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Adverse birth outcomes: Investigating the role of nativity and perceived racial discrimination among black mothers enrolled in Des Moines, Iowa healthy start.

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ADVERSE BIRTH OUTCOMES: INVESTIGATING THE ROLE OF NATIVITY AND PERCEIVED RACIAL DISCRIMINATION AMONG BLACK MOTHERS ENROLLED IN DES MOINES, IOWA HEALTHY START

By
Kendria Kelly-Taylor
B.S., Purdue University, 2014
M.S.P.H., Meharry Medical College, 2018

A Dissertation
Submitted to the Faculty of the
School of Public Health and Information Sciences of the University of Louisville
In Partial Fulfillment of the Requirements
for the Degree of

Doctor of Philosophy
in Public Health Sciences

Department of Epidemiology and Population Health
University of Louisville
Louisville, Kentucky

May 2023
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A Dissertation Approved on

April 20, 2023

by the following Dissertation Committee:

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Dr. Kira C Taylor

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Dr. Brian Guinn

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Dr. Muriel Harris

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Dr. Aishia Brown
DEDICATION

The dissertation is dedicated to my mother,

Stacy Kelly-Taylor.

As a preterm infant you never stopped believing in my strength from day one, and today I stand before you as a product of your hard work, dedication, and perseverance.

Thank you and I love you!
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I would like to thank my committee chair and mentor, Dr. Anne Wallis, for introducing me to Maternal and Child Health. I am thankful for your guidance, encouragement, and willingness to support me in my venues to uplift Black maternal and child health needs. I also like to thank you for believing in me when I did not believe in myself. Also, for never doubting my ability and providing me with opportunities to grow professionally and personally.

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challenging me academically. I am forever grateful.
ABSTRACT

ADVERSE BIRTH OUTCOMES: INVESTIGATING THE ROLE OF NATIVITY AND PERCEIVED RACIAL DISCRIMINATION AMONG BLACK MOTHERS ENROLLED IN DES MOINES, IOWA HEALTHY START

Kendria Kelly-Taylor

April 20th, 2023

Birth outcomes for Black women in the United States (US) are disproportionately worse in comparison to non-Black women, even when controlling for potential confounders. Existing studies suggest foreign-born (FB) Black women present better birth outcomes in comparison to US-born (USB) Black women. Also, the longer FB Black women live in the US, the more their perinatal health advantage diminishes. Racial discrimination has been hypothesized as a potential reason for this decline. This dissertation investigates the relationship between nativity and adverse birth outcomes while also exploring how the reporting of racial discrimination impacts birth outcomes among FB and USB Black mothers who participate in Des Moines Healthy Start.

Secondary data (N= 1233, USB = 904, FB = 329) from the Healthy Start database from 2000 to 2021 was used to examine the association between nativity, preterm birth (PTB) and small for gestational age (SGA). Primary data (N= 31, USB =4, FB = 27) was captured using a survey that measured three domains: perceived racial discrimination, perceived stress, and acculturation. Perceived Racial Discrimination was measured
using the Racial Microaggression Scale (RMAS). Mothers of singleton live births and self-identified as Black or African American were included in the study.

USB Black women presented higher odds of PTB (OR:1.65, 95% CI 1.13-2.40) and SGA (OR: 1.47, 95% CI 0.92-2.35) in comparison to their FB counterparts, yet after adjustment for covariates, this effect attenuated, and no significant differences were observed. Also, USB Black women reported higher scores on the RMAS. Among FB Black women, higher reports were observed among those who resided in the US for more than 5 years or migrated prior to 18 years of age. Additionally, the odds of having an adverse birth outcome increased for each additional experience of racial discrimination among FB Black women. The findings of our study suggest though FB Blacks mothers present a perinatal advantage, exposure to racial discrimination, contingent on the age of migration and the duration of residency, aids in the decline of their birth outcomes. This study provides a basis for future research in the areas of nativity, racial discrimination, and acculturation.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEDICATION</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>iv</td>
</tr>
<tr>
<td>ABSTRACTS</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>x</td>
</tr>
<tr>
<td>I. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>II. OBJECTIVE, STUDY AIMS, HYPOTHESES</td>
<td>4</td>
</tr>
<tr>
<td>III. LITERATURE REVIEW</td>
<td>6</td>
</tr>
<tr>
<td>Definition of PTB and SGA</td>
<td>6</td>
</tr>
<tr>
<td>Casual Mechanism of PTB and SGA</td>
<td>7</td>
</tr>
<tr>
<td>Factors Associated with PTB and SGA</td>
<td>8</td>
</tr>
<tr>
<td>Maternal Age</td>
<td>9</td>
</tr>
<tr>
<td>Maternal Ethnicity</td>
<td>10</td>
</tr>
<tr>
<td>Tobacco and Alcohol Use</td>
<td>12</td>
</tr>
<tr>
<td>Prenatal Care</td>
<td>13</td>
</tr>
<tr>
<td>Maternal Health Conditions</td>
<td>15</td>
</tr>
<tr>
<td>Socioeconomic Status</td>
<td>17</td>
</tr>
<tr>
<td>Social Support: Marital Status</td>
<td>18</td>
</tr>
<tr>
<td>Psychological Distress: Depression</td>
<td>19</td>
</tr>
<tr>
<td>Maternal Stress</td>
<td>21</td>
</tr>
<tr>
<td>Black Immigrant Health: An Overview</td>
<td>22</td>
</tr>
<tr>
<td>Racial Disparity in Birth Outcomes</td>
<td>23</td>
</tr>
<tr>
<td>Length of Residency in the US and Birth Outcomes</td>
<td>25</td>
</tr>
<tr>
<td>Maternal Stress: An Expansion</td>
<td>26</td>
</tr>
<tr>
<td>Racial Discrimination</td>
<td>27</td>
</tr>
<tr>
<td>Perceived Racial Discrimination and Birth Outcomes</td>
<td>29</td>
</tr>
<tr>
<td>Biological Mechanism</td>
<td>31</td>
</tr>
<tr>
<td>Theoretical Underpinning</td>
<td>32</td>
</tr>
<tr>
<td>Conceptual Model</td>
<td>35</td>
</tr>
<tr>
<td>Summary</td>
<td>35</td>
</tr>
<tr>
<td>IV. METHODS</td>
<td>37</td>
</tr>
<tr>
<td>Study Design</td>
<td>37</td>
</tr>
<tr>
<td>Study Site</td>
<td>37</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 1: Birth Outcomes Among US-born and Foreign-born Black Women..... 88
Table 2: Racial Microaggression Scale Domains................................. 40
Table 3: Study Covariates.............................................................. 44
Table 4: Descriptive Data by Nativity Status .................................... 51
Table 5: Birth Outcomes by Nativity Status....................................... 53
Table 6: Association between Nativity Status and PTB and SGA: Logistic Regression Models......................................................... 54
Table 7: Change in Beta Estimate of Nativity in Bivariate Logistic Regression Model................................................................. 55
Table 8: Descriptive Table of Survey Participants................................. 58
Table 9: Internal Consistency of RMAS.............................................. 60
Table 10: Reporting of Median Racial Microaggression Scores by Nativity Status................................................................. 61
Table 11: Differences in Median Racial Microaggression Scores by Duration of Residency and Age of Migration in the US among Foreign-born Black Women................................................................. 61
Table 12: Prevalence of Adverse Birth Outcomes among Foreign-born Black Women................................................................. 63
Table 13: Wilcoxon Mean Scores for Perceived Racial Discrimination by Duration of Residency and Age of Migration in the US................. 63
I. INTRODUCTION

The global burden of preterm birth (PTB) and small for gestational age (SGA) are of public health concern. Estimates suggest that approximately 15 million babies worldwide are born preterm indicating a global preterm birth rate of approximately 11% (Walani, 2020). Globally, the burden of preterm births disproportionately impacts countries categorized as low-income. However, high-income countries, specifically the United States, rank in the top ten countries with the greatest number of preterm births (World Health Organization, 2018). Likewise, 32.5 million infants worldwide are born SGA (Lee et al., 2013; Osuchukwu OO & Reed DJ, 2022). Over the past two decades, the incidence of SGA in the United States has increased to as high as 29%, with a limited understanding of the causation (Ewing, Ellington, Shapiro-Mendoza, Barfield, & Kourtis, 2017).

