



Contents lists available at ScienceDirect

## Annals of Epidemiology

journal homepage: [www.annalsofepidemiology.org](http://www.annalsofepidemiology.org)

## Original article

## Maternal exposure to childhood maltreatment and risk of stillbirth

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## ARTICLE INFO

## Article history:

Received 20 March 2017

Accepted 6 July 2017

Available online xxx

## Keywords:

African Americans

Adult survivors of childhood trauma

Child abuse and neglect

Child maltreatment

Stillbirth

Stress

Trauma

## ABSTRACT

**Purpose:** To determine the association between maternal exposure to childhood maltreatment (CM) and risk of stillbirth (fetal death at or after 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 less than 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 (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 the future studies of associations between CM and pregnancy outcomes, including stillbirth.

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## 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 the 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

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<http://dx.doi.org/10.1016/j.annepidem.2017.07.005>

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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]. In addition, 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 the 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 a 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 1932 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 6 months and 3 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 three-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

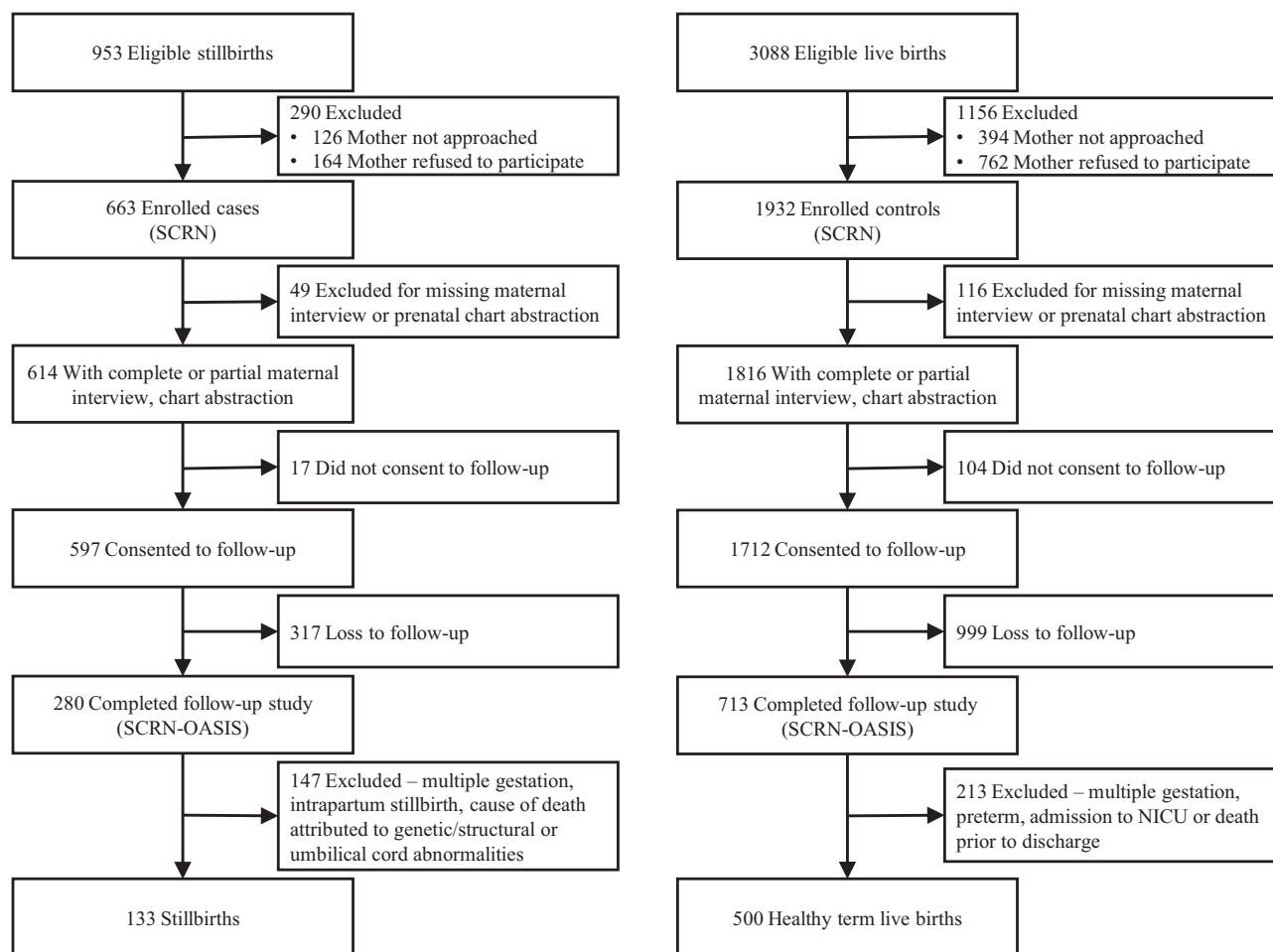


Fig. 1. Study enrollment and inclusion.

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