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THE ASSOCIATION BETWEEN PREGNANCY-SPECIFIC STRESS, DISCRIMINATION, AND BIRTH OUTCOMES FOR WOMEN OF DIFFERENT ETHNIC BACKGROUNDS IN THE U.S.

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THE ASSOCIATION BETWEEN PREGNANCY-SPECIFIC STRESS, DISCRIMINATION, AND BIRTH OUTCOMES FOR WOMEN OF DIFFERENT ETHNIC BACKGROUNDS IN THE U.S.

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BY THE COMMITTEE CONSISTING OF

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ABSTRACT

When observing birth outcome rates across the U.S., one can find higher rates of adverse outcomes for minority women. As similarly seen for other health issues such as heart disease, obesity, and diabetes across the country, Black or African American, Hispanic, and Native American women are typically reported to have higher rates of adverse gestation. These outcomes may include delivering a low-weight infant, delivering premature, miscarriages, stillbirths, infant morbidity and ultimately infant mortality. To better understand why such disparity gaps exist and persist despite efforts to improve outcomes, this study will observe pregnancy-specific stress and experiences of discrimination to determine if relationships exist between the stress and discrimination women of color experience and the birth outcomes they have. This study also aims to observe differences in experiences within racial groups, further specifying participant's ethnicity and nativity status to see how those identifications affect perception and if they significantly influence outcomes as well.

Previously constructed scales will be used to quantify the participant's experiences of pregnancy-specific stress (*Prenatal Distress Questionnaire* and *Prenatal Life Events Scale*) during pregnancy and discrimination (*General Ethnic Discrimination Scale*) both during pregnancy and throughout lifetime. Data will be collected through use of an anonymous online survey that will also include questions about birth and demographic information. Measuring and determining the relationships between these variables and birth outcomes will be important for understanding how the gestational experience differs for minority women (compared to non-Hispanic White women) and may help trigger conversations on how and what to implement so that better reproductive health outcomes can be obtained.

CHAPTER 1: INTRODUCTION

Research has highlighted many possible contributors to the existing disparities between Black/African American and White women in the U.S. Mother's country of origin has been explored as a factor to the prevalence of adverse birth outcomes among Black women in this country. Relative risk for delivering a low birth weight (LBW) infant has been found to be significantly higher among U.S.-born Black women when compared to Black women who were born in Africa (David & Collins, 1997). Despite studies also showing that education and marital status help improve birth outcomes for pregnant women, infants born to Black college-educated parents have also been found to be twice as likely to have a LBW outcome, and three times as likely to have a very low birth weight (VLBW) outcome (Schoendorf, Hogue, Kleinman, & Rowley, 1992). Although many years have past since this information was published, being among the first groups of articles bringing attention to the subject, current birth statistics made available by the Center for Disease and Control (CDC) reveal that disparities in adverse birth outcomes have not improved.

Significant disparities exist for birth outcomes among women living in the U.S., with Black, Hispanic, and Native American woman having higher risks of experiencing adverse birth outcomes compared to White women (Borrell, Rodriguez-Alvarez, Savitz, & Baquero, 2016). Despite slight decreases in preterm birth rates from previous records, current rates among Native American and Black women are higher than White women in the U.S. (Ely & Driscoll, 2019). Black women have also been found to have twice the chance of delivering a LW infant and almost three times the chance of delivering a VLW infant at birth (Ely & Driscoll, 2019). This is of great concern because infants who are born premature, or who have lower than normal weights at birth, are more likely to have neurological, emotional, cognitive, pulmonary, or

cardiovascular development issues as they get older (Rosenthal & Lobel, 2011). This then contributes to the occurrence of chronic illnesses, that arise later during adulthood, and the resulting health disparities that occur across the U.S (Rosenthal & Lobel, 2011).

In 2004, Black infants were found to be more than twice as likely to die during their first year of life when compared to White infants (Collins, David, Handler, Wall, & Andes, 2004). In 2016, infant mortality rates were the highest among Black women despite general decreases in infant mortality between 2007-2012, with unchanging rates between 2012-2016 (Xu, Murphy, Kochanek, Bastian, & Arias, 2018). The infant mortality rates were twice as high for non-Hispanic Black women with elevated rates among Hispanic women as well (Xu et al., 2018). It was also noted that harsh pregnancies, delivery complications, and death during pregnancy are usually experienced in higher proportions by women of racial/ethnic minorities (Creanga et al., 2014).

According to the CDC, 1 in 100 pregnancies are impacted by stillbirths (U.S. Department of Health and Human Services, 2019). Although advances in medical practices have increased, improving the number of stillbirths that occur across the country, the rates have been relatively unchanged in the past few years. Stillbirths can happen to women of any race/ethnicity; however, the CDC has listed being of the Black race to be a factor for common occurrences (U.S. Department of Health and Human Services, 2019). Records also show that in 2013, occurrences of fetal death, out of 1,000 live births, were more than twice as high for Black women (10.52) when compared to White women (4.88), with elevated rates among American Indians (6.22) and Hispanic (5.22) women as well (MacDorman & Gregory, 2015).

Many factors in a woman’s life can influence her gestational health. Current programs offered by health organizations focus on ensuring pregnant women know how essential dietary

consumption, physical activity, and healthy behaviors are for proper growth and development throughout gestation **(**Costa de Oliveira et al., 2018; Eddy, Prileszky, Nicoll, Barker, & Anisy, 2015; Johnson, 2018; Solhi, Abbasi, Azar, & Hosseini, 2019**)**. Even though these resources may exist for physical health during pregnancy, factors effecting emotional well-being may also play an important role in birth outcomes (Wisborg, Barklin, Hedegaard, & Henriksen, 2008). Adverse birth outcomes can include miscarriages, premature births, low weight births, and stillbirths, which all typically occur at a higher rate among the racial/ethnic minority groups in the U.S. (Borrell, Rodriguez-Alvarez, Savitz, & Baquero, 2016). These outcomes ultimately add to the rates of infant mortality seen among these groups (Borrell, Rodriguez-Alvarez, Savitz, & Baquero, 2016).

Minority women are more likely to encounter discriminatory situations based on their skin color or culture, adding to the stress they experience throughout life and during gestation. A focus to obtain information about the unique experiences of these women could be beneficial for learning how they impact health conditions that can surpass the current generation. Identifying specific factors of their experience that contribute to stress and emotional wellbeing, as well as observing how they correlate to birth outcomes, could also help shed light on what interventions and implementations need to take place in order to improve the overall health for these individuals.

Purpose of Study

Although previous beliefs have been that disparities in adverse birth outcomes were due to biological differences between racial groups, more recent evidence has suggested that personal experiences of discrimination, or witnessing discrimination to members of one's own racial/ethnic group, can be linked as a contributor to stress and low emotional well-being

(Rosenthal & Lobel, 2011; Seaton, Caldwell, Sellers, & Jackson, 2008). Determining specific factors that can contribute to stress during gestation, as well as if they differ based on racial/ethnic background, would be helpful in understanding the experiences of pregnant minority women in this country.

The goal of this study is to observe if relationships exist between the pregnancy-specific stress and discrimination minority women experience and their birth outcomes. The information obtained could help add to the growing literature outlining the impact of social and environmental influences on fetal outcomes, even prior to conception. The information may also help identify aspects of social society, as well as mechanisms of institutional discrimination, that would need to be addressed in order to improve health outcomes for these groups (Salm Ward, Mazul, Ngui, Bridgewater, & Harley, 2013). Understanding this could highlight the importance of deconstructing discriminatory practices in society and assist with the development of strategies to achieve the CDC's reoccurring goal of decreasing birth outcome disparities across the country (U.S. Department of Health and Human Services, 2014).

Research Questions

- Is there a difference in pregnancy-specific stress for women of differing racial/ethnic background in the U.S. who have been pregnant in the past 10 years?
- Is there a difference in perception of discrimination experienced by women of differing racial/ethnic background in the U.S. who have been pregnant in the past 10 years?
- Is there an association between pregnancy-specific stress and discrimination experienced by women of racial/ethnic minority groups in U.S. and their birth outcomes?

Hypotheses

- There will be no difference in mean scores for pregnancy-specific stress between the racial or ethnic groups.
- There will be a difference in discrimination scores between racial or ethnic groups tested, with minority women obtaining higher discrimination scores compared to White women.
- There will be an association between the scaled experiences of pregnancy-specific stress and discrimination and birth outcomes among the women who participate.

Significance of the Research Problem

This study is significant because it would help highlight the pregnancy experience of minority women in the U.S. to help identify contributors to the high adverse birth outcomes among them. It could not only help researchers understand the harm certain encounters may have on the well-being of an individual, but also allow them to observe how impactful it can be for the following generations. Exposure to socially toxic environments early on in life can cause physiological responses to stress, which can contribute to general risks of individual health and pregnancy outcomes later on in adulthood (Hilmert et al., 2014). The current study would also allow researchers to understand how experiences may differ based on the ethnic group with which women identify. Nativity status (whether or not they were born in the U. S. compared to an individual who is a 1st or 2nd generation American) and how long an individual has been in the U.S. may also impact their perception of their experience (Hunter, 2008). Because discrimination is very complex and can vary based on individual perception, it is important to include multiple factors when observing experiences (Hunter, 2008). Studies have shown that cultural views and ethnic background can influence someone's perception of racial discrimination, allowing for variations within the existing racial groups in our country (Hunter, 2008). Although minority

women may have similar increased risks for adverse birth outcomes when compared to White women in America, they might have differing attributes.

Findings from this study could help explain why disparity gaps persist, and continue to expand, despite efforts to diminish them. Findings from this study could also provide recommendations for interventions that can do more than provide health information and physical resources, but also target systems that have a history of functioning in a manner that does not benefit minority groups.

Delimitations

- The goal will be to have about 300 participants in the study. Women of any racial background would be able to participate, however there will be some over-sampling of minority groups so that an accurate representation of their experience is measured. This will also be done so that differences occurring within the racial groups can be accurately examined.
- Participation eligibility would be based on age and how recent the women's last pregnancy was. Women who are between 18-45 years old, who have been pregnant in the last 10 years, regardless of the gestational outcome, would be eligible to participate in this study. The study would exclude women whose last pregnancy resulted in multiple births (twins or triplets) and women who do not currently live in the U.S.
- Participants will be obtained through recruitment through daycare centers, health clinics, and other organizations that serve women and children. They will also be obtained online, through social media sites such as Facebook, Instagram and Reddit. Participants would also be allowed to recommend other women they know who might qualify through email or social media.