US-born Black women experience the greatest burden of PTB, and SGA compared to other racial and ethnic groups in the United States. Currently, the preterm birth rate for Black women is 14.4%, which far exceeds the national average of 10.2% and the white PTB rate of 9.2% (Centers for Disease Control and Prevention, 2020). Moreover, it is well known that Black infants have a higher incidence of SGA (Alexander, Kogan, Himes, Mor, & Goldenberg, 1999). Grobman et al., (2018) found that non-Hispanic Black women had an increased risk of all adverse birth outcomes across eight clinical sites in the United States. The prevalence of SGA among Non-Hispanic
Black women was 17.2%, the highest prevalence compared to other racial groups and more than 50% higher prevalence compared to non-Hispanic white women (PR: 8.6%) (Grobman et al., 2018).

Extensive research has examined the differences in birth outcomes across racial and ethnic groups, with significant research examining the Black-white disparity. In recent years, scholars have noted that solely focusing on the Black–white disparity hinders the full etiological understanding of factors associated with disparities in birth outcomes. This dissertation research will shift the lens and focus on the differences in birth outcomes among foreign-born Black women and US-born Black women to gain an understanding of how nativity and other factors may facilitate this disparity.

Research suggests foreign-born Black women present more favorable birth outcomes in comparison to US-born Black women even when adjusting for well-known behavioral, socioeconomic, and maternal health risk factors. Furthermore, the existing literature proposes that the longer foreign-born Black women live in the US, the more their perinatal health advantage diminishes, and their birth outcomes mirror those of US-born Black women. One possible theory is that living in the US exposes foreign-born Black women to racial discrimination that they may not otherwise have experienced in their home country if they were born in a black-majority region. Exposure to racial discrimination has been linked to poor health outcomes including cardiovascular disease, obesity, and cancer (R. T. Carter, Lau, Johnson, & Kirkinis, 2017b) Racial discrimination has also been associated with negative perinatal health outcomes including PTB and SGA (Alhusen, Bower, Epstein, & Sharps, 2016). Significant research has explored the relationship between experiences of racial discrimination and adverse birth outcomes.
among US-born Black women (Nancy Dole et al., 2004; D. Misra, Strobino, & Trabert, 2010; Slaughter-Acey et al., 2016; Slaughter-Acey, Talley, Stevenson, & Misra, 2019) yet less research has explored this among foreign-born Black women.

The literature suggests that foreign-born Black women may perceive racial discrimination less than US-born Black women (Krieger, Kosheleva, Waterman, Chen, & Koenen, 2011) but research findings are few. Moreover, the literature suggests that the perception of racial discrimination among foreign-born women is contingent on the age of migration and length of US residency (T. P. Dominguez, E. F. Strong, N. Krieger, M. W. Gillman, & J. W. Rich-Edwards, 2009). In addition, foreign-born Black women live at the intersections of being female, Black, and foreign-born, thus constructing a unique experience that may impact birth outcomes (Hossin, 2020).

To date, there is no study that has quantitively examined the association between perceived racial discrimination and birth outcomes among foreign-born and US-born women. Dominquez and colleagues (2009) attempted to examine this association, yet due to limitations in sample size and prevalence of adverse birth outcomes effect estimates could not be determined (T. P. Dominguez et al., 2009). In addition, to our knowledge, there is no study that has examined the association between perceived racial discrimination and birth outcomes in Healthy Start, a federally funded program.

This dissertation explores the role of nativity and perceived racial discrimination and their impact on birth outcomes among foreign-born and US-born Black women who participate in Des Moines, Iowa Healthy Start Program.
II. OBJECTIVE, STUDY AIMS, HYPOTHESES

The objective of the study was to examine PTB and SGA among foreign-born and US-born Black women who participate in a federal Healthy Start program in Des Moines, Iowa, where there is a high population proportion of American Black and foreign-born Black clients. In addition, the objective of the study is to quantitatively explore the relationship between nativity, adverse outcomes, and social and behavioral factors. Furthermore, the study examines the differences in reporting racial discrimination between foreign-born and US-Born Black women and its impact on birth outcomes.

**Study Aims and Hypotheses**

**Aim 1**: To compare the rates of SGA and PTB among US-born and foreign-born Black women while adjusting for socioeconomic, behavioral, psychosocial, and maternal health conditions.

*Ho: There will be no significant difference between rates of PTB and/or SGA among foreign-born Black women compared to rates of PTB and SGA among US-born Black women while adjusting for socioeconomic, behavioral, psychosocial, and maternal health conditions.*

*Ha: Rates of PTB and SGA among foreign-born Black women will significantly differ as adjusting to rates of PTB and SGA among US-born Black women while controlling for socioeconomic, behavioral, psychosocial, and maternal health conditions.*
**Aim 2:** To describe the reporting of racial discrimination among Black women based on their nativity status, age of migration, duration of residency in the United States, and other socioeconomic, behavioral, and maternal health characteristics.

**Aim 3:** To determine if (A) there is a crude association between perceived racial discrimination and adverse birth outcomes and (B) how the reporting of perceived discrimination differed by the length of residence in the US and age of migration among foreign-born Black women.

**Ho:** (A) There will be no significant association between perceived racial discrimination and adverse birth outcomes among foreign-born Black women.

**Ha:** (A) There will be a significant association between perceived racial discrimination and adverse birth outcomes among foreign-born Black women.

**Ho:** (2) There will be no significant difference in the reporting of perceived racial discrimination among foreign-born women who have lived in the US for less than 5 years compared to those who have lived in the US for 5 or more years or migrated to the US before age 18 compared to those who migrated to the US after age 18.

**Ha:** (2) There will be a significant difference in the reporting of perceived racial discrimination among foreign-born women who have lived in the US for less than 5 years compared to those who have lived in the US for 5 or more years or migrated to the US before age 18 compared to those who migrated to the US after age 18.
III. LITERATURE REVIEW

The purpose of the study is to explore the role of nativity and perceived racial discrimination and its impact on adverse birth outcomes among foreign-born and US-born Black women. Adverse birth outcomes refer to infant health problems resulting from complications of pregnancy and childbirth. Preterm birth and low birth weight are two commonly studied adverse birth outcomes, yet other examples include birth defects, infant mortality, and neonatal death for example. This review of literature will primarily focus on preterm birth and small for gestational age among Black women living in the US.

**Definition of PTB and SGA**

PTB is defined as the birth of a baby before 37 completed weeks of gestation (Centers for Disease Control and Prevention, 2020). PTB can be categorized into subgroups including extremely preterm (less than 28 gestational weeks), very preterm (28-to-32-gestational weeks), and moderate to late preterm (32-to-37 gestational weeks). During the final weeks of pregnancy, vital organs including the brain, lungs, and liver undergo maturation. Immaturity of these organs can lead to complications and increase the risk of respiratory distress infections, hypoglycemia, and birth defects to name a few (Moster, Lie, & Markestad, 2008; Simmons, Rubens, Darmstadt, & Gravett, 2010; Swamy, Ostbye, & Skjaerven, 2008).
SGA is defined as an infant born below the 10th percentile of birth weight; specified by gestational age and sex (Ewing, Ellington, Shapiro-Mendoza, Barfield, & Kourtis, 2017). SGA infants comprise those who are constitutionally smaller due to genetic disposition and those who suffer from intrauterine growth restriction (IUGR). Maternal and environmental factors for including malnutrition, placental insufficiency, and pregnancy complications (i.e., preeclampsia) are common factors associated with IUGR (Damhuis, Ganzevoort, & Gordijn, 2021; Lesley Mccowan & Horgan, 2009). Often, SGA infants may also have low birth weight (LBW), yet these terms are not synonymous. Likewise, SGA is a common proxy for IUGR yet, not all SGA infants suffer from IUGR and vice-versa. Infants classified as SGA are also at an increased risk of infant deaths similar to preterm infants. Additionally, PTB and SGA are associated with neurocognitive disabilities, developmental delays, and increased risk of chronic adult diseases (Damhuis et al., 2021; Luu, Katz, Leeson, Thébaud, & Nuyt, 2016; Lme Mccowan et al., 2010)

