderate agreement for every subscale except physical neglect.[61] This suggests that compared to other trauma types, physical neglect may be more prone to selective recall. Further, a study comparing prospective and retrospective measures of CM found that retrospective measures may underestimate the association of CM with objective adult health outcomes.[62]

Conclusions

Health professionals are increasingly recognizing the importance of a psychosocial life course perspective in studying and ultimately preventing adverse perinatal outcomes, although seldom with respect to stillbirth.[63, 64] The results of this study, especially for neglect, should be replicated in future studies of CM. Where study design allows, prospective assessments of CM would also help eliminate possible recall bias. Longitudinal studies would also offer the opportunity to assess the development of risky health behaviors, which may serve as mediators of the relationship between CM and stillbirth.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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LIST OF ABBREVIATONS AND ACRONYMS

CI	Confidence interval
CM	Childhood maltreatment
CTQ	Childhood Trauma Questionnaire
OR	Odds ratio
SCRN	Stillbirth Collaborative Research Network
SCRN-OASIS	Stillbirth Collaborative Research Network, Outcomes after Study Index Stillbirth

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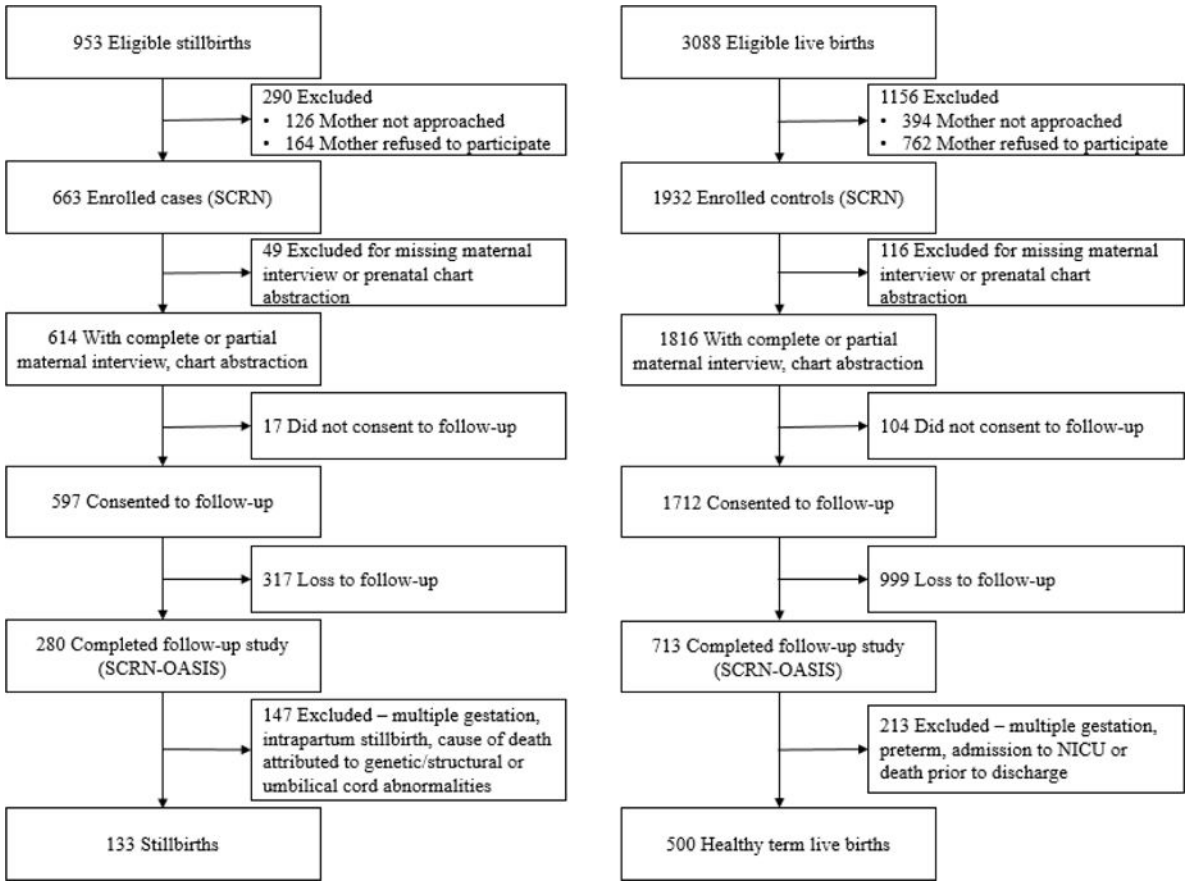

Figure 1.

Study enrollment and inclusion.

Abbreviations: SCRN, Stillbirth Collaborative Research Network; SCRN-OASIS, SCRN Outcomes after Study Index Stillbirth

Table 1

Descriptive characteristics using the weighted data by outcome status.