- Data would be collected through use of a questionnaire. Collection will begin in the fall semester of 2019, following IRB approval.

Limitations

Possible limitations of this study may include:

- Having a self-administered survey available online, without being there in person to answer questions for clarification, might allow for misunderstood questions and lead to skipped or inaccurate responses. This may also contribute to self-reporting bias.
- The criteria for participants will only include women who have been pregnant in the past 10 years, which might limit the amount of responses and information obtained. It might also effect the accuracy of the information if the women do not remember their experiences or birth outcomes correctly.
- If participation in the study is low, it will affect the ability to generalize the results of the study, especially if minority groups are not represented as intended.
- Health conditions prior to pregnancy were not asked about during the questionnaire. It is worth noting that they may also have an effect on the individual's resulting birth outcomes.

Assumptions

- Participants can accurately and will honestly recall their past experiences when answering the questions about stress during pregnancy and discrimination.
- Participants will remember the outcome of pregnancies that occurred within the last 4 years.

Operational definitions

- Racial Discrimination: the belief that an individual has experienced unfair treatment

based on their racial group classification (Jerald, Cole, Ward, & Avery, 2017).

- Stress: an interaction between a person and an environment that incorporates the stressor, the individual's perception of the threat that stressor presents, and the physiological, emotional, or behavioral response to the occurrence (Dominguez, Dunkel-Schetter, Glynn, Hobel, & Sandman, 2008).
- Preterm Births: an infant born before 37 weeks of gestation (Rosenthal & Lobel, 2011).
- Low Birth Weight: an infant weighing less than 2,500g (5.5lbs) at birth (Rosenthal & Lobel, 2011).
- Miscarriages: and unexpected loss of a fetus before 20 weeks of gestation (Watson & Jewell, 2018).
- Stillbirth: the loss of a baby before or during delivery, typically after surviving the first 20 weeks of gestation (Francois, 2018).
- Infant Mortality: infant death before the first full year of life (Rosenthal & Lobel, 2011).
- Neonatal Mortality: the death of an infant within the first 28 days of life (Lawn et al., 2016).

CHAPTER 2: LITERATURE REVIEW

Disparities in Birth Outcomes

David and Collins (1999) were among the first to identify the health disparities between birth outcomes of Black and White women in the U.S. Prior beliefs attributed birth outcomes disparities to genetic differences between racial groups (David & Collins, 1997), however, their study took a closer look at birth record data for Black and White women in the country, taking into consideration birth origin of the mother. The data was categorized into three groups: U.S.-born White, U.S.-born Black, and African-born Black women. Thus, if the genes were the cause for higher rates of adverse birth outcomes, the African-born Black group would experience higher counts of low and very low weight births (since their genes are more purely derived from African, compared to African Americans whose genes might have more European) (David & Collins, 1997).

Although rates of LBW and VLBW for African-born Black women and U.S.-born White were higher than rates for U.S.-born White women, the overall distribution of infant weights were more similar between U.S.-born White and African-born Black women (David & Collins, 1997). Similarly, the relative risk for delivering a LBW infant was significantly higher among U.S.-born Black women than African-born Black women (David & Collins, 1997). The U.S.-born Black women, on the other hand, were more likely to get pregnant before 20 years old, have less than a 12-year education, to be unmarried, and to have received prenatal care late in their pregnancy, if at all, which all contributed to a higher risk for obtaining an adverse birth outcome (David & Collins, 1997).

Among White women in the U.S., greater educational attainment has been shown to be a protective factor for birth outcomes. Recent studies, however, have also shown an increased association between older Black women with high educational experiences (more than 12 years of school) and very low birth weight outcomes (Collins et al., 2004). Another study published in the 1990's acknowledged that even when controlling for risk factors such as age, marital status, and education, there was a large health disparity for birth outcomes among Black women in the U.S. (Schoendorf, Hogue, Kleinman, & Rowley, 1992). This study specifically observed factors that were not just attributed to the mother, but that included paternal and household characteristics as well. The data used was taken form National Linked Birth and Infant Data Files from singleton pregnancies for women in 1983-1985 who were older than 20 years of age, the same race as their partner, and had at least 16 years educated (Schoendorf, Hogue, Kleinman, & Rowley, 1992).

Results showed infants born to Black college-educated parents were still two times as likely to have a low weight at birth, and that the risk of a VLBW continued to be three times as high (Schoendorf, Hogue, Kleinman, & Rowley, 1992). Although infant mortality rates were not different between the two groups, results showed that 72% of deaths among the Black infants were attributed to having low birth weight (LBW), compared to 52% among White infants (Schoendorf, Hogue, Kleinman, & Rowley, 1992). This highlighted that education, although it may have an influence on general infant mortality, it did not improve the occurrences of LWB for Black women. The authors suggested that possible for this high rate in LBW among Black women could be attributed to physiological factors that are not acknowledged (or probably addressed) by current obstetrician practices (Schoendorf, Hogue, Kleinman, & Rowley, 1992).

Despite decreases in the country's infant morbidity and mortality rates in recent years, large racial/ethnic health disparity gaps continue to exist (Howell et al., 2018). Compared to White women, harsh pregnancies, delivery complications, and death during pregnancy are experienced in higher proportions by women of ethnic minorities (Creanga et al., 2014). In the U.S., Black or African American women, on average, have higher rates of preterm and low birth weight deliveries (Mustillo, Krieger, Gunderson, Sidney, & et al., 2004). In a study observing birth outcomes for women in metropolitan areas in the U.S., Black women were found to be twice as likely to deliver premature babies and three to four times more likely to deliver a child with LBW than non-Hispanic White women (Mustillo et al., 2004). Mustillo et al. (2004) also found significant associations between adverse birth outcomes and mother's lifetime experiences (Mustillo et al., 2004). This is of great concern because early-life health issues can have a significant effect on development and quality of life as a child grows.

Adverse birth outcomes, such as LBW or premature births, can contribute to infant mortality and morbidity (Mustillo et al., 2004). Studies have shown that premature infants that are Black or Hispanic have higher risks of experiencing severe neonatal morbidities, with Black neonates being twice as likely to die compared to non-Hispanic White neonates (Howell et al., 2018). Risks were shown to be elevated among Hispanic infants as well (Howell et al., 2018). Black infants have also been found to be more than twice as likely to die in their first year of life, compared to White infants (Collins et al., 2004), a rate that has existed since the 1980s (Schoendorf, Hogue, Kleinman, & Rowley, 1992).

Although much is researched about the LBW/VLBW, premature births, and general infant mortality stillbirths and miscarriages remain too be a much less known or understood topic (Frazier, Hogue, Bonney, Yount, & Pearce, 2018; Willinger, Ko, & Reddy, 2009). Studies on

miscarriages have shown that higher rate occur among older women, with an increase in risked risk for recurrence after experiencing the first time (Frazier et al., 2018). Risk for still birth was found to increase with advanced maternal age (being 35 years or older) and to be higher among Black, Hispanic, and Native American women, when compare to White women (Bateman & Simpson, 2006). It was also reported that, when considering higher education (having over 12 years of education), the Black/White disparity grew in comparison to the differences seen with less than 12 years of education (Willinger, Ko, & Reddy, 2009). Risks of stillbirth among Hispanic women increased, when compared to White women, for older, more educated, women who had multiparous pregnancies (Willinger, Ko, & Reddy, 2009). Since such a great gap exists in birth outcome between minority women and White women in the U.S. and reasons they occur, continued research is needed to address these health disparities.

Factors Contributing to Stress

Associations have been found between factors such as body mass index during pregnancy, gestational hypertension, and maternal diabetes and infant outcomes for minority women in the U.S. (Howell et al., 2018; Mustillo et al., 2004). A study done in New Zealand also showed significant relationships between socioeconomic status and an increased rate of low weight deliveries (Janevic et al., 2017). Disparities for delivery outcomes in the U.S., however, persist despite socioeconomic status for minority women (Mustillo et al., 2004). Similarly, substance use (the consumption of alcohol, cigarettes, or other drugs) during pregnancy can be a contributing factor to unfavorable pregnancy outcomes, however the disparity gaps in this country cannot be solely attributed to any behavioral determinants (Mustillo et al., 2004).

Research examining maternal experience with healthcare has demonstrated significant associations between prevalence of complications during delivery low birth weight, premature

births, and infant mortality (Creanga et al., 2014). Minority women have been found less likely to have health insurance than non-Hispanic White women, which greatly affects their access to prenatal care. Prenatal care is typically recommended to begin during the first trimester (Creanga et al., 2014). For women who had have insurance, many expressed receiving less quality service if under a publicly funded plan, such as Medicaid (Howell et al., 2018). A study that explored differences in health risks for infants of different racial backgrounds attributed 39.9% of the gap to White mothers receiving better quality care at better hospitals compared to Black mothers (Howell et al., 2018). They also recognized that Black and Hispanic women were delivering in hospitals that had poorer rates of performance, for reasons such as distance convenience, risk perception access, insurance, structural characteristics, and racial segregation patterns (Howell et al., 2018). In comparing the service of predominantly White-, Hispanic-, or Black-served hospitals, studies have shown that Black-served hospitals had the worst performance rates out of the three (Creanga et al., 2014). Also highlighted, were Black women's experiences of more complications during delivery procedures and that Black-served hospitals had higher rates of poor and chronically ill women, compared to predominantly White-served hospitals that had older and wealthier women as patients (Creanga et al., 2014).