Causal Mechanism of PTB and SGA

Preterm birth can be a consequence of 1) spontaneous preterm labor with an intact membrane, 2) maternal or fetus symptoms that promote iatrogenic preterm delivery, or 3) preterm premature rupture of membranes (PPROM). The onset of preterm labor is thought to be the product of multiple mechanisms that operate through distinctive pathways resulting in a transition from uterine quiescence (i.e., a stage of parturition) to preterm labor or PPROM (Goldenberg, Culhane, Iams, & Romero, 2008; Simmons et al., 2010). Common etiological pathways include infection/inflammation, uteroplacental hemorrhage, activation of the hypothalamic-pituitary-adrenal resulting from maternal or
fetal stress, uterine overdistension, and other immunological-related processes (Goldenberg et al., 2008; Simmons et al., 2010). Though no single pathway is clearly defined, each of these mechanisms described can be influenced by genetic variability and environmental factors.

SGA is a statistical notion of fetal size, often defined by less than 10% birthweight based on specified reference curves. To that end, SGA describes the differences in fetal size, not the underlying condition. Yet, SGA has been used interchangeably with IUGR due to ease of interpretation and the assumption that the smaller an infant the more likely it has experienced IUGR (Damhuis et al., 2021). Nonetheless, the primary underlying mechanism of SGA lies in placental insufficiency caused by impaired placental function. Thus, the fetus fails to reach its inherent growth potential resulting from a deprivation of oxygen and nutrition (Damhuis et al., 2021).

Factors Associated with PTB and SGA

Several risk factors have been investigated for PTB and SGA including biological, social, and environmental factors. Some well-documented risk factors for PTB include women with a history of preterm deliveries, multiple gestations, chronic medical conditions, and abnormalities of reproductive organs (e.g., short cervix) (Fuchs & Senat, 2016; Ville & Rozenberg, 2018). In addition, maternal ethnicity, age, healthcare accessibility, smoking/alcohol use, negative social support, exposure to environmental pollutants, residing in a disadvantaged neighborhood, and stress have also been identified (Ncube, Enquobahrie, Albert, Herrick, & Burke, 2016). Some established factors associated with SGA include constitutional factors (e.g., maternal height and weight), maternal age, substance use, educational status, chronic medical conditions, and
hypertensive disorders during pregnancy (Lesley Mccowan & Horgan, 2009). The following section will cover the study's risk factors, including maternal age, ethnicity, smoking and alcohol use, prenatal care, hypertensive disorders, gestational diabetes, socioeconomic status, social support, depression, and maternal stress.

**Maternal Age**

Several studies have demonstrated the effect of maternal age on pregnancy outcomes (Ferre, Callaghan, Olson, Sharma, & Barfield, 2016; Khalil, Syngelaki, Maiz, Zinevich, & Nicolaides, 2013). Maternal age is a risk factor for PTB and SGA, as it can be indicative of additional risk factors associated with adverse birth outcomes. For example, Ferrè and colleagues (2016) examined the relationship between maternal age and age-specific rates of preterm birth in the US in 2007 and 2014. The study findings suggest the rate of overall PTB decreased largely due to the decline in teen pregnancies and births among mothers between the ages of 20 to 24 years old. Characteristics of this age group such as low socioeconomic status and smoking are contributing factors to preterm birth, thus as maternal age increased, there was a reduction in these characteristics. Additionally, the study identified that mothers in their mid-twenties to thirties faced pre-existing chronic conditions impacting their risk of PTB (Ferre et al., 2016).

Moreover, Khalil and colleagues (2013) investigated the association between maternal age and adverse pregnancy outcomes utilizing a retrospective cohort study design (Khalil et al., 2013). Maternal characteristics, medical history, and pregnancy outcomes were collected from mothers of singleton births at their first routine check-up post-delivery. Maternal age was examined as a continuous and categorical variable as
such <35 years, 35-39 years, and ≥ 40 years. Overall, the findings suggest that the risk of adverse pregnancy outcomes increases with age, with advanced maternal age (i.e., ≥ 40 years) having the greatest risk (Khalil et al., 2013). More specifically, this study found that after controlling for maternal characteristics and obstetric history, maternal age greater than 35 years was associated with a 46% increased risk of SGA and a 35% increased risk of iatrogenic PTB but no increased risk of spontaneous PTB. Furthermore, additional risk factors for SGA and iatrogenic PTB included being of a racial background other than white, smoking, chronic hypertension, assisted conception, and type II diabetes (Khalil et al., 2013).

**Maternal Ethnicity**

Ethnicity is commonly defined as Hispanic/Latina or non-Hispanic/Latina origin. Since the turn of the 21st century, researchers have observed that those who are Latina or Mexican-born origin present similar, and at times better, health outcomes compared to their non-Latina white counterparts even though they often present risk profiles that align with negative health outcomes (e.g., less educated, or lower socioeconomic status) (Valles, 2016). This observation has been coined the Hispanic Paradox, Latina epidemiologic paradox, or immigrant paradox in the epidemiologic literature (Bediako, Belue, & Hillemeier, 2015; Valles, 2016). Though several studies have cited this phenomenon among adverse birth outcomes (Fuentes-Afflick, Hessol, & Pérez-Stable, 1999; González-Quintero et al., 2006) recent literature has explored the nuanced of the phenomenon and showcase differences in perinatal outcomes based on nativity, length of residence, and racial classification (Bediako et al., 2015; Hoggatt, Flores, Solorio, Wilhelm, & Ritz, 2012; Sanchez-Vaznaugh et al., 2016; Valles, 2016). Moreover,
researchers have also investigated the immigrant paradox among mothers who racially identify as Black. Studies have found that among Black mothers, those of Hispanic descent present more favorable perinatal outcomes (Bediako et al., 2015; Green, 2014). Green (2014) investigated differences in birth weight among Non-Hispanic and Hispanic Black mothers who had a live birth record in the 2002 Vital Statistics Natality File. On average, infants of Hispanic Black mothers had the heaviest birthweight in comparison to Non-Hispanic Black mothers. Furthermore, those who identified as foreign-born Hispanic Black had significantly heavier infants, while US-born non-Hispanic Black mothers had the lowest birthweight infants. Furthermore, these differences were not fully explained by maternal characteristics or health behaviors (Green, 2014).

Similar findings were discovered by Bediako and colleagues' (2015) study that examined differences in birth outcomes, PTB, SGA, and LBW, among mothers who identify as Non-Hispanic Black, Black Hispanic, Hispanic, and Non-Hispanic White. Using the 2013 US Natality file (n= 2,970, 316 singleton births), Non-Hispanic Black mothers presented the highest prevalence of each birth outcome, followed by Black Hispanics, Hispanics, and then Whites. Across the birth outcomes, Black Hispanics presented higher rates compared to Hispanic Mothers, while lower rates compared to Non-Hispanic Black mothers. After adjustment of age, infant sex, marital status, maternal education, prenatal care, a recipient of the Women Infant and Child program, insurance, birth order, tobacco use, pre-pregnancy BMI, pregnancy weight gain, and maternal medical conditions, birth outcomes of Black Hispanics presented closer to Hispanic mothers than Non-Hispanic Black mothers, especially for LBW and PTB (Bediako et al., 2015). Hispanic origin presents a protective factor among Black mothers. Interestingly,
both studies highlighted that Black Hispanics present birth outcomes similar to Hispanic mothers while presenting risk profiles in alignment with Non-Hispanic Black mothers.