Characteristic – Weighted %	Stillbirths N_w = 182	Healthy Term Live Births[1] N_w = 639	*P* value[2]
Maternal Age[3]			0.32
<20	3.0	3.9	
20 – 34	76.4	70.6	
35 – 39	13.4	20.0	
40+	7.2	5.5	
Maternal Race/Ethnicity			0.07
Non-Hispanic white	34.1	46.3	
Non-Hispanic black	17.0	12.0	
Hispanic	43.0	32.6	
Other	5.9	9.1	
Maternal Education			<0.01
$0 – 11_{(\text{none/primary/some secondary})}$	26.7	18.0	
$12_{(\text{completed secondary})}$	34.4	24.0	
$13+_{(\text{college})}$	38.9	58.0	
Marital Status			<0.01
Not married or cohabitating	19.6	13.4	
Cohabitating	33.5	19.1	
Married	46.9	67.5	
BMI[4]			0.02
<18.5	1.3	3.3	
18.5 – 24.9	38.0	52.0	
25 – 29.9	22.1	22.9	
30 – 34.9	17.4	12.0	
≥35	21.2	9.8	
Insurance			0.02
No insurance	5.4	2.9	
Any public/private insurance	60.3	46.6	
VA/commercial health ins/HMO	34.3	50.5	
Depression[5]			0.08
EDS > 12	19.4	10.5	
EDS ≤ 12	80.6	89.5	
Intervening Pregnancy			<0.01
No	41.1	74.0	
Yes – only incomplete[6]	8.9	8.0	
Yes – at least one live birth	43.1	16.5	
Yes – no live births	6.9	1.5	
Smoking Status[7]			0.69

Characteristic – Weighted %	Stillbirths N_w = 182	Healthy Term Live Births[1] N_w = 639	*P* value[2]
Did not smoke	84.0	86.5	
< 10	10.3	7.0	
≥ 10	5.7	6.5	
Alcohol Use[8]			0.19
Did not drink	62.8	56.8	
Drank, no binging	17.8	25.6	
Binged	19.4	17.6	
Illicit Drug Use[9]			0.26
Never used drugs	71.3	68.3	
Ever used drugs w/o addiction	25.8	31.0	
Ever used drugs w/ addiction	2.9	0.7	
SLE[10] **– Financial**	52.5	45.8	0.25
SLE – Emotional	46.0	45.1	0.88
SLE – Traumatic	25.7	17.0	0.09
SLE – Partner-related	34.8	27.6	0.19
Number of SLE Factors			0.41
0	19.1	26.3	
1	34.5	33.6	
2	22.3	23.7	
3	16.7	11.1	
4	7.4	5.3	

[1] Excluding live births <37 weeks gestation, admitted to neonatal intensive care unit, or died

[2] *P* values calculated using Rao-Scott chi-square tests comparing all stillbirths to healthy term live births

[3] Maternal age at the time of the follow up interview

[4] Missing 250 observations (26%)

[5] Depression at time of follow up interview, based on Edinburgh Depression Scale

[6] The woman was pregnant at the time of interview

[7] Average number of cigarettes during 3 months prior to pregnancy

[8] Alcohol consumption during 3 months prior to pregnancy

[9] Lifetime drug use

[10] Significant Life Events

Table 2

Descriptive statistics of Childhood Trauma Questionnaire as a categorical variable by outcome status using the weighted data.

	Stillbirth %	Healthy Term Live Birth %	*P* value[1]
Overall CM			0.66
None	43.6	46.1	
Any	56.4	53.9	
Emotional Abuse			0.52
None or Minimal	73.3	69.8	
Low to Extreme	26.7	30.2	
Emotional Neglect			0.02
None or Minimal	60.9	75.1	
Low to Extreme	39.1	24.9	
Physical Abuse			0.97
None or Minimal	79.9	79.7	
Low to Extreme	20.1	20.3	
Physical Neglect			0.14
None or Minimal	71.8	80.0	
Low to Extreme	28.2	20.0	
Sexual Abuse			0.47
None or Minimal	78.5	74.8	
Low to Extreme	21.5	25.2	
Minimization/Denial			0.39
0	53.7	48.8	
≥ 1	46.3	51.2	

Abbreviations: CM, childhood maltreatment

[1] *P* values calculated using chi square tests comparing stillbirths to healthy term live births

Table 3

Descriptive statistics of Childhood Trauma Questionnaire by outcome status, stratified by race/ethnicity and language of follow-up interview.