Although research has shown that these environmental factors contribute to the disparities observed in birth outcomes among minority women, significant associations with adverse pregnancy outcomes are also accredited to experiences of ethnic discrimination. Experiencing discriminatory events both during pregnancy and throughout an individual's lifetime has been shown to have lasting effects on women's psychological or physiological health (Thayer & Kuzawa, 2015). These experiences may also account for the common rates of LBW or VLBW in infants born to Black women, even to those who are highly educated, receive

adequate prenatal care, or who live in non-impoverished areas (Collins et al., 2004). Significant relationships between lifetime racial discriminatory encounters and low weight delivery rates in African American women are consistently found (Collins et al., 2004). Reporting more accounts of racial discrimination has also been associated with being three times more likely to deliver preterm and five times more likely to deliver a low weight infant, after controlling for potential depressive symptoms (Mustillo et al., 2004). Since discriminatory encounters can have many attributing factors, few studies have highlighted the separate and negative association of interpersonal and institutional racial discrimination to increased risks of delivering underweight infants (Janevic et al., 2017).

Perception of Discrimination

Stress during pregnancy can be largely attributed to a women's perception of factors in her environment that may be considered as a stressor. As mentioned previously, racial discrimination can occur in many dimensions. These events can be due to skin color, ethnic background or can be language-based, for individuals who may be speaking English as their second or third language (Halim, Yoshikawa, & Amodio, 2013). Not all discriminatory acts are obvious or intentional (Salm Ward et al., 2013); however, an individual's perception of the encounter is what has lasting effects. Perception is important, especially in regards to directed ethnic discrimination, whether to an individual or to an individual's ethnic group, because it can have negative influences on psychological well-being, that may also lead to physiological health outcomes (Giamo, Schmitt, & Outten, 2012).

Although individuals may be grouped into the same racial categories within a society, perception of discriminatory events can differ based on their ethnic background. For instance, laBck individuals in America can identify more specifically as African American, African,

Caribbean, Caribbean American, Afro-Latino or other ethnic classifications. Identifying with one of these ethnicities may alter an individual's perception of a discriminatory situation due to differences in cultural background. A study done to investigate perceptions of discrimination in African Americans and British Caribbean Americans showed significantly higher perceptions of discrimination among African Americans (Hunter, 2008). Attribution for this difference was given to historical experiences of systematic devaluation immigrants or first generation Americans may not have experienced to the same degree as most African Americans (Hunter, 2008). Findings also showed that Black immigrants, compared to African Americans, were more likely to minimize implications of racism and structural barriers attributed to racial discrimination (Hunter, 2008).

Nativity status has been shown to influence perceptions of discrimination due to language or accent barriers (Halim, Yoshikawa, & Amodio, 2013). Discrimination based on language barriers was found to be significantly related to child health in a study by Halim et al. (2013) with Mexican and Dominican immigrant mothers residing in New York. Perception of discrimination had a negative association with health issues experienced by the participants' children, with rates increasing for recent immigrants who had not yet established a connection with their ethnic group in their new area (Halim, Yoshikawa, & Amodio, 2013). Once these recently immigrated mothers had developed a connection in their environment with other people of their ethnicity, child health issues were not observed as often (Halim, Yoshikawa, & Amodio, 2013). This study helped establish a significant relationship between social factors within an individual's environment, their resulting perception, and the effect that it can have on their health behaviors, ultimately effecting their children.

A national study done with African American and Caribbean American youth demonstrated how prevalent racial discriminatory instances were among Black youth in America, accentuating how perceptions of discrimination can increase with age (Seaton, Caldwell, Sellers, & Jackson, 2008). Results demonstrated the association between lifetime experience of discrimination and birth outcomes later on in life while also signifying how perception can alter as an individual grows. This change in perception was accredited to encounters as individuals got older and an increase in awareness as they became more identified with their racial/ethnic groups (Seaton, Caldwell, Sellers, & Jackson, 2008). This is important to highlight since associations between high perceptions of discrimination and negative impacts on psychological well-being have been found to lead to an increase in symptoms of depression (Seaton, Caldwell, Sellers, & Jackson, 2008) and has also been recognized as a reflection of internalized racism.

Some discriminatory encounters, such as minority women experiencing less quality care, have be attributed to income or insurance status (being on public assistance) (Salm Ward et al., 2013). A focus group done in Milwaukee, Wisconsin with African American women who were new mothers, recognized similar experiences with racial discrimination when attempting to receive healthcare services (Salm Ward et al., 2013). Common responses from participants demonstrated a difference in treatment based on having public insurance (receiving poor service), with many participants pointing out that a large majority of individuals utilizing public insurance in the area were African American, suggesting that their experiences were more of an institutionally enforced form of discrimination (Salm Ward et al., 2013). Findings from the discussions allowed researchers to observe to what extent perception can vary, with many women expressing that they did not primarily attribute their experience to discrimination (Salm

Ward et al., 2013). It also showed how discrimination can affect an individual's well-being and cause a decrease in the utilization of health resources. Whether it be utilization for the individuals themselves or for their loved ones, many women stated they were less likely to go back to these establishments for care (Salm Ward et al., 2013), which is a factor that may also be contribute to existing disparity gaps.

Physiological Effects of Stress

The human body has multiple pathways that respond to stress stimuli, symptoms that typically involve the release of hormones like adrenaline. As was previously mentioned, individual perception is what makes discrimination such a unique stressor (Hilmert et al., 2014). The extent to which an individual is effected by these experiences depends on the time in life they are exposed to the stressor and how often the exposure occurs (Hilmert et al., 2014). With many minority groups experiencing discriminatory events throughout their lifetime, these events can be an important factor to look at when observing environmental influences on birth outcome disparities (Hilmert et al., 2014). Few studies have observed these physiological responses during pregnancy, such as tracking the correlation between racial discrimination and specific disparities in health issues like birth outcomes. A study by Hilmert et al. (2014) focused on tracing alterations in diastolic blood pressure during pregnancy, paying special attention to fluctuations with increasing encounters of discrimination. Alterations in blood pressure can typically signify changes in the cardiovascular health of a pregnant woman, who would already have increased cardiovascular demands due fetal development (Hilmert et al., 2014). This study tested for relationships between direct and indirect racial discrimination experiences, both in early childhood and late adulthood, and severe birth outcomes. Results showed that African American women who reported more exposure to discrimination (especially during early

childhood years) experienced increases in blood pressure early during gestation, the first 18-32 weeks (Hilmert et al., 2014). It was also reported that they had infants with lower gestational age due to restricted fetal growth (Hilmert et al., 2014).

An association was also found between pregnancy outcomes and an increase in levels of pro-inflammatory cytokines during immune responses to stress. When a woman's body changes to compensate a growing fetus, the body experiences changes within the immune system that shifts from pro-inflammatory responses to anti-inflammatory responses, so that the system does not reject the embryo (Coussons-Read, Okun, & Nettles, 2007). However, elevated stress levels and low support mid-pregnancy, has been associated with increased concentrations of pro-inflammatory cytokines further along in gestation (Coussons-Read, Okun, & Nettles, 2007). Although an increase in pro-inflammatory cytokines is a normal and accurate response to stress, it can contribute to the development of preeclampsia and other complications that may lead to premature deliveries (Coussons-Read, Okun, & Nettles, 2007). Another study, by Thayer and Kuzawa (2015) conducted with pregnant women in New Zealand, tracked cortisol levels during late pregnancy and administered questionnaires about lifetime experiences of ethnic discrimination. The authors found associations between stressful experiences of the mother and increased stress reactivity in her infant six weeks following birth (Thayer & Kuzawa, 2015). Results suggested that stressful experiences by women during pregnancy, especially due to discrimination, can have physiological effects on both individual and their future offspring (Thayer & Kuzawa, 2015). It also mentioned that the associations tested were still strong after controlling for material deprivations, suggesting there was a lack of dependence on socioeconomic status (Thayer & Kuzawa, 2015).

Psychosocial stress of a mother during pregnancy can also influence infant temperament and neurodevelopment (Lambertini, Chen, & Nomura, 2015). Lambertini et al. (2015) highlights how mitochondria can play an important role in stress response, with its responsibility over many cellular functions that deal with energy. Its importance in organs with high metabolic activity, such as the muscles, brain, and placenta, was emphasized by the authors of this study (Lambertini, Chen, & Nomura, 2015). Findings stated that psychosocial stress stimuli triggers responses involving mitochondria, who's functions, if effected, could contribute to deficiencies in fetal development during gestation (Lambertini, Chen, & Nomura, 2015). These stressors can include any feelings, thoughts, or experiences that the pregnant individual may perceive as stressful (Lambertini, Chen, & Nomura, 2015). Previous research has shown multiple ways perceived experiences can be harmful to an individual, effecting birth outcomes in a negative way, potentially lasting throughout the child's lifetime, if mortality is not an immediate result (Lambertini, Chen, & Nomura, 2015).

CHAPTER 3: METHODS

Study Design and Procedures

This was a cross-sectional study that used three scales to capture and measure the experiences of pregnancy-specific stress and discrimination for the participants. The information was collected through use of a survey that was available online, so participants could fill it out on their own time. This was also done to minimize contact between the participants and the primary investigators while taking the survey. The survey also included questions about birth outcomes for the participant's most recent pregnancy and general demographic information. The survey consisted of about 80 questions and took about 20-25 minutes to complete. The data was collected immediately following the thesis proposal and IRB approval. Collection took place from December 2019 to February 2020, to allow enough time for the target population to respond.

Description of Sample

For this study, sampling procedures included a mixture of convenience and snowball sampling. Recruitment for participants took place both online and in-person. In order to qualify for participation in this study, an individual had to have been female, pregnant in the past 10 years (regardless of the pregnancy outcome), and between the ages of 18 and 45. Participants also had to be currently residing in the U.S.

In-person Recruitment. Participants for this study were obtained by going to clinics in the area to post or leave flyers for their patients. Flyers were also left at daycare centers, early education facilities, and community offices that offered services for women and children. A mass email was also sent out throughout the campus as a way of obtaining participants.

Online Recruitment: Participants were additionally obtained by making the survey available online and sending the link out through social media sites like Instagram, Facebook, and Reddit. These sites are inexpensive networks that have a large number of users and offer targeted posting for information shared on their sites (Kosinski, Matz, Gosling, Popov, & Stillwell, 2015). These targets can be based on interest (ex: music, language, travel) or specific demographics (ex: gender, race/ethnicity), containing options that can vary per site used (Kosinski et al., 2015; Shatz, 2017).