**Tobacco and Alcohol Use**

A well-established body of literature has investigated the relationship between tobacco use and prenatal outcomes. In 2000, a meta-analysis was conducted among 20 prospective studies examining the relationship between maternal smoking and PTB (N. R. Shah & Bracken, 2000). Mothers who smoked during pregnancy had a 27% higher risk of preterm delivery. Moreover, this study identified a dose-response relationship, with light smokers defined as 0-10 cigarettes per day having a lower risk of PTB in comparison to moderate and heavy smokers (N. R. Shah & Bracken, 2000).

Liu and colleagues (2020) investigated the effect of maternal smoking before and during pregnancy and PTB (Liu et al., 2020). Mothers who smoked in their first and second trimesters had significantly greater odds of preterm labor compared to mothers who did not smoke while pregnant. A dose-response relationship was also observed between smoking and preterm labor (Liu et al., 2020).

Studies suggest that two key chemicals, nicotine, and carbon monoxide, can have significant negative impacts on the placenta and the developing fetus. Nicotine can cause vasoconstriction, which reduces blood flow to the placenta and can lead to decreased oxygen and nutrient delivery to the fetus. This can result in growth restriction, low birth weight, and preterm birth. While carbon monoxide binds with hemoglobin, and forms carboxyhemoglobin. This reduces the amount of oxygen that can be transported to the fetus, which can cause hypoxia in the developing fetus. This can also result in growth
restriction, low birth weight, and preterm birth (Goldenberg et al., 2008; Wagijo, Sheikh, Duijts, & Been, 2017).

Since the 1970s when alcohol was identified as a teratogen, researchers have explored its impact on various health outcomes including adverse perinatal outcomes (Albertsen, 2004; Nykjaer et al., 2014). Alcohol has been identified as a risk factor for adverse birth outcomes, yet this is contingent on the amount consumed during pregnancy (Henderson, Gary, & Brocklehurst, 2007; O’Leary & Bower, 2012; Patra et al., 2011). The most recent systematic review and meta-analysis conducted in 2011, reviewed 36 studies that utilized either cohort or case-control study design, examining LBW, PTB, or SGA, and providing estimates of the association between alcohol consumption to adverse birth outcomes. The systematic review and meta-analysis found a dose-response between alcohol consumption and adverse birth outcomes. For example, an increased risk of SGA was observed among mothers who consumed between 10 to 18 grams of alcohol per day which is equivalent to 1 to 1.5 drinks per day. An increased risk for PTB was observed with up to 3 drinks per day. The results of this analysis indicate that alcohol consumption is a risk factor for adverse birth outcomes with differential impact based on the average daily consumption.

**Prenatal Care**

The adequate utilization of prenatal care (PNC) is of primary concern to many public health interventions aimed at improving maternal and child health. Adequate prenatal care, defined by the American College of Obstetricians and Gynecologists, is prenatal care initiated in the first trimester with regular visits of increasing frequency as full-term approaches (Guidelines for Perinatal Care 2017). In practice, the criterion of
adequate prenatal care is defined as “initiated by 4 months gestation and at least 80% of expected visits”; while inadequate prenatal care is defined as “initiated after 4 months gestation or fewer than half of expected visits” based on the Adequacy of Prenatal Care Utilization Index (APNCU) (Kotelchuck, 1994).

Over the years, researchers have sought to estimate the magnitude of the effect of PNC and fetal outcomes. A general census is that inadequate or absent PNC is associated with LBW, PTB, and SGA. However, recently more scholars have suggested that quality of PNC may be more imperative than quality of visits. A recent study suggests PNC may be beneficial up to a certain amount, until imposing an increased risk of pregnancy intervention (e.g., caesarian section) without improvement of neonatal outcomes among low-risk women (E. B. Carter et al., 2016). Nonetheless, Partridge et al (2012) conducted a retrospective cohort study utilizing national health statistics data of 32 million births over 8 years to investigate the relationship between inadequate prenatal care and poor fetal outcomes. While a steady rise in adequate PNC was observed over the study period, increased PNC utilization was not distributed equally among all demographics. Inadequate PNC disproportionately impacted Black women, those who were less than 20 years of age, had less than a high school diploma, were single, and experiences poor birth outcomes. Furthermore, a linear relationship was observed between decreasing PNC utilization and increasing risk of infant deaths and subsequent perinatal mortalities (Partridge, Balayla, Holcroft, & Abenhaim, 2012).

The findings of this study indicated that there was no significant difference in the risk of SGA among mothers whose utilization of PNC was considered inadequate compared to adequate based on the APNCU index. However, this finding may be due to a disproportionate number of teen mothers. Nevertheless, the results showed mothers who did not receive any PNC or less than recommended visits were at an increased risk of delivering SGA or PTB infants. Furthermore, mothers in the adequate-plus utilization category observed an increased risk of PTB compared to the adequate utilization category. Interpretations of these findings should be considered with caution for two reasons: (1) gestational age bias observed in the calculation of the APNCU index, and (2) the adequate-plus group includes high-risk mothers who require more prenatal care visits (Appleton, Kiley, Holdsworth, & Schell, 2019; Partridge et al., 2012). Although the effectiveness of prenatal care to reduce SGA and PTB is still debated, the literature supports that prenatal care is beneficial for identifying and reducing potential risk factors such as medical conditions and negative health behaviors that can directly impact the risk of SGA, PTB, and other infant outcomes.

**Maternal Health Conditions**

The effects of both hypertensive disorders during pregnancy and gestational diabetes are of growing concern on the risk of adverse pregnancy outcomes. Throughout the years there has been a drastic increase in these medical diagnoses in part to the global increase in obesity and maternal age thus affecting the health of millions of mothers worldwide (Moussa, Arian, & Sibai, 2014). Hypertensive disorders in pregnancy (HDP) include chronic hypertension, gestational hypertension, preeclampsia/eclampsia, and preeclampsia superimposed on chronic hypertension. In the US, these disorders account
for about 10-25% of maternal deaths, exceeding the global prevalence from hypertensive disorder, 5- 10% (Bramham et al., 2014).

In the recent meta-analysis of 152 cohort studies examining the association between HDP and pregnancy outcomes, Li and colleagues (2021) discovered that mothers with a hypertensive disorder experienced a significantly higher risk of SGA (OR: 3.39, 95% CI: 2.9–4.0) and PTB (OR: 4.20, 95% CI: 3.6–4.9), in addition to other outcomes including stillbirth, neonatal death, and congenital malformations compared to mothers without HDP (F. Li et al., 2021). While the heterogeneity of the effect of HDP on pregnancy outcomes persisted across the studies, this analysis was the first that provided a collective census of the effect of HBP while controlling for confounders and examining an array of pregnancy outcomes, a differential piece to the previous meta-analyses conducted (Bramham et al., 2014; F. Li et al., 2021).

Similarly, gestational diabetes, the onset of diabetes due to pregnancy, is associated with PTB, low Apgar score, macrosomia, and large for gestational age (Centers for Disease Control and Prevention, 2021). In the most recent systematic review of 156 studies inclusive of 7,506,061 pregnancies; researchers concluded that women with GDM had 51% higher odds of delivering a preterm infant (OR: 1.51, 95 CI: 1.126-1.80) and 57% higher odds of having an infant born large for gestational age (OR: 1.57, 95% CI: 1.25-1.97) after controlling for one of seven confounders (i.e., maternal age, body mass index, gestational weight gain, gravidity, parity, smoking, chronic hypertension) (Ye et al., 2022).
**Socioeconomic Status**

It is well documented that people of higher socioeconomic status (SES) tend to have better general health outcomes than those of lower SES. As a measure of societal position, SES is commonly measured by income, education, and occupation. Additional measures include area-based indicators such as neighborhood deprivation indices, poverty, and wealth (Campbell et al., 2018). Studies have demonstrated that higher SES serves as a protective factor against adverse birth outcomes (Blumenshine, Egerter, Barclay, Cubbin, & Braveman, 2010; Joseph et al., 2014; Whitehead, 2012) yet the magnitude of protection may not be equal across racial and ethnic groups (Braveman et al., 2015). Research has demonstrated that Black women of similar or higher SES status to white women still maintained a greater risk of PTB, SGA, and LBW (Braveman et al., 2015). Kothari and colleagues (2016) observed that the protective effect of SES on birth outcomes is substantially different based on the racial diversity (or lack thereof) of one’s residential space. Black women of higher SES residing in predominately white neighborhoods experienced the worst outcomes, yet Black women of higher SES residing in predominately Black neighborhoods experienced the best outcome (Kothari et al., 2016). This suggests that SES does not fully explain racial disparities in birth outcomes, the influence of SES on birth outcomes is contingent on the interplay of additional unknown socio-environmental factors.

