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A population-based examination of intimate partner violence in the perinatal period and adverse neonatal outcomes

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Introduction

Intimate partner violence (IPV) is a widespread and pervasive public health problem, affecting nearly 30% of women in the US, with significant health consequences for women and children.^{1,2} The prevalence of IPV during pregnancy is 4-9%, with young, single, minority, and low income women at higher risk.²⁻⁴ A growing body of research supports the association between experiencing IPV during pregnancy and delivering a neonate classified as low birth weight (LBW).⁵⁻⁷ Less studied is the association between IPV and delivering a neonate classified as small for gestational age (SGA). SGA, birth weight that is <10th percentile adjusted for gestational age, is associated with lifelong health challenges, such as cardiovascular disease, and diabetes mellitus. Existing evidence on the relation between women's experience of IPV during pregnancy and SGA is based on small community-based samples with mixed findings.⁸⁻¹⁰ Therefore, the purpose of our study was to advance our understanding on IPV during pregnancy and delivering a SGA neonate, and to assess whether adequacy of prenatal care (PNC), maternal depressive symptoms, and minority race/ethnicity moderate this relation while adjusting for relevant confounders (e.g. tobacco use, gestational weight gain).

Fetal growth is an important determinant of future health.¹¹ Children born SGA are at increased risk for neonatal death, neurodevelopmental disabilities, psychiatric disorders and behavioral sequelae.¹²⁻¹⁴ Indeed, SGA is a major determinant of infant mortality rates and racial disparities therein.¹⁵ Accumulating evidence supports that SGA is associated with chronic diseases in adulthood, particularly cardiovascular diseases, diabetes mellitus, and metabolic syndrome. The examination of SGA as a birth outcome is significant given its association with increased morbidity and mortality throughout the life course.¹⁶⁻¹⁸ Aligned with MCHB's recognition of the importance of a life course perspective, this study examines important social and health factors that may contribute to the large and persistent disparities among racially and ethnically diverse population in birth outcomes.¹⁹⁻²¹

Study Design and Methods

We used the 2004-2008 national Pregnancy Risk Assessment Monitoring System (PRAMS) dataset to study the relation between experiencing IPV during pregnancy (defined in PRAMS as in the year prior to pregnancy, during pregnancy and both time periods) and delivering a neonate classified as SGA. Our study provided an opportunity to examine this relation in a nationally representative US sample. The specific aims of the proposed study were to: 1) examine the relation between timing of IPV during pregnancy (i.e. IPV in the year prior to pregnancy, during pregnancy, both time periods) with SGA; 2) examine the relation between timing of IPV during pregnancy and SGA in subgroups of racial and ethnic minorities and mothers with concurrent depressive symptoms; and 3) examine whether adequacy of prenatal care (PNC) moderates the association between IPV and SGA.

The 2004-2008 PRAMS includes 202,367 women who delivered a live birth in the United States. The Centers for Disease Control and Prevention (CDC) established this population-based surveillance system to collect national data on maternal behaviors around the time of pregnancy. Participating states (n=32) sample participants based on birth certificate files.²²⁻²⁴ Some subgroups are oversampled, e.g., African American women, to ensure adequate sampling of high-risk populations. Data collection protocols and instruments were standardized to allow comparability. All states in the proposed analysis have an overall response rate of at least 70%. The following key variables in PRAMS for the study are detailed below:

Intimate partner violence (IPV): IPV victimization around pregnancy in PRAMS is assessed using two survey items: 1)“During the 12 months before you got pregnant, were you physically hurt in any way by your husband or partner?” and; 2)“During your most recent pregnancy, were you physically hurt in any way by your husband or partner?” Responses are recorded into 3 dichotomous variables consistent with other population-based research²⁵: physical abuse by current or ex-husband or partner in the 12 months prior to pregnancy only (“Preconception IPV”), physical abuse by current or ex-husband or partner during pregnancy only (“Prenatal IPV”), and physical abuse by a past or current husband or partner in the 12 months prior to and/or during pregnancy (“Preconception and/or Prenatal IPV”). Women who fail to answer both questions about timing of IPV will not be included in the mutually exclusive categories of “Preconception IPV” and “Prenatal IPV” to avoid misclassification of IPV timing.

Small for gestational age (SGA): Consistent with well-established national recommendations, SGA neonates are classified as those neonates whose birth weight is <10th percentile adjusted for gestational age.²⁶⁻²⁹ Birth weight data is extracted from birth certificates. This was recorded as a dichotomous variable with neonates either SGA or not SGA.