Snowball Sampling: Those who participate were also given the option of recommending someone they know who might qualify to take part in the study. Using social media was very useful for this process, since users were able to share the post directly to people who may qualify or post it on their story or their personal page for their friends to see (Kosinski et al., 2015).

Measures

Measuring Pregnancy-Specific Stress. For this study, the *Prenatal Distress Questionnaire* (PDQ) and the *Prenatal Life Events Scale (Appendix A: Survey Scales and Questions)* were used to measure pregnancy-specific stress. The PDQ scale contains 12 items that obtain information about conditions during pregnancy, such as bodily changes, symptoms of gestation, and changing relationships (Yali & Lobel, 1999). Responses for each condition were recorded on a 4-point Likert scale (0-4), ranging from *not at all worried* to *extremely worried* and then summed to create a total score for each consistency, with a possible range of 0-48 (Yali & Lobel, 1999). The *Prenatal Life Events Scale* is a modified 40-item scale measuring stressful life events that may have occurred during pregnancy (Barnett, Hanna, & Parker, 1983). These events include instances such as a major move, getting robbed, or losing a close family member or friend (Lobel, Dunkel-Schetter, & Scrimshaw, 1992). The individual is then asked to rate how

undesirable the event was on a scale of 1-4, with 1 being *not at all* and 4 being *very much*. Two measurements were obtained from these questions, one scoring the number of stressful life events the participant experienced and another of the average distress score from their undesirable rating (Lobel, DeVincent, Kaminer, & Meyer, 2000). Focusing on pregnancy-specific stress, rather than general stress, is suggested to be a more powerful contributor to predicting birth outcomes, since it measures factors specifically related to pregnancy (Lobel et al., 2008).

Measuring Discrimination. The third scale used measured experiences of discrimination. The *General Ethnic Discrimination (GED) Scal*e (General Ethnic Discrimination Scale *Appendix A: Survey Scales and Questions*) is a global scale that measures lifetime exposure to experiences of discrimination as well as the stress associated with the encounters (Hwang & Goto, 2009). The GED was modified after a previously used *Schedule of Racist Events Scale* (SRE) that measured discriminatory events among African Americans for research purposes (Landrine, Klonoff, Corral, Fernandez, & Roesch, 2006). This modification allowed the scale to be used to measure experiences of discrimination among groups with differing ethnic backgrounds, including those who may be speaking English as a second language (Landrine et al., 2006). The scale contains 18 items that address occurrences of discrimination in different settings, such as the work place, education, healthcare practices and other public spaces (Hwang & Goto, 2009). Each item is answered on a 6-point Likert scale of how often the event occurs for the individual, *never* to *almost all the time*, and how stressful they perceived the event to be, *not stressful at all* to *extremely stressful*. The scale is written at a 5th grade reading level and takes about 10 minutes to complete (Landrine et al., 2006). Since no standards exist for weighing the effects of discriminatory experiences, the measure of lifetime exposure and the consequential stress scores

were combined to generate an overall discrimination score (Hwang & Goto, 2009). Higher scores indicate more encounters of discriminatory events and higher stress experienced as a result (Cheng & Mallinckrodt, 2015).

Reliability and Validity of Instruments. The scales that were used to measure pregnancy-specific stress have been used in other studies to accurately measure the stress of pregnant individuals (Lobel et al., 2008). The *Pregnancy Distress Scale* has been recorded to have a high internal consistency, with an alpha of .81 (Yali & Lobel, 1999). In a study by Landrine et al. (2006) that tested the internal reliability and factor validity of the *GED* Scale, high reliability indices for each participating ethnic group were found, with a Cronbach's alpha between .91-.92 for White participants, .93-.95 for African Americans, .93-.94 for Latin-x participants, and .91-.94 for Asian Americans (Landrine et al., 2006). A factor analysis was also completed to see if the subscales of the *GED* Scale assessed perception of discrimination in a similar manner to the *SRE* Scale it was modeled after (Landrine et al., 2006). Results revealed strong and significant factor loadings for all ethnic groups ($p < 0.05$) as well as an equal perception measure for college students and regular members of the community, with a Cronbach's alpha of 0.82-0.99 for community members and 0.80-0.98 for college students (Landrine et al., 2006).

Threats to Internal and External Validity. The validity of the study greatly depended on the amount of participants that responded to the survey. If the sample size was not large enough, there would not be a good representation of the encounters experienced by women of differing racial/ethnic groups around the country, which would then affect the ability of the results to be generalized. The internal validity of the study may have also been effected by the recollection process for pregnancy-specific stress, since participants were not reporting on a current feeling. This probably varied per participant, depending on how long it had been since their last

pregnancy occurred. To control for these threats to validity, a large sample size was targeted. To control for recollection accuracy, the limit to participate in the study was set at 10 years (meaning the participants had to have to had their last pregnancy occur within the past 10 years). This allowed for enough women to participate while also asking within a time frame that would permit a reliable recollection of their gestational experience.

Data Collection Management

The questionnaire was entered into the Qualtrics software to help organize and appropriately manage the questions administered, as well as the responses that were obtained. Since this is a master's thesis, I collected and assed the data with assistance from my faculty advisor and lab members. Once the data was obtained through the Qualtrics system, it was exported and analyzed using SPSS 24.

Analysis

The total scores for each scale were gathered per participant as mentioned previously, either summed or averaged based on the subscale and the Likert range given. The responses for the *Prenatal Distress Questionnaire* were summed to yield a total distress score (Yali & Lobel, 1999) and the responses for the *Prenatal Life Events Scale* were added, with the scaled responses averaged (Lobel, DeVincent, Kaminer, & Meyer, 2000). The responses for the *General Ethnic Discrimination* Scale, using the lifetime exposure and the appraised stress subscales, were summed to generate a total discrimination score where each subscale carried equal weight for the total score (Hwang & Goto, 2009).

A correlation was conducted to see the relationship between all the variables being tested for this study (Lobel et al., 2008). The means and standard deviations for the scaled stress and discrimination experiences were reported by racial/ethnic group and compared to the recorded

experiences of Caucasian women in the sample. The minority groups presented will be based on the responses obtained during data collection. This was done using a multivariate analysis of variance to observe if significant differences existed between the groups, followed by post-Hoc tests to see where the differences in experience occurred and how significant they were (Hwang & Goto, 2009). The resulting scores were also used to determine if associations existed between the scaled experiences and the self-recorded birth outcomes using a logistic regression and expressing the relationships with odd ratios (Chau, Bowie, & Juon, 2018). Based on G-Power analysis, about 300 participants were needed in order to have significant findings.

CHAPTER 4: MANUSCRIPT

Title: THE ASSOCIATION BETWEEN PREGNANCY-SPECIFIC STRESS, DISCRIMINATION, AND BIRTH OUTCOMES FOR WOMEN OF DIFFERENT ETHNIC BACKGROUNDS IN THE U.S.

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Abstract

Objective: The purpose of this study was to explore pregnancy-specific stress and experiences of discrimination as influences for disparities in birth outcomes for women of different racial/ethnic minority groups in the U.S.

Methods: Women between the ages of 18-45 were recruited online through social media and in-person to participate in the anonymous online survey. Complete responses were obtained from 198 women (101 no-Hispanic White, 58 Black, and 39 women that were grouped under other minority). The survey consisted of birth information, demographic questions, and 3 scales (the *Prenatal Distress Questionnaire*, the *Prenatal Life Events Scale*, and the *General Ethnic Discrimination Scale*), quantifying experiences of stress and discrimination during pregnancy. An analyses of variance was used to observe differences between the racial group's experiences of stress and discrimination. A logistic regression was done to observe the influences of the scaled experiences on the occurrence of an adverse birth outcome.

Results: White and other minority women were found to have significantly higher distress during pregnancy. Black and other minority women reported experiencing more stressful prenatal life events and higher undesirable feelings towards them, although scores only differed significantly between White and other minority women. Black and other minority women also reported significantly more experiences of discrimination and were found to experience five times the stress from the encounters, when compared to white women. Pregnancy-specific stress was not found to be associated with adverse birth outcomes, however, when taking experiences of discrimination into consideration, racial neighborhood demographics, insurance type during pregnancy, and WIC utilization were

found to significantly influence adverse birth outcomes, after controlling for birth and demographic factors.

Conclusions: Observing psychosocial aspects of the gestational experience for minority women in the U.S. may be helpful for understanding persistent disparities in birth outcomes. Targeting discriminatory and oppressive practices may also be necessary to include in interventions aiming to eliminate racial disparities for women's reproductive health.

Keywords: Pregnancy, disparities, discrimination, stress, and reproductive health.

Introduction

In 2018, Black women in the U.S. were found to be twice and almost three times as likely to have a low birth weight (LBW) or very low birth weight (VLBW) infant, respectively, compared to non-Hispanic White women (Martin, Hamilton, Osterman, & Driscoll, 2019). Recent preterm gestational outcomes have also been elevated among Black and Native American women in the U.S. (Martin, Hamilton, Osterman, & Driscoll, 2019). Similarly, studies have found significant disparities in birth outcomes among women in the U.S., with Black, Hispanic/Latina, and Native American woman having higher risks of experiencing adverse birth outcomes compared to non-Hispanic White women (Borrell, Rodriguez-Alvarez, Savitz, & Baquero, 2016). In 2014, stillbirth records expressed rates to be more than twice as high for Black women when compared to White women, with elevated rates among Native American and Hispanic/Latina women as well (U.S. Department of Health and Human Services, 2019). Research has also found Black infants to be more than twice as likely to die in their first year of life, compared to White infants (Collins et al., 2004) and has acknowledged that harsh pregnancies, delivery complications, and death during pregnancy are experienced in higher proportions by women of ethnic minorities (Creanga et al., 2014). Current birth and infant death files show neonatal, post neonatal, and general infant mortality rates to be the highest among Black, Native American, and Native Hawaiian/Pacific Islander women across the country (Ely & Driscoll, 2019). Overall, death during the first year of life is almost and over twice as likely a birth outcome for infants born to Native American and Black women, respectively (Ely & Driscoll, 2019).