A review of the literature suggests there are many factors associated with the racial disparities of adverse birth outcomes. However, SES remains an important indicator of birth outcomes between and among racial demographics. Mothers of lower SES are more likely to engage in risky behaviors such as smoking and alcohol use and
are less likely to have access to health care services, thus increasing their risk of adverse birth outcomes (Räisänen et al., 2013).

**Social Support: Marital Status**

Marital status can serve as a protective or risk factor for adverse birth outcomes. It is well-studied that mothers who are married have a lower risk of unfavorable birth outcomes compared to mothers who are cohabitating and/or unmarried. In a systematic review and meta-analysis, the findings highlighted a gradient in adverse birth risk based on marital status with married women exhibiting the lowest risk of PTB, SGA, and LBW, followed by cohabitating women than those who were unmarried (P. S. Shah, Zao, & Ali, 2011). The underlying premise linking marital status and birth outcome includes a lack of social support and stability, an increase in risky health behaviors, and a lack of social acceptance among unmarried mothers that facilitate social stigmatization (P. S. Shah et al., 2011). Additionally, risk profiles among married, cohabitating, and single mothers, generally present differences in underlying factors attributing to the risk of adverse birth outcomes including food security, physical activity, and health conditions (Shapiro et al., 2018).

In more recent literature, scholars have examined the effect of marital status in relation to maternal age and differences among racial groups. Shapiro et al. (2018) observed that as maternal age increased, single mothers had an increased risk of PTB in comparison to married mothers (Shapiro et al., 2018). Furthermore, Hibbs et al. (2018) examined the racial differences in maternal age patterns among mothers of preterm infants according to marital status and lifelong neighborhood income. They found that single Black mothers who reported lifelong residence in lower-income neighborhoods
presented a higher risk of PTB with an increase in age, a phenomenon referred to as weathering (Hibbs, Rankin, DeSisto, & Collins, 2018).

**Psychological Distress: Depression**

Over the last several decades, researchers have started to evaluate the association between prenatal depression and birth outcomes. Psychological distress such as depression during pregnancy has shown an association with sub-optimal perinatal outcomes including PTB, SGA, and LBW (Accortt, Cheadle, & Dunkel Schetter, 2015; Kim et al., 2013; X. Li et al., 2020). A recent meta-analysis conducted in 2015 examined the effect of perinatal depression on LBW and PTB. Of the 95 prospective studies examined, the authors concluded that prenatal depression is associated with adverse birth outcomes. This association was more consistent among studies where LBW was the outcome of interest. (Accortt et al., 2015). While this meta-analysis showed an association between depression and adverse birth outcomes, it is important to consider the influence of different depression measurements. For example, the Center for Epidemiologic Studies Depression Scale (CES-D), Edinburgh Postnatal Depression Scale (EPDS), and the Beck Depression Inventory (Accortt & Schetter, 2014) all screen for depression symptomatology. However, caution should be used when comparing different studies that used differed depression screening tools as each tool has unique questionnaires and diagnosis thresholds (Accortt & Schetter, 2014; Heller, Draisma, & Honig, 2022). For example, Kim et al., (2013) retrospectively evaluated the association between prenatal depression and adverse birth outcomes among Black mothers who delivered at the University of Pennsylvania hospital. Mothers that presented mild depression based on an EPDS score greater than 10, were at elevated risk of PTB, IUGR,
LBW, and preeclampsia (Kim et al., 2013). While investigating the association of antenatal depression and pregnancy complications in Li and colleague's (2020) studies, those who presented an EPDS score of 12 or greater were at an increase of LBW but not PTB and SGA (X. Li et al., 2020). This showcases the differences in associations that exist based on specified cut points specifically using the EPDS scale.

Additionally, researchers have investigated the role of maternal mental health as a potential mediator. A mediator is defined as an intermediate step in the causal pathway between exposure and outcome. Specifically regarding PTB, several socioeconomic factors have been conceptualized as potential meditators contributing to the inequalities in PTB (Mchale et al., 2022). Over the last decade, there has been rapid development in the approaches to assess meditation among observational studies to improve causal interpretations. To assess mediation, several assumptions must be met to determine the direct and indirect effect: (1) control for expose-outcome confounding, (2) control for meditation-outcome confounding, (3) control for exposure-meditation confounding, and (4) no meditation-outcome confounder can be caused by the exposure (VanderWeele, 2016). If these assumptions hold true, we can assess mediating through the counterfactual framework.

The most recent systematic review conducted in 2022 examined studies that explored mediation among known socioeconomic risk factors and preterm birth. Homing in on mental health variables including depression, stress, and anxiety; the review identified six studies that explored the indirect effect of these variables on the relationship between socioeconomic status and preterm birth. Some studies determined the effect of depression and anxiety to reduce the effect of SES on PTB by 22% (Mirabzadeh et al.,...
2013) while Mirsa and colleagues (2001) determine the effect among Black mothers to be 44% (D. P. Misra, O'Campo, & Strobino, 2001).

**Maternal Stress**

The effects of stress on pregnancy have gained much attention over the years. Though the mechanism is poorly understood, it is hypothesized that maternal stress might influence fetal development via physiological changes impacting the hypothalamic-pituitary-adrenal axis, inflammatory mechanism, and stress hormones (Glover, O’Conner, & O’Donnell, 2010; Leimert & Olson, 2020; Monk, Lugo-Candelas, & Trumpff, 2019). While researchers have suggested that experiences of stressful events may have a potential causal relationship to adverse birth outcomes, differences in sample size, study design, confounding assessment, and measurement of stress have yielded inconsistent findings (Grigoriadis et al., 2018; Hansen Precht, Kragh Andersen, & Olsen, 2007; Morgan, Christensen, Skedros, Kim, & Schliep, 2022). The most recent systematic review and meta-analysis conducted by Ding et al., (2021) featured 31 studies that measured stressful events and at least one of three adverse birth outcomes, PTB, SGA, and LBW. Their findings support that stressful life events are associated with adverse birth outcomes with varying effects depending on the assessment of stressful events (i.e., during or after pregnancy) (Ding et al., 2021). Furthermore, the findings suggest the need for more prospective studies that examine an array of stressful events to better understand the relationship between stress and adverse birth outcomes. Acknowledging that stress takes many forms to fully understand the impact, future research must investigate various stress measures, their occurrence, and their intensity (Ding et al., 2021).
Black Immigrant Health: An Overview

Through the years there has been an increased interest in the health of foreign-born Black immigrants residing in the US. Currently, there are approximately 4.5 million foreign-born Black immigrants living in the US (Palarino, 2021) a significant increase from 800,000 in the 1980s (Anderson, 2017). Before the Immigration and Nationality Act (also known as the Hart-Celler Act) of 1965, there was limited voluntary migration of Africans to the United States resulting from restrictive policies that overemphasized preference for European immigrants while denying entry to African immigrants (Palarino, 2021). The Hart-Celler Act of 1965 was a critical legislation that alleviated previous restrictive policies, expanded the classification for refugee and asylum seekers, and introduced the diversity visa (Palarino, 2021; Venters & Gany, 2011). Thus, from 1970 to 2000 the US observed a ten-fold increase in African-born immigrants, with the majority self-identifying as Black (Anderson, 2017).