Maternal depressive symptoms was measured using two items in PRAMS: 1)“While you were pregnant, how often did you feel down, depressed, or hopeless?” and; 2)“While you were pregnant, how often did you have little interest of pleasure in doing things?” Women who answer “Always” or “Often” to either question is categorized as having antenatal depressive symptoms, and those who answer “Seldom” or “Never” will be categorized as not having antenatal depressive symptoms. The PRAMS measures for depressive symptoms are based on the 2-item depression module of the Patient Health Questionnaire, or PHQ-2, which demonstrates strong sensitivity 96% (95% CI 90% - 99%) and adequate specificity 57% (95% CI 53% - 62%).³⁰

Adequacy of prenatal care (PNC): PNC adequacy is categorized into four care groups (inadequate, intermediate, adequate, and adequate plus) based on Kotelchuck’s Adequacy of Prenatal Care Utilization (APNCU) Index.³¹ Currently, the APNCU Index is considered the most comprehensive and used index.³²⁻³⁴ The APNCU index is a composite of 2 adequacy dimensions: when PNC was initiated and frequency of visits. Inadequate care is defined as PNC beginning after the fourth month or making less than 50% of expected visits. Intermediate care begins in the fourth month and receiving between 50% and 79% of expected visits. Adequate care begins in the fourth month and receiving 80% to 109% of expected visits. Adequate plus begins in the fourth month and completing 110% or more of expected visits.³¹ The expected number of visits is consistent with the American College of Obstetricians and Gynecologists guidelines for PNC utilization and is the ratio of actual visits to recommended number of visits.³⁵

Birth certificates: Information about prenatal and neonatal characteristics are collected from birth certificates at the time of birth and included in the PRAMS dataset. Data includes: birth date, birth weight, gestational age, sex, parity, and parents’ education, race/ethnicity, marital status, pregnancy history, pre-pregnancy weight, and gestational weight gain.

Results

To date, two papers have been submitted (one in publication, one revision under review) related to the analyses. Our first paper (published) examined the effects of IPV at varied time points in the perinatal period on inadequate and excessive gestational weight gain. Results revealed Results demonstrated approximately 6% of mothers reported experiencing perinatal IPV with 2.7% of mothers reporting experiencing IPV in the year prior to pregnancy, 1.1% reporting experiencing IPV during pregnancy only, and the remaining 2.5% of mothers reporting

experiencing IPV both before and during pregnancy. Inadequate GWG was more prevalent among those women experiencing IPV during pregnancy and those experiencing IPV before and during pregnancy (23.3% and 23.5%, respectively) as compared to women reporting no IPV (20.2%; $P < 0.001$). Women experiencing IPV before pregnancy only were significantly more likely to have excessive GWG ($P < 0.001$). Results were attenuated in the multivariate modeling with only women experiencing IPV before pregnancy having a weakly significant odds of excessive GWG (aOR 1.14, 95% CI 1.02-1.26). Consistent with other research findings, our results suggest several maternal characteristics, including maternal age, race/ethnicity, education, and income were associated with an increased risk for both inadequate and excessive gestational weight gain. In sum, the association between perinatal IPV with inadequate GWG was explained by confounding variables; however, women who reported perinatal IPV had higher rates of GWG outside of the optimal range.

Gestational weight gain is a significant issue given its association with maternal, fetal, neonatal, and early childhood outcomes. Our study demonstrated the role that IPV may play in GWG, both through direct effects as well as through hypothesized confounding variables. Screening for IPV is an important first step in identifying women who may be at heightened risk for inadequate or excessive GWG. Multiple organizations, including the U.S. Preventive Services Task Force, have endorsed the recommendation to incorporate IPV screening and treatment into prenatal care yet screening rates remain relatively low. Prenatal care offers a unique window of opportunity for nurses and other health care professionals to foster trusting relationships with pregnant women through repeated contacts. For many women, pregnancy is the only time they engage regularly with the health care system further highlighting the need to establish a trusting patient-provider relationship. There were several limitations in the current study. First, the PRAMS IPV assessment is limited to experiencing physical abuse, though research supports an association between psychological and sexual abuse with adverse health behaviors and outcomes. As with all self-reported data, reporting and recall biases may generate misclassification. Pre-pregnancy BMI and gestational weight gain data may suffer inaccuracies related to maternal recall. Finally, data on substance use and mental health disorders during pregnancy, both important predictors of GWG, are limited in PRAMS. Future studies are needed to determine how relevant confounding variables may affect a woman's gestational weight gain.