With persistent adverse gestational outcomes, researchers continue to shift and explore possible contributors to reproductive health that may currently go unacknowledged by

obstetrician practices. Current resources available for pregnant women typically involve essential dietary consumption, physical activity, and healthy behaviors for proper growth and development throughout gestation (Costa de Oliveira et al., 2018; Eddy et al., 2015; Johnson, 2018; Solhi, Abbasi, Azar, & Hosseini, 2019). Factors effecting emotional well-being, however, may also require special focus, since research has found lifetime experiences to be significantly associated with adverse birth outcomes (Wisborg, Barklin, Hedegaard, & Henriksen, 2008). Some stress women might experience during pregnancy can include bodily changes, worries about fetal health, or anxiousness over delivery (Yali & Lobel, 1999). Since stress can influence physiological responses, it is an important aspect to highlight for women who are already going through many physiological changes. Similarly, evidence has suggested personal experiences of discrimination or witnessing discrimination to members of one's own racial/ethnic group can be linked as a contributor to stress and low emotional well-being (Rosenthal & Lobel, 2011; Seaton, Caldwell, Sellers, & Jackson, 2008). This may further highlight the importance of observing the experiences of minority women, who may be facing a heightened amount of discriminatory encounters (Salm Ward et al., 2013). As unchanging disparities persist, not only for Black women in the U.S., but for other women of color as well, it is important to observe different aspects of their gestational experience. It is similarly important to observe if and how these experiences may differ between racial/ethnic groups and if they are associated with adverse birth outcomes. Thus, the research questions for the current study included:

RQ 1: Is there a difference in pregnancy-specific stress for women of differing racial/ethnic background in the U.S. who have been pregnant in the past 10 years?

RQ2: Is there a difference in perception of discrimination experienced by women of differing racial/ethnic background in the U.S. who have been pregnant in the past 10 years?

RQ3: Is there an association between pregnancy-specific stress and discrimination experienced by women of racial/ethnic minority groups in U.S. and their birth outcomes?

It was hypothesized that there would be no significant differences in pregnancy-specific stress experienced by the women in the sample and that there would be significant differences in discrimination scores between the racial groups. It was also hypothesized that there would be a significant association between both the stress and discrimination experienced by minority women in the sample and having an adverse birth outcome.

Methods

Participants and Recruitment

Women between the ages of 18-45 years old, who had been pregnant in the past 10 years and who were currently living in the U.S. were recruited to take part in the cross-sectional, anonymous, online survey. Participants (n=266) were recruited through social media sites such as Facebook, Reddit, and Instagram. Participants were also obtained through flyers distributed at daycare centers and community organizations that served women and young children. Participation in the survey was voluntary, and informed consent was obtained on the first page of the online survey. Women who gave birth to more than one baby at a time (e.g. twins or triplets) were excluded from the survey. All procedures for this study were approved by (blinded for review) Institutional Review Board, and data collection took place from December 2019-March 2020.

Measures

Participants were asked to provide demographic information in addition to family and medical history, stress experienced during their pregnancy, and discrimination experienced during their pregnancy. Demographic items included ethnic identification, marital status,

education, income, number of people in household, nativity status, state of residence, neighborhood, and racial demographic of neighborhood. Additionally, participants were asked about family history for birth outcomes and the use of WIC services, type of insurance (i.e., private insurance/not private insurance), prenatal care, and BMI before pregnancy. They were also asked about postpartum care following birth.

Pregnancy-Specific stress was measured by the use of two scales, the *Prenatal Distress Questionnaire* (PDQ) and the *Prenatal Life Events Scale* (PLE). The PDQ employed 12 items about conditions during pregnancy, such as bodily changes, symptoms of gestation, and changing relationships (Yali & Lobel, 1999). Participants were asked to rate how worried they were about each condition on a 4-point Likert scale, ranging from *not at all worried* (0) to *extremely worried (3).* A total score was created from the summed ratings, leaving a possible range from 0-48. The PLE used 40 items to measure stressful life events that may have occurred during pregnancy (Barnett, Hanna, & Parker, 1983). Events included experiencing a major move, getting robbed, finding out something was wrong with the developing child, and losing a family member. If a participant indicated they experienced a particular event, they were asked to rate how undesirable the event was, on a scale of 1-4 (*not at all* to *very much*). Two measurements were obtained from this scale, one for the number of stressful life events the participant experienced and another of the summed distress scores from their undesirable rating (Lobel, Dunkel-Schetter, & Scrimshaw, 1992).

Experiences of Discrimination were measured using the *General Ethnic Discrimination* Scale (GED), which was modified to be used for experiences of discrimination among groups with differing ethnic backgrounds, including those who may be speaking English as a second language. The GED used an 18-item scale that asked participants about occurrences of

discrimination in different settings, such as the work place, education, healthcare practices, and other public spaces (Hwang & Goto, 2009). Each item was answered on a 6-point Likert scale of how often the event occurs for the individual (*never* [1] to *almost all the time [6]*) and how stressful they perceived the event to be (*not stressful at all* [1] to *extremely stressful [6]*). Answers for each subscale were summed, with higher scores indicating more experiences of discrimination and higher stress as a result of the events.

Data Analysis

SPSS 24 was used to analyze the data (IBM Corp, 2016). Of the original sample (n=266), 34 participants were excluded for currently being pregnant. An additional 29 participants were excluded due to having a multiparous pregnancy or currently living outside of the U.S. After removing incomplete responses, the final sample included in the data analysis was 198 women. Due to low response among minority groups aside from Black/African American, participants were categorized into three groups based on racial/ethnic identification: non-Hispanic white, Black/African American, and other minorities (n=39). After reporting participant demographics, analyses of variance (ANOVA) explored differences between these three racial/ethnic groups and their pregnancy-specific stress and experienced discrimination scores. A Scheffe post-hoc analysis was employed to observe differences within the three groups. Next, a logistic regression was conducted to examine relationships between identified predictive variables (i.e. race/ethnicity, education level, neighborhood demographics, etc.) and recorded birth outcomes. This relationship was expressed by odd ratios for obtaining an adverse birth outcome (premature birth, low weight birth, miscarriage, or stillbirth). The odd ratios were presented in three models, one for each scale used, and controlled for demographic and pregnancy factors that may influence birth outcomes.

Results

The average age for this sample was 30.7 (SD=4.9). Hispanic/Latina (n=7), Black/African American (n=58), White (n=101), American Indian (n=5), Asian/Pacific Islander (n=7), Mixed race (n=13), and women of other ethnicities (n=7) were represented in this study (*Table 1*). Of this sample, half of the participants (50.6%) indicated that they had family origins from another country (parents or grandparents born in another country), and 81.3% of the participants were married or had a domestic partner while they were pregnant, compared to 13.1% that were never married or single during pregnancy. Overall, 11.6% of participants had at least a high school education while they were pregnant, and 85.3% had some college experience (34.3% with a master's degree or higher). Over half the participants (55.6%) also reported living in a suburban neighborhood.

A majority of the participants in this sample (81.3%) had full-term outcome for their most recent pregnancy, compared to the 16.7% that experienced an adverse birth outcome (see *Table 1* for full birth outcome information). Of the sample, 30.3% of the participants reported they had a family history of adverse birth outcomes, and 52.5% reported being pregnant before. For this sample, 43.9% of participants had a normal BMI prior to pregnancy, 81.8% reported having a private insurance provider during pregnancy, and 42.4% reported that they attended at least one post-partum appointment. Most participants (73.7%) also reported that they became pregnant after November 2016 (following the U.S. presidential election).

Pregnancy-specific stress. Data analysis showed significant differences in pregnancy-specific stress scores for the PDQ ($F[df]= 6.03[2]$, $p < 0.01$) between the three racial groups (shown in *Table 3*). Those grouped within the category of other minorities were found to have higher summed PDQ scores (M=19.49; SD=9.4) than Black (M=13.05; SD=10.5) and non-

Hispanic White (M=16.83; SD=5.5) participants. PDQ Scores for non-Hispanic White (p=0.049) and other minority ($p < 0.01$) women were also differed significantly from Black women.

Prenatal Life Events. Summed scores for the Prenatal Life Events scale showed significant differences for both the number of events measured ($p = 0.012$; F[df]= 4.52[2]) and the rating of undesirability for those events ($p = 0.017$; F[df]= 4.18[2]). Other minority women were found to report more stressful life events during pregnancy (M = 6.23, SD = 4.5) and higher undesirable feelings towards them (M = 17.51, SD = 14.0) than Black or African American women, for both factors (M=4.52 SD= 3.2 and M=13.0, SD=10.4 respectively). Differences between them, however, were not significant. Significant differences in PLE events (*p=0.015*) and PLE ratings (*p=0.017*) were only found between other minority women and White women (M = 4.34, SD = 3.1 and M = 11.42, SD = 10.4 respectively).

Racial discrimination during pregnancy. Both Black (M = 34.8, SD = 11.3) and other minority women (M = 34.84, SD = 15.7) were found to have significantly higher scores for lifetime discrimination than non-Hispanic White women (M = 20.34, SD = 3.3; F[df]= 50.93 [2]; *p < 0.01*) who participated (see *Table 2*). There were no significant differences between the two minority groups for this subscale (*p= 1.0*). Other minority women reported experiencing the most discrimination during pregnancy (M=29.0, SD=14.4; F[df]= 24.94[2]; *p < 0.00*), however scores were not significantly different from Black women who participated (M=25.94 SD=7.0; *p=0.21*). Scores for both minority groups did differ significantly from White women (M=19.18, SD=2.6; *p< 0.00*) for this subscale. Higher scores for stress associated with the encounters of discrimination were observed for other minority women (M=29.95 SD=22.0; F[df]= 51.92[2]; *p< 0.00*), although they did not differ significantly from Black women (M=28.67, SD=21.5;

p=0.93). Both minority groups reported significantly higher scores compared to White women (M=5.51, SD=8.7; *p< 0.00*), experiencing over five times the stress from these encounters.