Despite the growing influx of Black immigrants, research among this population has been limited in comparison to other immigrant populations. For example, the healthy immigrant effect, a well-studied paradox among Hispanic immigrant populations, is less understood among Black immigrants (Ichou & Wallace, 2019; Viruell-Fuentes, Mirand, & Abdulrahim, 2012). Research suggests that Black immigrants present a health advantage compared to their US-born counterparts, indicating that migration selection, a facilitator of the immigrant health paradox, may hold, yet this is presumptive (Ichou & Wallace, 2019; Palarino, 2021). Moreover, aspects such as duration in the US and acculturation processes may operate differently for Black immigrants due to the historically racialized structure that undoubtedly stigmatizes Black populations residing
in the US (Elo, Mehta, & Huang, 2008). Moreover, the existing literature has further identified that the Black immigrant health advantage may be contingent on the sending country. For example, studies have investigated the differences in health outcomes among Black immigrants who migrated from Africa verse the Caribbean countries. Among these groups, Black African-born immigrants have better health outcomes compared to Black Caribbean-born immigrants. In fact, Black African-born immigrants often have better health outcomes compared to US-born whites (Elo, Vang, & Culhane, 2014; Palarino, 2021). Additionally, a study by Acedevado and colleagues (2005) demonstrated that foreign-born status among Black mothers was more protective than that similar status among white mothers (Acevedo-Garcia, Soobader, & Berkman, 2005). This study asserts that foreign-born status among Black women should be distinguished from other racial and ethnic groups, as it may not operate the same across all racial and ethnic lines.

**Racial Disparity in Birth Outcomes**

Black infants carry the greatest burden of adverse birth outcomes compared to other racial and ethnic groups. Research has examined factors that contribute to the differences across racial groups, with a primary focus on Black and white infants (Ely & Discroll, 2019). Solely focusing on the Black-white disparity does not fully explore other risk factors associated with racial disparities in birth outcomes (Montoya-Williams, Barreto, Fuentes-Afflick, & Collins, 2022).

US-born Black women are disproportionately affected by adverse birth outcomes in comparison to foreign-born Black women. Studies suggest foreign-born Black infants are less likely to be premature, LBW, and/or SGA when compared to US-born Black infants (Acevedo-Garcia et al., 2005; Belanoff, Alade, & Almeida, 2022; Cabral, Fried,
Levenson, Amaro, & Zuckerman, 1990; Elo et al., 2014; Mckenzie-Sampson et al., 2021;
Taylor & Sarathchandra, 2016; Wasse, Holt, & Daling, 1994). Some studies have found
that foreign-born Black women present a more favorable risk profile (i.e., higher
education, married, and less likely to smoke) compared to US-born Black women (Cabral
et al., 1990; Mckenzie-Sampson et al., 2021; Wasse et al., 1994).

The epidemiologic literature provides evidence that even when controlling for
well-known behavioral, socioeconomic, and maternal health risk factors, foreign-born
Black women have more favorable birth outcomes (see Table in Appendix A) Further, the
existing literature suggests the longer foreign-born Black women live in the US, their
perinatal health advantage diminishes, leading to rates of adverse birth outcomes similar
to US-born Black women. These changes in health advantages have been observed as
early as one generation post-migration (Andrasfay & Goldman, 2020; Collins, Wu, &
David, 2002).

One possible explanation is that living in the US exposes foreign-born Black
women to racial discrimination they otherwise may not have experienced in their country.
Acculturation is the process of learning and adapting to the host’s country while
maintaining values, norms, beliefs, etc., of the country of origin (Fox, Thayer, &
Wadhwa, 2017). Though it has been acknowledged as a contributing factor to immigrant
health; it often averts the impact of historical, political, and cultural components and their
construction of health (Montoya-Williams et al., 2022).

In the United States, one component to consider is racism. Drawing from
Geronimus’s work, exposure to racial discrimination as a consequence of residing in a
society that stigmatizes Black people erodes the health of Black women through the
accumulation of stress (A. Geronimus, M. Hicken, D. Keene, & J. Bound, 2006).

Exposure to racial discrimination has been linked to poor health outcomes, specifically PTB and SGA among US-born black women (Alhusen, Bower, Epstein, & Sharps, 2016; Larrabee Sonderlund, Schoenthaler, & Thilsing, 2021).

**Length of Residence in the US and Birth Outcomes**

Recently, there has been an emerging body of literature exploring the role of length of residency in the US on pregnancy outcomes among foreign-born Black women. Elsayed and colleagues (2019) examined the association between the duration of residence in the US and PTB and length of gestation among 104 foreign-born Black mothers and 340 US-born Black mothers who delivered in Newark, New Jersey from 2013 to 2014. Foreign-born Black mothers were categorized as “recent” or “long-term” immigrants defined as residing in the US for less than 5 years or 5 or more years, respectively. The study found that foreign-born Black mothers presented higher gestational length compared to US-born Black mothers. Also, duration of residency was inversely associated with gestational length thus, foreign-born Black mothers who have resided in the US for at least 10 years had similar differences in gestational length compared to US-born Black mothers, even after adjusting for socioeconomic and social/behavioral variables. This suggests that over time the health advantage diminishes among foreign-born Black mothers (Elsayed, Amutah-Onukagha, Navin, Gittens-Williams, & Janevic, 2019). Minhas et al (2022) exhibited similar findings when examining the risk of PTB by maternal nativity status and length of US residence among mothers of the Boston birth cohort. Among the 2699 Non-Hispanic Black women (1607 US-born; 1092 foreign-born) the odds of PTB were lower for foreign-born Black women.
in comparison to US-born Black mothers even after adjustment for sociodemographic characteristics, health behaviors, and maternal health conditions (aOR: 0.76, CI .65-.97). In addition, foreign-born Black mothers with less than 10 years of residence had a significantly lower odds of PTB comparison to US-born Black women (aOR; 0.57, CI .43-.75), whereas foreign-born Black women whom duration of residency was 10 years and more did not significantly differ in their odds of PTB from US-born women (aOR: 0.76, CI .54-1.07) (Minhas et al., 2022). These two studies echo that the longer foreign-born Black women reside in the US their birth outcomes deteriorate. A recent study acknowledges that this may be in part to foreign-born Black women with longer residency may have a higher allostatic load, and thus at an increased risk of adverse birth outcomes, in comparison to those who have lived in the US for a shorter time, yet more research is needed (Minhas et al., 2022)

**Maternal Stress: An Expansion**

Stress across the lifespan and during pregnancy has been investigated to explain the racial disparity in PTB and SGA. Measuring stress can be methodologically difficult as stress is multidimensional in meaning and interpretation (Dole et al., 2003; Slaughter-Acey, Talley, Stevenson, & Misra, 2019) yet, research suggests higher lifetime exposure to chronic stress may increase the risk of adverse birth outcomes. These findings were most prevalent among ethnic minority groups (Latendresse, 2009). Moreover, studies have identified that African Americans have a greater burden of stress compared to other racial and ethnic groups in terms of frequency, type, and severity (T. P. Dominguez, Dunkel-Schetter, Glynn, Hobel, & Sandman, 2008; T. P. Dominguez, Schetter, Mancuso, Rini, & Hobel, 2005). Specifically, studies have examined the effects of different forms
of stress including gender and racial discrimination, experiences of trauma, and financial hardship before and during pregnancy and its association with PTB, LBW, and SGA (Alhusen et al., 2016; Almeida, Becares, Erbeta, Bettegowda, & Ahluwalia, 2018; Dole et al., 2003). A substantive body of literature has identified stress, particularly maternal stress, as a well-known risk factor for adverse birth outcomes.