A second analyses was undertaken (revision under review) to examine how perinatal IPV may influence SGA birth. Using the PRAMS dataset described above, IPV in the year prior to or during pregnancy was related to SGA bivariately (odds ratio [OR] 1.39, 95% confidence interval [CI] 1.28-1.51), and after adjustment for demographic and obstetric factors, this association attenuated after further adjustment for perinatal smoking patterns, (adjusted odds ratio [aOR] 1.06, 95% CI 0.97-1.15). Compared with nonabused women, women experiencing perinatal IPV were more than twice as likely to smoke before pregnancy (aOR 2.34, 95% CI 2.19-2.49), and nearly 1.5 times as likely to report sustained smoking into the last three months of pregnancy (aOR 1.45, 95% CI 1.32-1.59). In turn, among pre-pregnancy smokers, sustained smoking was associated with delivery of a SGA neonate (aOR 1.87, 95% CI 1.72-2.03), fully attenuating the association of perinatal IPV with SGA. Limited research has demonstrated a significant association between IPV and SGA birth after controlling for maternal smoking though findings were limited by small sample sizes, and high risk samples. Results extend past research demonstrating a link between maternal smoking and SGA birth, by clarifying the role of maternal smoking pattern during the prenatal period. Our findings demonstrated that the

prevalence of SGA was more than twice as high among women who sustained smoking into the last three months of pregnancy as compared to non-smokers in a population-based study. These findings are consistent with other research demonstrating that women who smoke during pregnancy have double the risk of fetal growth restriction as compared to non-smokers.

Taken together, our results suggest that public health initiatives and interventions focused on improving pregnancy outcomes must address both smoking cessation and perinatal IPV. Women who experience perinatal IPV are more likely to continue to smoke throughout pregnancy, and may have a more difficult time quitting smoking at any point during pregnancy. Women experiencing perinatal IPV represent a high priority population for smoking cessation, and treatment approaches should acknowledge the additional challenges in cessation for women experiencing trauma-related symptoms. Women who experienced perinatal IPV were significantly more likely to smoke pre-pregnancy and sustain smoking into the last three months of pregnancy. Through behavioral and physiologic pathways, smoking cessation may be uniquely challenging for women experiencing IPV, yet critical to address clinically to mitigate risk for SGA.

List of Products

Manuscripts, published

Alhusen, J.L., Geller, R., Dreisbach, C., Constantoulakis, L., & Siega-Riz, A.M. (2017). Intimate partner violence and gestational weight gain in a population-based sample of perinatal women. *Journal of Obstetric, Gynecologic, and Neonatal Nursing (JOGNN)*. Epub ahead of print. doi: 10.1016/j.jogn.2016.12.003.

Manuscripts, in review

Alhusen, J., Geller, R., Budhathoki, C., & Decker, M. Perinatal intimate partner violence and small-for-gestational birth: a population-based analysis. *Journal of Women's Health*. (Accepted with minor revisions, revisions submitted 5/25/17)

Manuscripts, in preparation

Alhusen, J., Geller, R., Budhathoki, C., & Decker, M. Perinatal intimate partner violence and illicit substance use during pregnancy in PRAMS. Anticipated submission to *Obstetrics and Gynecology*

Dissemination Activities

1. Association of Women's Health, Obstetric & Neonatal Nurses Annual Meeting- will submit abstract of IPV and gestational weight gain findings to present at 2018 national conference.
2. American Public Health Association- will submit abstract of IPV and illicit substance use in PRAMS to present at 2018 national conference.
3. Southern Nursing Research Society- findings presented (2017) related to IPV and SGA birth

Plans to extend this program of research

A common, but significant limitation of PRAMS dataset is its definition of IPV which is limited to physical abuse. This definition fails to recognize that IPV encompasses aspects of psychological and sexual violence as well. PRAMS recently included key aspects of sexual violence that ask participants about reproductive coercion. While these questions are currently only asked by 5 participating states, they will provide useful information that will elucidate the manner in which IPV, and reproductive coercion impact birth outcomes. Thus, our team has requested the most recent data from CDC and once received, we will analyze aspects of reproductive coercion and neonatal outcomes.

We are also in the midst of a comprehensive literature review focused on perinatal IPV interventions, and assessing the feasibility/acceptability of these interventions as well as determining any interventions that target adolescents. Our research demonstrated that young age was associated with an increased risk of perinatal IPV thus we would like to submit a research proposal examining the effects of a perinatal IPV intervention, targeting adolescents, on birth outcomes.

Finally, limited research suggests that women living with disabilities represent a particularly vulnerable group for perinatal IPV. To date, existing population-based data sets do not adequately capture aspects of perinatal IPV, disability status, and adverse neonatal outcomes that account for issues of temporality. Thus, the PI (Alhusen) of the current grant secured additional funding from NIH/NICHD to conduct a mixed methods study aimed at examining aspects of disability and adverse reproductive health outcomes. A key goal of this proposal is to explore the influence of perinatal IPV on maternal and child health through qualitative interviews with approximately 50 women living with diverse disabilities. Our goal is to inform intervention development, likely around safety planning, that could be tested in an R01-level funding mechanism.

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