Adverse health outcomes. The logistic regression analyses concurrently evaluated the influence demographic information and other predictors influenced participants' likelihood of having an adverse birth outcome (shown in *Table 3)*. The first model assessed the influence that pregnancy distress (using the PDQ) had on adverse birth outcomes when controlling for birth and demographic predictors. Model 2 observed the influences of stressful life events during pregnancy on predicting adverse birth outcomes, using the PLE scale. Predictive demographic and birth factors were controlled for in this model as well. Finally, Model 3 explored the influence experiences of discrimination, both throughout lifetime and during pregnancy, had on adverse outcomes following pregnancy. Predictive factors were similarly controlled for in this model.

No variables within Model 1 (r^2=0.219) or Model 2 (r^2=0.256) were significantly associated with self-reported adverse birth outcomes. Model 3, however, explained 26.5% of the variance (r^2=0.265) and contained factors that were significantly associated with experiencing an adverse birth outcome, including being of the Black race (OR=0.07, 95% CI= 0.01- 0.72). Neighborhood demographics and insurance type during pregnancy were also found to be significant factors. Participants living in a racially different neighborhoods (95% CI = 1.10 - 39.21) and who did not have private insurance during pregnancy (95% CI = 1.44 - 68.23) were 6.58 and 9.91 times as likely to report an adverse birth outcome (respectively) than their counterparts. Utilizing WIC services during the gestational journey (before, during, or following pregnancy) was also found to be a significant factor, with participants being 7.31 (OR=7.31, 95% CI=1.57 – 33.98) times as likely to report an adverse birth outcome when compared to those who

did not use WIC services. No other variables were found to be significantly related with self-reported adverse health outcomes for the model controlling for racial discrimination experienced during one's lifetime and pregnancy, in addition to the rating of how stressful those experiences were.

Discussion

With persisting disparities in birth outcomes among minority women throughout the country, and averages that have not changed in over 20 years (David & Collins, 1997; Schoendorf, Hogue, Kleinman, & Rowley, 1992), there is great importance in exploring gestational experiences and how they may effect outcomes for pregnant women. Although birth and demographic data is recorded when women deliver their babies in the U.S., hospital or government databases may lack the in-depth information necessary to understand factors attributing to reoccurring adverse birth outcomes. Exploring aspects of the psychosocial environment during pregnancy may prove helpful for expressing influences on birth and other health outcomes, as well as healthcare utilization, for minority women (Abdou et al., 2010). Since this was a retrospective study, this additional information about experiences during gestation was able to be collected.

Contrary to what was hypothesized, significant differences were found in pregnancy-specific stress scores, with other minority and White women reporting a significantly higher amount of distress during pregnancy than Black women. It may be significance to point out the PDQ's inclusion of feelings related to bodily changes during pregnancy and how that may have influenced the low scores among Black women for this scale. Studies have highlighted varying perceptions of body image based on race/ethnicity, with Black women having lower concerns for mainstream ideas of thinness and higher appreciation for larger body sizes, especially when

strongly identified with their ethnic group (Rogers Wood & Petrie, 2010). Consistent with other studies, Black and other minority women were found to have a higher occurrence of undesirable stressful events during pregnancy (Abdou et al., 2010; Dominguez et al., 2008), although scores did not differ significantly between Black and White women who participated. This insignificant difference in stress scores may be attributed to aspects of culture or varying perceptions of stress, in which Black women have been found to have higher psychological tolerance in encounters of psychosocial pressure (Bey, Waring, Jesdale, & Person, 2018). This tolerance has been attributed to coping mechanisms, in dealing with discrimination from intersected social roles of being both Black and female, that White women do not experience (Bey, Waring, Jesdale, & Person, 2018).

Similar to what was hypothesized, both minority groups reported more experiences of discrimination during pregnancy and throughout their lifetime. Although scores did not differ significantly between the minority groups, women of other minorities reported more experiences of discrimination during pregnancy. When explored further, experiences from American Indian and mixed-race women, which made up 50% of the other minority group, may have contributed to the elevated scores observed for this group. This is significant, since both groups of individuals may be exposed to heightened stress and discriminatory encounters due to identifying with multiple racial/ethnic groups, for mixed-race individuals, or to the historic and current trauma experienced by the American Indian community (Walters & Simoni, 2002).

It was also hypothesized that there would be an association between experiences of pregnancy-specific stress and discrimination and birth outcomes minority women have as a result. Although pregnancy-specific stress was not found to be significantly associated with experiencing an adverse birth outcome, discrimination was, after controlling for other predictive variables. Factors that may attribute to experiences of discrimination, such as living in a racially

different neighborhood and not having a private insurance provider, were observed to be significant influences in experiencing an adverse birth outcome. As a potential source for macro-level experiences of discrimination, research has shown maltreatment (receiving poor service) among black and brown individuals based on having public assistance and the negative effects it ultimately had on parental attitudes towards receiving health services (Salm Ward et al., 2013). Additionally, living in a neighborhood lacking similar ethnic or cultural representation to one's own may leave more room for feeling out of place while also providing more opportunities for discriminatory encounters with people who may not be familiar with (or open to) other cultures and practices.

Results from model 3 also found being of the Black race and utilizing WIC services to be protective against experiencing an adverse birth outcome. Utilizing WIC services typically indicates a need for assistance in improving infant or maternal health, since eligibility is based on both income and risk (Ahluwalia, Hogan, Grummer-Strawn, Colville, & Peterson, 1998). Finding WIC use as a significant factor for this sample could be due to those employing WIC resources already being at risk for obtaining these outcomes. Being of the Black race, despite being found to be a significant factor, had very low odd ratios, indicating that this group was less likely to report an adverse outcome when compared to White women. This outcome could be attributed to the sample size of the study, with Black women having a lower representation, or to the demographic and birth factors that were controlled for. Despite this, the ability to assess the occurrence of specific discriminatory events, and the stress associated with those events, is an added benefit for this study, and was crucial in highlighting a source of stress unexperienced by non-Hispanic White women in this country. With minority women facing multiple avenues of discrimination (racial, gender, or language), in addition to a history of oppression for some

women of color, all contributing to the experiences of stress they may encounter throughout life and during pregnancy (Walters & Simoni, 2002), it is essential to consider these aspects in exploring influences for their reproductive outcomes.

Limitations

Limitations for this study included a low representation of minority women, including American Indians and Latina women, making it difficult to properly examine differences in gestational experiences throughout the country. Additionally, this sample did not have a strong representation for women with adverse birth outcomes (premature birth, low birth weight, stillbirth, miscarriage, etc.), requiring them to be grouped together as a general adverse outcome. Limitations may also include the retrospective aspect of this study, requiring a recall of feelings and situations the participants experienced during pregnancy. This may have left room for both recollection and self-reporting error. Additionally, this sample had a higher representation for participants living in New York, Oklahoma, and Texas, which may have contributed to the differences in perceptions observed, for both stress and discrimination. Moreover, health conditions prior to or obtained during pregnancy were not recorded, which can also influence birth outcomes, aside from the psychosocial factors being explored.

Future Research

Future research may look to obtain a much larger sample size, with recruitment focused on minority populations to obtain a proper representation of their experiences. This would also be beneficial for observing differences within the racial group, to see how ethnic identifications contribute to varying perceptions and birth outcomes. A focus to obtain a higher representation of women who have experienced adverse gestational outcomes would also be beneficial for singling out factors that contribute to outcomes where the fetus survives verses the latter.

Conclusion

The birth outcome disparities seen among minority women in the U.S. continue to be of great concern, since averages have not seen significant changes in over two decades. Observing the differences in what these women experience, both before and during pregnancy, could help researchers and health providers understand what may be contributing to these persistent outcomes. Acknowledging the effects that historically oppressive and current discriminatory actions can have on physical health may also be essential in highlighting the necessity to incorporate psychosocial aspects to interventions that target disparities in reproductive health for minority women in the U.S.

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Table 1. Participant Demographic and Pregnancy Information (N=198)

Variable	N (%)
Age (years)	
Mean age 30.7	166 (83.8)
Race/Ethnicity	
Hispanic/Latino	7 (3.5)
Black/African American	58 (29.3)
White/Caucasian	101 (51.0)
American Indian	5 (2.5)
Asian/ Pacific Islander	7 (3.5)
Mixed Race	13 (6.6)
Other	7 (3.5)
Marital Status	
Single, never married	26 (13.1)
Married or domestic partnership	161 (81.3)
Divorced	5 (2.5)
Separated	1 (0.5)
Education	
Less than High School Diploma	1 (0.5)
High School Degree or Equivalent (GED)	23 (11.6)
Associates Degree (AA, AS)	15 (7.6)
Bachelor's Degree (BA, BS)	83 (41.9)
Master's Degree or Higher (MA, MS, MEd, MD, DDS, DVM, PhD, etc.)	68 (34.3)
Some College	3 (1.5)
Neighborhood	
Rural	28 (14.1)
Urban	54 (27.3)
Suburban	110 (55.6)
Nativity Status	
Immigrant	17 (8.6)
1st Generation American	30 (15.2)
2nd Generation American	12 (6.1)
3rd Generation American	41 (20.7)
None of the above	74 (37.4)
Other	16 (8.1)
Birth Outcomes	
Full-term	161 (81.3)
LBW/Premature	21 (10.6)
Stillbirth/Miscarriage	12 (6.1)
Family History	
Yes	60 (30.3)
No	138 (69.7)
First Pregnancy	
Yes	93 (47.0)
No	104 (52.5)
First Prenatal Visit	
1st Trimester	186 (93.9)
2nd Trimester	9 (4.5)
Health Insurance During Pregnancy	
Private	162 (81.8)
Public	29 (14.6)
None	4 (2.0)
Postpartum Check-up	
Yes, 1 Appointment	99 (50.0)
Yes, 2-3 Appointments	68 (34.3)
Yes, 4 or more Appointments	16 (8.1)
No, I did not	13 (6.6)
BMI Before Pregnancy	
Normal	87 (43.9)
Overweight	39 (19.7)
Obese	49 (24.7)
Pregnancy Date	
Before November 2016	35 (17.7)
After November 2016	146 (73.7)
Missing	17 (8.6)

Table 2. Analysis of Variance: Expressing the Mean(M) and Standard Deviation(SD) for Differences between Pregnancy-Specific Stress and Experienced Discrimination Between Racial/Ethnic Groups.