Racism and racial discrimination are unique multifaceted chronic stressors that expand across an array of behavioral, sociodemographic, and psychological factors that influences health. Literature suggests racism serves as a fundamental cause of diseases, facilitating the ongoing health inequalities (Phelan & Link, 2015; Viruell-Fuentes et al., 2012). Scholarly articles propose exposure to racism and racial discrimination operate via stress pathways that negatively influence the physiological function of the neuroendocrine, immune, and cardiovascular systems (Tyan Parker Dominguez, 2011). Adverse functioning of these systems due to the accumulation of stress has been hypothesized to prematurely age a female’s reproductive systems (A. Geronimus et al., 2006). Thus, a growing body of research is examining the role of racial discrimination and its direct and/or indirect impact on physical health, specifically birth outcomes (Alhusen et al., 2016).

Racial Discrimination

Racism continues to play a central role in the production of social and economic inequalities hindering health and the pursuit of health. Racism has been investigated as a key factor in health disparity research as it is the most prevalent form of oppression in the US (R. T. Carter, Lau, Johnson, & Kirkinis, 2017b). Moreover, scholars have postulated that to address the long-standing racial inequalities in health we must address racism as a
root cause of these inequalities (Phelan & Link, 2015). Racism is defined as “a system of structuring opportunity and assigning value based on the social interpretation of how one looks, that unfairly disadvantages some individuals and communities, unfairly advantages other individuals and communities, and saps the strength of a whole society through the waste of human resource” (C. P. Jones, 2018). Scholarship has described racism as operating in three domains: institutional, personally mediated, and internalized (C. Jones, 2000). A growing body of literature has focused on individual-mediated racism (i.e., personally mediated) and health, with increasing research zooming in on how day-to-day experiences of racism and racial discrimination impact health.

Racial discrimination is conceptualized as a stressor that may be harmful because it is arbitrary, uncontrollable (Williams & Mohammed, 2009), pervasive, and induces a state of anticipation and worry (Sawyer, Major, Casad, Townsend, & Mendes, 2012). A growing body of evidence has investigated experiences of racial discrimination and poor health outcomes, with much of the literature reflecting the disproportionate reporting of experiences from Black Americans (R. T. Carter, Lau, Johnson, & Kirkinis, 2017a). In more recent years, research has examined the relationship between perceived racial discrimination and health among foreign-born populations. Although not conclusive, evidence suggest perceived racial discrimination is associated with poor mental and physical health conditions, negative health behaviors, and quality of healthcare among foreign-born populations (Gee, Ro, Shariff-Marco, & Chae, 2009; Noh, Kaspar, & Wickrama, 2007; Ryan, Gee, & Laflamme, 2006; Szafalarski & Bauldry, 2019). Moreover, studies suggest that foreign-born people are less likely to report experiences of perceived racial discrimination in comparison to their US-born counterpart (Gee et al., 2009;
Lauderdale, Wen, Jacobs, & Kanduka, 2006). Factors including the age of migration and length of stay in the host country may differentiate exposure reporting among foreign-born Black women. For example, Krieger and colleagues (2011) found that in general US-born Black reported more experiences of racial discrimination compared to their foreign-born Black counterparts. Interestingly though, among foreign-born Blacks who reported experiences of racial discrimination, there was a significant increase in reports among those with longer duration of residence in the US (Krieger, Kosheleva, Waterman, Chen, & Koenen, 2011).

The differences in self-reported discrimination may be due to differences between foreign-born and US-born racialization processes from the timeline of exposure to discrimination and immigrant opposition to identify with their minority status (T. P. Dominguez, E. F. Strong, N. Krieger, M. W. Gillman, & J. W. Rich-Edwards, 2009; Viruell-Fuentes et al., 2012). Racial discrimination is known to yield negative health outcomes yet more research is needed to further understand the complexities in which this operates, especially among immigrant populations. Furthermore, future research should evaluate the association between racism and other health outcomes to better understand the impact racial discrimination has on health. The following section will focus on the relationship between self-reported racial discrimination and adverse birth outcomes.

**Perceived Racial Discrimination and Birth Outcomes**

The literature suggests that self-reported experiences of racial discrimination are associated with an increased risk of adverse birth outcomes, yet findings are ambiguous. For example, the findings of a case-control study among US-born Black women suggest
that mothers of preterm infants reported greater exposure to racial discrimination in public settings in comparison to mothers of full-term infants (OR: 2.5 95%; 95 CI: 1.20-5.20) (Rankin, David, & Collins, 2011). Dole and colleagues (2004) utilized a prospective cohort study design to examine the relationship between psychosocial factors and the risk of preterm birth among white and Black mothers. The findings of this study demonstrated that African American mothers who reported higher levels of racial or gender discrimination were more likely to deliver preterm (RR: 1.80, 95 CI: 1.10-2.90) (Dole et al., 2004). Among Black and Latina women, perceived discrimination was associated with greater odds of LBW in a study conducted by Earnshaw and colleagues (2013); however, this relationship was mediated by depressive symptoms (Earnshaw et al., 2013). Misra and colleagues (2010) discovered among a sample of low-income African American women, lifetime exposure to racism measured by the Racism and Lifetime Experience Scale was not associated with PTB. However, the interaction between racism, depression, and stress was a significant predictor of PTB (D. Misra, Strobino, & Trabert, 2010). Slaughter-Acey and colleagues (2019) examined the relationship between personal or group racism, and SGA using the brief form of the Racism and Lifetime Experience Scale questionnaire. Group racism was defined as racial discrimination experienced by family, friends, or other members of a racial/ethnic group. In the unadjusted analysis, neither personal nor group racism was associated with SGA. However, in the adjusted modal, when age was examined as an effect modifier, overall and group racism was positively associated with SGA for women 25 years and older. Personal experiences of racism were not significantly associated with SGA. (Slaughter-Acey et al., 2019).
To date, only one study examined the differences in perceived racial discrimination between foreign-born Black and US-born Black pregnant women (T. P. Dominguez et al., 2009). Due to the limited sample size and the low prevalence of adverse birth outcomes, the study lacked statistical power to determine estimates of the effects of self-reported racism and birth outcomes. Yet the findings of the study provide insight into differences in self-reported racism by nativity. Exposure to racial discrimination was captured using the adapted version of the Experiences of Discrimination questionnaire (Krieger, Smith, Naishadham, Hartman, & Barbeau, 2005) highlighting type (i.e., personal versus group) and timing (i.e., childhood versus adulthood). The main findings revealed that US-born Black pregnant women self-reported more experiences of personal and group racial discrimination as compared to their foreign-born counterparts, while controlling for age, income, and lack of resources in childhood. Furthermore, experiences of racial discrimination extended across a greater number of life domains, with US-born Black women three times more likely to report experiences of personal racism exposure during pregnancy. Moreover, among foreign-born women, those of Caribbean ancestry reported more racial discrimination experiences than those of African ancestry. In addition, foreign-born women who migrated to the US before the age of 18, reported more experiences of discrimination in comparison to those who migrated after the age of 18 years (T. P. Dominguez et al., 2009).

**Biological Mechanism to Stress**

Allostatic load, a widely accepted theory, suggests long-term physiological consequences to the cardiovascular, nervous, endocrine, and immune systems resulting
from an accumulation of stress over the life course (Boullier & Blair, 2018). Stressful life events, including the experiences of racial discrimination, can lead to activation of the sympathetic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis (Leimert & Olson, 2020). These stressors activate the HPA axis, releasing inflammatory hormones, cortisol, and neurotransmitters to adapt to the stress (i.e., allostasis). This response to a stressful event is normal. However, experiencing chronic stress can overload the body’s natural HPA axis response. If left unabated, chronic stress and subsequent over-activation of the HPA axis may inhibit a return to the baseline homeostasis (Leimert & Olson, 2020). The dysregulation of these pathways can cause long-term consequences aiding in the “wear and tear” of the body and mind (Leimert & Olson, 2020; Olson et al., 2015). Experiences of racial discrimination have been identified as a psychosocial stressor eliciting a chronic stress response (Alhusen et al., 2016).