Weighted N (%)	Non-Hispanic White Women		Non-Hispanic Black Women		Total Hispanic		Hispanic Women English Interview		Spanish Interview	
	SB	LB	SB	LB	SB	LB	SB	LB	SB	LB
Overall CM										
None	33 (56.5)	170 (57.7)	10 (32.9)	23 (30.9)	30 (38.8)	80 (38.5)	28 (45.8)	64 (41.2)	3 (15.3)	15 (30.2)
Any	26 (43.5)	125 (42.3)	21 (67.1)	51 (69.1)	48 (61.2)	127 (61.5)	33 (54.2)	92 (58.8)	15 (84.7)	36 (69.8)
Emotional Abuse										
None or Minimal	40 (68.1)	223 (75.5)	26 (82.8)	41 (56.1)	60 (76.8)	135 (65.5)	46 (75.5)	99 (63.5)	15 (81.5)	35 (71.7)
Low to Extreme	19 (31.9)	72 (24.5)	5 (17.2)	32 (43.9)	18 (23.2)	71 (34.5)	15 (24.5)	57 (36.5)	3 (18.5)	14 (28.3)
Emotional Neglect										
None or Minimal	42 (71.6)	238 (80.6)	16 (51.2)	53 (72.4)	43 (55.1)	142 (68.9)	39 (65.1)	108 (69.1)	4 (21.5)	34 (68.0)
Low to Extreme	17 (28.4)	57 (19.4)	15 (48.8)	20 (27.6)	35 (44.9)	64 (31.1)	21 (34.9)	48 (30.9)	14 (78.5)	16 (32.0)
Physical Abuse										
None or Minimal	50 (84.6)	256 (86.8)	17 (55.2)	46 (62.1)	69 (88.5)	161 (77.5)	55 (90.6)	119 (76.4)	15 (81.5)	41 (80.7)
Low to Extreme	9 (15.4)	39 (13.2)	14 (44.8)	28 (37.9)	9 (11.5)	47 (22.5)	6 (9.4)	37 (23.6)	3 (18.5)	10 (19.3)
Physical Neglect										
None or Minimal	46 (77.6)	258 (87.6)	24 (75.9)	61 (82.6)	52 (65.9)	143 (69.4)	49 (80.9)	119 (76.4)	3 (15.3)	23 (47.4)
Low to Extreme	13 (22.4)	37 (12.4)	7 (24.1)	13 (17.4)	27 (34.1)	63 (30.6)	12 (19.1)	37 (23.6)	15 (84.7)	26 (52.6)
Sexual Abuse										
None or Minimal	47 (79.9)	249 (85.0)	20 (63.5)	43 (57.6)	63 (80.4)	141 (68.9)	49 (81.9)	101 (65.7)	14 (75.3)	40 (78.9)
Low to Extreme	12 (20.1)	44 (15.0)	11 (36.5)	31 (42.4)	15 (19.6)	64 (31.1)	11 (18.1)	53 (34.3)	4 (24.7)	11 (21.1)

Abbreviations: SB, stillbirth; LB, healthy term live birth; CM, childhood maltreatment

Table 4

Stillbirth odds ratios for the total and stratified populations for the Childhood Trauma Questionnaire, analyzed as a dichotomous variable, using the weighted data.

	Total population		Non-Hispanic White Women		Non-Hispanic Black Women		Total Hispanic		Hispanic Women English Interview		Spanish Interview	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Overall CM												
None	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Any	1.11	0.70, 1.74	1.05	0.55, 1.99	0.91	0.30, 2.75	0.99	0.43, 2.24	0.83	0.33, 2.09	2.40	0.37, 15.74
Emotional Abuse												
None or Minimal	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Low to Extreme	0.84	0.50, 1.44	1.45	0.72, 2.92	0.27	0.05, 1.32	0.57	0.22, 1.49	0.57	0.20, 1.62	0.58	0.05, 6.22
Emotional Neglect												
None or Minimal	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Low to Extreme	1.93	1.17, 3.19	1.64	0.77, 3.51	2.50	0.78, 7.98	1.80	0.77, 4.20	1.20	0.45, 3.24	7.74	1.31, 45.72
Physical Abuse												
None or Minimal	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Low to Extreme	0.99	0.54, 1.82	1.20	0.47, 3.07	1.33	0.39, 4.48	0.44	0.14, 1.46	0.33	0.09, 1.24	0.95	0.09, 10.35
Physical Neglect												
None or Minimal	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Low to Extreme	1.57	0.90, 2.76	2.03	0.85, 4.87	1.51	0.36, 6.34	1.18	0.48, 2.86	0.76	0.24, 2.43	5.01	0.77, 32.61
Sexual Abuse												
None or Minimal	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent	1.00	Referent
Low to Extreme	0.81	0.45, 1.46	1.43	0.58, 3.51	0.78	0.22, 2.82	0.54	0.21, 1.41	0.42	0.14, 1.25	1.22	0.15, 9.89

Abbreviations: OR, odds ratio; CI, confidence interval; CM, childhood maltreatment