(PDQ, PLE, and PLE Rating n=198, GED Lifetime n=181, GED Pregnancy n=171, and GED Rating n=198)

Scales	**Black or African American**	**Other Races**	**Non-Hispanic White**	**F-Value (df)**	**P value**
	M (SD)	M (SD)	M (SD)		
PDQ	13.05 (10.5)[bc]	19.49 (9.4)[a]	16.83 (8.5)[a]	6.03 (2)	0.003
PLE	4.52 (3.2)	6.23 (4.5)[c]	4.34 (3.1)[b]	4.52 (2)	0.012
PLE Rating	13.0 (10.4)	17.51 (14.0)[c]	11.42 (10.4)[b]	4.18 (2)	0.017
GED - Lifetime	34.84 (11.3)[c]	34.84 (15.7)[c]	20.34 (3.3)[ab]	50.93 (2)	0.001
GED - Pregnancy	25.94 (7.0)[c]	29.0 (14.4)[c]	19.18 (2.6)[ab]	24.94 (2)	0.001
GED - Rating	28.67 (21.5)[c]	29.95 (22.0)[c]	5.51 (8.7)[ab]	51.92 (2)	0.001

Note. [a] Significantly different than Black/African American. [b] Significantly different than Other Races. [c] Significantly different than White/Caucasian.

PDQ = Pregnancy Distress Questionnaire
PLE = Prenatal Life Events Scale; number of stressful events
PLE Rating = Prenatal Life Events Scale; rating of undesirability for each event
GED Lifetime = General Ethnic Discrimination Scale for lifetime experiences of discrimination
GED Pregnancy = General Ethnic Discrimination Scale for experiences of discrimination during pregnancy
GED Rating = General Ethnic Discrimination Scale rating of stress for each experiences of discrimination

Table 3. Logistic Regression Analyses: Expressing Odd Ratios for Birth Outcomes.

Variable	**N (%)**	**Model 1 OR (95% CI) N = 164**	**Model 2 OR (95% CI) N = 164**	**Model 3 OR (95% CI) N = 146**
Race/Ethnicity				
Non-Hispanic White	101 (51)	1.00	1.00	1.00
Other Minority Groups	39 (19.7)	0.90 (0.17-4.85)	0.53 (0.09-3.11)	0.15 (0.02-1.45)
Black/African American	58 (29.3)	0.35 (0.08-1.62)	0.26 (0.05-1.42)	0.07 (0.01-0.72)*
Education				
Master's Degree or Higher	68 (34.3)	1.00	1.00	1.00
High School or Equivalent	45 (22.7)	0.36 (0.06-1.96)	0.15 (0.02-1.09)	0.17 (0.02-1.35)
Bachelor's Degree	83 (41.9)	0.50 (0.14-1.68)	0.36 (0.10-1.33)	0.27 (0.07-1.16)
Poverty Line				
Above Poverty	159 (80.3)	1.00	1.00	1.00
Poverty	31 (15.7)	1.36 (0.32-5.68)	1.64 (0.37-7.29)	1.23 (0.25-6.10)
Neighborhood Demographics				
Same	104 (52.5)	1.00	1.00	1.00
Different	58 (29.3)	2.53 (0.57-11.31)	3.08 (0.65-14.57)	6.58 (1.10-39.21)*
Mixed	29 (14.6)	0.56 (0.10-3.20)	0.61 (0.10-3.80)	0.58 (0.07-4.76)
Use of WIC Services				
No	150 (75.8)	1.00	1.00	1.00
Yes	44 (22.2)	3.81 (0.94-15.44)	3.64 (0.87-15.36)	7.31 (1.57-33.98)*
BMI				
Normal	87 (43.9)	1.00	1.00	1.00
Overweight	39 (19.7)	2.00 (0.53-7.53)	1.59 (0.42-6.02)	2.46 (0.57-10.71)
Obese	49 (24.7)	2.67 (0.80-8.92)	1.52 (0.47-4.93)	2.26 (0.63-8.11)
Family History				
No	60 (30.3)	1.00	1.00	1.00
Yes	138 (69.7)	1.64 (0.57-4.70)	1.60 (0.54-4.78)	1.69 (0.50-5.67)
First Pregnancy				
Yes	93 (47.0)	1.00	1.00	1.00
No	104 (52.5)	0.55 (0.18-1.68)	0.87 (0.30-2.49)	0.87 (0.27-2.87)
Pregnancy Date				
Before November 2016	35 (17.7)	1.00	1.00	1.00
After November 2016	146 (73.7)	1.10 (0.30-4.02)	1.00 (0.27-3.72)	0.72 (0.17-3.02)
Private Insurance				
Yes	162 (81.8)	1.00	1.00	1.00
No	33 (16.7)	4.39 (0.88-21.86)	4.16 (0.75-23.13)	9.91 (1.44-68.23)*
Postpartum Appointment				
Two or more	84 (42.4)	1.00	1.00	1.00
One or none	112 (56.6)	1.42 (0.49-4.12)	1.24 (0.44-3.47)	0.84 (0.28-2.53)
Neighborhood				
Suburban	110 (55.6)	1.00	1.00	1.00
Urban	54 (27.3)	0.90 (0.29-4.12)	0.42 (0.08-2.13)	0.54 (0.10-2.85)
Rural	28 (14.1)	0.31 (0.06-4.12)	0.57 (0.16-1.99)	0.88 (0.25-3.13)
Scales				
Pregnancy Distress Questionnaire	198 (100)	0.95 (0.90-4.12)	-	-
Prenatal Life Events	198 (100)	-	0.82 (0.43-1.54)	-
Prenatal Life Events Rating	198 (100)	-	1.14 (0.93-1.40)	-
GED Scale Lifetime	181 (91.4)	-	-	1.11 (0.95-1.29)
GED Scale Pregnancy	171 (86.4)	-	-	0.90 (0.80-1.02)
GED Scale Rating	198 (100)	-	-	0.99 (0.93-1.06)
R^2		0.219	0.256	0.265

Note. *Significant Correlations

CHAPTER 5: FUTURE RESEARCH

Despite limitations, the present study provides a closer look into the stress and discrimination experienced by pregnant women across the country, offering necessary information when considering psychosocial attributes to disparate birth outcomes in the U.S. Future research may include obtaining this information from pregnant women on a lager scale, to draw stronger associations and obtain more generalizable conclusions. Including a higher representation of Black, Indian American, Latina, and mixed-race women would also be beneficial for a more in-depth look at how their experiences relate to specific birth outcomes. This would help in observing differences within racial groups, between different ethnic identities, and for incorporating the impact of nativity status.

A larger sample size would assist in obtaining more information from women who experienced adverse outcomes to their pregnancies, allowing for associations to be drawn between gestational outcomes where the fetus does or does not survive. Asking for gestational age and weight in grams at birth may also be better methods of obtaining birth outcome information in which the fetus survives. It might also be beneficial to expand the outcomes observed to include more adverse gestational results relating to the mother, such as postpartum conditions and maternal mortality, since disparities are persistent for those outcomes as well.

Continued research could be used as building blocks for interventions geared towards minority women as well as the organizations and practices that serve them. This could be helpful in making environments more diverse and culturally aware, while also teaching specific medical personal what extra precautions need to be taken for minority women who are pregnant. Whether that means having additional check-ups, providing better resources for understanding gestational experiences, or providing more emotional (or mental) support for both pregnant and young

women of color, or having additional training for the healthcare professionals working with them, the obtained information can aid decisions in what should be implemented.

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Appendices

Appendix A: Survey Scales and Questions

Revised Prenatal Distress Scale:

To some women, certain aspects of pregnancy are uncomfortable or upsetting, although other women may not be bothered by the same things. Please indicate your own feelings about each item below by choosing from the following alternatives:

Not at all (0), A little (1), Moderately (2), Very Much (3), and Extremely (4)

I found weight gain during pregnancy troubling.

Physical symptoms of pregnancy such as nausea, vomiting, swollen feet, or backaches irritated me.

I was worried about handling the baby when I first went home from the hospital

Emotional ups and downs during pregnancy annoyed me.

I was troubled that my relationships with other people important to me were changing due to my pregnancy.

I was worried about eating healthy food and a balanced diet for the baby.

Overall, the changes in my body shape and size during pregnancy bothered me.

I was concerned that having a new baby would alter my relationship with the baby's father.

I worried about having an unhealthy baby.

I was anxious about labor and delivery.

The possibility of premature delivery frightened me.

I was worried that I might not become emotionally attached to the baby.

Prenatal Life Events:

For the following question, select all events that occurred during your most recent pregnancy. On a scale of 1-4, please indicate how undesirable this experience was when you went through it:

Not at all undesirable (1), A little Undesirable (2), Undesirable (3), Very Undesirable (4)

You were the cause of a traffic accident in which someone was badly injured.

Someone close to you (in the family or outside) died.

You became seriously ill.

Increasingly serious arguments developed with your mother.

Someone close to you (in the family or outside) developed a serious illness.

A major financial crisis arose.

You had difficulty in arranging for someone to look after your family whilst in hospital.

You were separated from your family or a close friend.

Increasingly serious arguments developed with your in-laws.

You had blood pressure trouble.

You found out you were pregnant and did not want to be.

A new person came to live in your household (not baby).

You moved house.

You stopped work.

You were involved in a legal action which could have damaged your reputation.

You were in contact with someone who had an infectious disease that might've effected your baby.

You heard that something you took (medication, alcohol, cigarettes) during pregnancy might be harmful to the baby.

You were told your baby would need some special treatment after the birth.

You almost miscarried before 3 months.

You were told medical complications might arise during delivery.

You were told your obstetrician would not be present at the delivery of your baby.

You had a caesarian operation.

You found out you were pregnant and did not want to be.

You developed piles (hemorrhoids).

You developed varicose veins (twisted or swollen veins typically in the legs).

You had severe vomiting/morning sickness.

You had an amniocentesis investigation during the pregnancy.

You had an ultrasound investigation during the pregnancy.

Your baby was not the sex you hoped for.

You were told your baby would be abnormal.

You were pregnant and your husband/partner did not want you to be.

You were told by your husband/partner that you were no longer loved.

You separated from your husband/partner.

Your husband's/partner's business failed.

Your husband/partner died.

Your husband/partner was unfaithful.

Increasingly serious arguments developed with your husband/partner.

Your husband/partner became unemployed.

There were problems with your sexual relationship during the pregnancy.

Your husband/partner said he would not be present during delivery.

General Ethnic Discrimination Scale

For the following question, indicate if the situation applies to you and, if it does, how often. For' how often while pregnant' and 'how often in life' the following options will be available:

Never (1), Once in a while (2), Sometimes (3), A lot (4), Most of the time (5), Almost always (6)

The participants will also be asked to rate how stressful each event was on a scale of 1-6, with (1) being not stressful and (6) being extremely stressful.

How often have you been treated unfairly by teachers and professors because or your racial/ethnic group?

How often have you been treated unfairly by your employers, bosses, and supervisors because of your racial/ethnic group?

How often have you been treated unfairly by your co-workers, fellow students, and colleagues because of you racial/ethnic group?

How often have you been treated unfairly by people in service jobs (store clerks, waiters, bartenders, bank tellers, etc.) because of your racial/ethnicity?

How often have you been treated unfairly by strangers because of your racial/ethnic group?

How often have you been treated unfairly by people in helping jobs (doctors, nurses, psychiatrists, case workers, dentists, school counselors, therapists, social workers, etc.) because of your racial/ethnic group?

How often have you been treated unfairly by neighbors because of your racial/ethnic group?

How often have you been treated unfairly by institutions (schools, universities, law firms, the police, the courts, the Department of Social Services, the Unemployment Office, etc.) because of your racial/ethnic group?

How often have you been treated unfairly by people that you thought were your friends because of your racial/ethnic group?

How often have you been accused or suspected of doing something wrong (such as stealing, cheating, not doing your share of the work, or breaking the law) because of your racial/ethnic group?

How often have people misunderstood your intentions and motives because of your race/ethnic group?

How often did you want to tell someone off for being racist towards you but didn’t say anything?

How often have you been really angry about something racist that was done to you?

How often have you been forced to take drastic steps (such as filing a grievance, filing a lawsuit, quitting your job, moving away, and other actions) to deal with some racist thing that was done to you?

How often have you been called a racist name?

How often have you gotten into an argument or a fight about something racist that was done to you or to another member of your racial/ethnic group?

How often have you been made fun of, picked on, shoved, hit, or threatened with harm because of your racial/ethnic group?

How different do you think your life would be now if you had not been treated in a racist and unfair way?

Screener Questions

What is your biological sex? (Male or Female)

Have you ever been pregnant? (Yes or No)

How long ago was your most recent pregnancy (whether or not you carried to full term)?

The options given will be: I am currently pregnant, Within the last year, 2 years ago, 3 years ago, 4 years ago, more than 4 years ago _____)

How old were you during your most recent pregnancy?

There will be a text box for the participant to enter their age.

For your most recent pregnancy, were you pregnant with more than one baby (did you carry twins, triplets, etc.)? (Yes or No)

Do you currently live in the U.S.? (Yes or No)

For your most recent pregnancy, did you carry to full term? (Yes or No)

How would you best describe yourself? (Hispanic/Latino, Black/African American, White/Caucasian, American Indian/Native Alaskan, Asian/Pacific Islander, or Other)

Birth Outcome Questions:

During your last pregnancy, when did you find out you were pregnant? (January 2009-December 2019)

Was your last pregnancy your first?

Yes, or No

How many times have you been pregnant? (This includes pregnancies that didn't carry to full term).

The answer options will include: Once, 2-4 times, 5 or more times

What was the outcome of your most recent pregnancy?

The answer options will include: Carried to full term, LBW delivery, premature delivery, stillbirth delivery, miscarried, and other.

Have you had this birth outcome in a previous pregnancy?

The answer options will include: Yes, no, and this was my first pregnancy.

Do you have a family history of any of these outcomes?

The answer options will include: Yes, no, and I’m not sure.

If yes (for question 5), for which outcome?

When was your first medical appointment for prenatal care after knowledge of your pregnancy?

The answer options will include: First, second, third trimester, and none at all.

What was your health insurance status during pregnancy?

The answer options will include: Private, public/Medicaid, or none.

What was your health insurance status following pregnancy?

The answer options will include: Private, public/Medicaid, or none.

Did you have a postpartum checkup with your doctor?

The answer options will include: Yes 1 appointment, yes 2 or 3 appointments, yes 4 or more appointments, and no I did not.

How long after you delivered was this appointment?

The participant will enter an answer similar to: 3 weeks, 5 weeks, 12 weeks after, etc.

What was your weight prior to getting pregnant?

The participant will be able to enter their weight directly or select unsure.

What was your height prior to getting pregnant?

The participant will be able to enter their height directly or select unsure.

How much weight did you gain during your pregnancy?

The participant will be able to enter their weight directly or select unsure.

Please indicate if you used any of the following tobacco products during your pregnancy (even just one time).

The answer options will include: Regular cigarettes, E-cigarettes, E-cigarette mods or tanks, Flavored cigarettes (ex. Camel Crush), Flavored Little Cigars, Hookah or Water Pipes, Snus such as Camel or Marlboro, or some other tobacco product.

Please indicate if you did any of the following during your pregnancy (even just one).

The answer options will include: Drank a beverage containing alcohol, used opioids, used methamphetamine, and used marijuana.

Demographic Questions:

What would you classify your ethnic background as?

The answer options will include: African, African American, Caribbean/ West Indian, Caribbean American, Indian, Latino, Latino American, Asian, Asian American, Pacific Islander/Native Hawaiian, Native American, Native Alaskan, European, European American, Middle Eastern, and Other.

How would you describe your nativity status?

The answer options will include: Immigrant, 1st generation American, 2nd generation American, 3rd generation American, none of the above, and other.

Which of the following describes the neighborhood you live in?

The answer options will include: Rural, Urban, Suburban

What is the racial demographic of your neighborhood is?

The answer options will include: Mostly Back/African American/African/Caribbean, mostly Hispanic, mostly Caucasian, mostly Asian/Pacific Islander, mostly Native American/ Native Alaskan, and other.

What was your household income during your last pregnancy?

The options available will include: Less than $10,000, $10,000 to $19,999, $20,000 to $29,999, $30,000 to $39,999, $40,000 to $49,999, $50,000 to $59,999, $60,000 to $69,999, $70,000 to $79,999, $80,000 to $89,999, $90,000 to $99,999, $100,000 to $149,999, and $150,000 or more.

How many people were a part of your household during this time?

The participant will be able to enter the amount on their own.

Did you utilize any government funded programs (such as WIC) before, during, or following pregnancy?

The options would be check all that apply and include: yes before giving birth, yes while I was pregnant, yes after giving birth, no, and I'm not sure.

What was your highest level of education at the time of your last pregnancy?

The answer options will include: Less than High School Diploma, High School Degree or Equivalent (GED), Associates Degree, Bachelor's Degree, Master's Degree or Higher, and none of the previous choices apply.

What was your marital status during your last pregnancy?

The options available will include: single/never married, married or domestic partnership, widowed, divorced, and separated

What state do you currently live in?

The participant will select which state from the options available.

Appendix B: Recruitment Script:

Female participants needed for research study observing birth outcomes among women of different ethnic backgrounds in the United States. To participate, you must be 18 years or older, have been pregnant in the past 10 years (regardless of the birth outcome) and currently living in the United States. The survey will take about 20-25 minutes to complete. After completing the survey, the participant will have the option of entering their name for a drawing to receive a $25 gift card. You can follow the link or QR code bellow to the online survey.

If you have any questions prior to taking the survey, please contact the primary researcher by email at Page.Dobbs@ou.edu or Aleyah.johnson-1@ou.edu.

If you do not qualify: Thank you for your willingness to participate in this study.

If you know someone else that may qualify: please share their contact information with us (preferably their email) so we can send them a link to the survey.

IRB: 11362

IRB Approval Date: 12/04/2019

https://survey.az1.qualtrics.com/jfe/form/SV_bkEdLOZQMjcwAAt

Appendix C: Consent Form:

Please read this document BEFORE agreeing to take part in my research.

What is the purpose of this study?

To scale the pregnancy-specific stress and discrimination experienced by women in the U.S. and compare birth outcomes among them.

About how many participants will be in this research?

Approximately 400 women who have been pregnant in the past 10 years that will take part in this study.

What will I be asked to do?

If you qualify, you would be asked to complete a survey, which is available online.

How long will I be in the study?

The survey will take about 20-25 minutes to complete.

What are the possible risks and/or benefits if I participate?

There are no risks with participating in this study. You can stop your participation at any moment throughout the survey.

Will I be compensated for participating?

Participants for the study will have the option of entering a drawing after completion of the survey. If they are selected, they will receive a $25 gift card. Participants are only eligible for this option if they are currently a U.S. citizen and do not work for the University of Oklahoma.

Who will see my information?

All information obtained through the survey will be kept confidential. Personal identifiers will be deleted after the recruitment process is complete. All published information will be presented as group data to further ensure that your privacy will be protected. The data will be collected through an online survey system that has its own privacy and security policies for keeping your information confidential. No assurance can be made as to their use of the data you provide.

Do I have to participate?

Your participation is not mandatory. You can stop participation in this survey at any moment.

What will happen to my data in the future?

The data collected may be shared with other researchers in the future without getting additional consent from you.

Who can I contact if I have questions, concerns, or complaints about the study?

For additional information regarding the study, please contact Page Dobbs or Aleyah Johnson before or after completing the survey at Page.Dobbs@ou.edu or aleyah.johnson-1@ou.edu.

You can also contact the University of Oklahoma – Norman Campus Institutional Review Board (OU-NC IRB) at (405) 325-8110 or irb@ou.edu if you have questions, concerns, or complaints about your rights as a research participant, or if you don't want to talk to the researcher.

This research has been approved by the University of Oklahoma, Norman Campus IRB.

IRB Number: 11362 **Approval date:** 12/04/2019

By providing information to the researcher(s), I am agreeing to participate in this research.

Required

- I agree to participate (click should connect to survey)
- I do not want to participate (click should connect to end of survey)