The weathering hypothesis suggests a proportion of Black women’s reproductive health is diminished due to a higher allostatic load in comparison to their white counterparts. This hypothesis postulates that this decrease in Black women's reproductive health is a product of residing in a society historically rooted in a racist ideology that perpetuates the oppression of Black women (A. T. Geronimus, M. Hicken, D. Keene, & J. Bound, 2006). 

**Theoretical Underpinning**

Alongside the weathering hypothesis, the contributions of Critical Race Theory (CRT) and Intersectionality provide conceptual meaning underpinning this dissertation study. The term “Critical Race Theory” first emerged in 1989. CRT emerged after law students and faculty members believed the hiring and matriculation decisions were a
practice of institutionalized racism introduced (Ford & Airhihenbuwa, 2010a). Unlike many social science theories, CRT is not a typical behavior theory, but a methodology to help researchers establish and main equity in research. Over the decades, CRT has expanded and is recognized as a transdisciplinary methodology rooted in social justice and race equity (Ford & Airhihenbuwa, 2010a).

The four main characteristics of CRT include (1) Race Consciousness, (2) Contemporary Orientation, (3) Centering on the margins, and (4) Praxis (Ford & Airhihenbuwa, 2010a). Briefly, race consciousness is a fundamental tenant of CRT, emphasizing the issues associated with racialization (i.e., how does one’s race, a social construct, contribute to health?). Implementing a race-conscious orientation to research provides an opportunity to explore non-racial factors associated with health while simultaneously exploring racial factors such as discrimination that are not well understood (Ford & Airhihenbuwa, 2010b). Contemporary Orientation refers to the importance of place, time, and social position. Researching racism should reflect the most relevant aspects as it is constructed today (Ford & Airhihenbuwa, 2010a). Though overt occurrences of racial discrimination still occur, in recent years racial discrimination can also be exemplified through more subtle and inconspicuous acts (i.e., racial Microaggression). Centering on the margins seeks to shift the perspective in which knowledge revolves from the mainstream (i.e., dominant group) to the marginalized group (Ford & Airhihenbuwa, 2010b). CRT suggests that often when we seek to understand issues that disproportionately affect marginalized communities our knowledge is restricted to best practices acquired from working amongst majority populations. Failure to consider the perspective of the marginalized may perpetuate the stigmatization
of these groups and limit our ability to gain useful information. Therefore, shifting the perspective in which knowledge is obtained can assist in reducing undue racial disparities. The final characteristic of CRT is praxis which aims to not only understand inequities but develop strategies for eliminating them (Ford & Airhihenbuwa, 2010b). Specific to this study, CRT will assist in guiding the quantitative measure of interest to reflect a relevant expression of racial discrimination. In addition, switching the focus from the Black-white disparity, arguably the mainstream approach to measuring differences in perceived discrimination and birth outcomes, to examining between racial lines to gain a different understanding of the effects of racism among Black women and their birth outcomes.

The concept of intersectionality has its roots in Black feminism and critical race ideology. In 1989 the term intersectionality was coined by legal scholar and Black feminist Kimberley Crenshaw. Her work shed light on the unique experiences of Black women beyond a reductionist view of being just Black or just a woman. Crenshaw suggested that there was an interactive effect of these identities that facilitated marginalization beyond being just Black, or just a woman. For example a “Black woman” may simultaneously experience the negative effect of both racism and sexism(Settles, 2006). Expanding in its original framework, intersectionality encompasses the multitude of identities and social powers that influences one’s identity. Scholars have suggested this framework can be used to further understand the health of immigrants (Viruell-Fuentes et al., 2012). Calling scholars to expand beyond the cultural factors, Hossin’s theoretical use of intersectionality accounts for the combined impact of cultural and structural factors
attributing to immigrant’s health (Hossin, 2020), specifically alluding to the distinctive experiences of foreign-born Black women.

**Conceptual Model**

One way to portray mechanisms in which selected risk and/or protective factors are associated with a health outcome is to create a conceptual model. Conceptual models represent potential causal pathways between exposure and outcome of interests (Brady et al., 2020). This conceptual model illustrates theoretical paths between nativity and adverse birth outcomes by way of structural and individual-level factors. This model highlights variables that may confound, mediate, or moderate the relationship between nativity and PTB/ SGA. The italicized bullets represent variables beyond the scope of this study yet are left in the model to provide a more comprehensive illustration (Appendix B).

**Summary**

The purpose of this review was to provide information from existing literature that elucidates the relationship between nativity, perceived racial discrimination, and adverse birth outcomes among foreign-born and US-born Black women. US-born Black women experience the worst birth outcomes compared to other racial and ethnic groups, including foreign-born Black women. The existing disparities have yet to be explained by known risk factors such as socioeconomic status, education, and prenatal care. The biomedical literature suggests that chronic stress may increase allostatic load, which may harm fetal development. To that end, Black women may be at increased risk from chronic stress due to perceived racial discrimination and other intersectional dimensions of historically marginalized groups. While this theoretical pathway between racial
discrimination and adverse birth outcomes exists in the literature, little is known about
the differences in perceived racial discrimination and its subsequent effect on birth
outcomes between US-born and foreign-born Black women. Additionally, little is known
about the effect perceived racism may play on birth outcomes between these two groups.
Given the known effects of chronic stress on health and how racism can lead to chronic
stress, it may be of interest to compare birth outcomes between US-born Black women
and foreign-Born Black women. While these two groups may self-identify as Black, their
perceptions of racism and subsequent stress may be different due to cultural differences
and/or total time of exposure to potential racial discrimination.
IV. METHODS

Study Design

A cross-sectional analysis of secondary and primary data was used to examine the study aims. This study was approved by the University of Louisville Institutional Review Board (IRB: 22.0014). Secondary data, used in Aim 1, was derived from the Des Moines Healthy Start Initiative data set, which contains participant data for all Healthy Start clients between 2000 and 2021. Primary data, used in aims 2 and 3, was collected from participants who were either previously or currently enrolled in the Des Moines Healthy Start/ Empowerment Initiative at the time of the study.

Study Site

Secondary and primary data were ascertained from Des Moines, Iowa Healthy Start Initiative clientele. Healthy Start is a federally funded initiative originally implemented in 1991 to target and prevent infant mortality in the US. Healthy Start initiative seeks to improve the well-being of women, infants, and children by addressing underlying factors that perpetuate maternal and child health inequities. Program projects target issues related to adequate prenatal care, access to healthcare, nutrition, housing, and psychosocial support.

The Des Moines Healthy Start program was established in 1997. Aligning with the fundamental tenants of Healthy Start, the program caters to women, infants, children (up to 18 months), and partners with the primary goal of reducing disparities in birth
outcomes. Based on the most recent reported, in 2019 the program served over 800 mothers and expectant mothers, providing comprehensive support services for women and their communities.

**Study Population**

The target study population was mothers of live births. The inclusion criteria for all three study aims were as followed: (1) mother of a singleton live birth enrolled in the Des Moines Healthy Start program and (2) self-identified as Black and/or African American. Mothers were excluded from the study if one of these criteria were met: (1) mothers who gave birth to multiple gestations, (2) did not self-identify as Black and/or African American, (3) lacked information on birthplace, and (4) who were younger than 18 years of age at enrollment in Healthy Start. A non-probability convenience sampling scheme was utilized to recruit eligible study participants for study aims 2 and 3.

**Study Recruitment**

For study aims 2 and 3, study participants were identified by Healthy Start case managers. Prior to recruitment, case managers were informed of the study purpose and eligibility criteria in a one-hour session hosted by the principal investigator (PI). In addition, each case manager was provided a study recruitment flyer (Appendix C) and a one-page snapshot to assist in recruitment efforts (Appendix D). Eligible study participants were directly provided with the survey website via a link and/or QR code to complete the survey. Participants whose primary language was not English were provided translation services through Healthy Start upon request.
Data Collection

Two sources of data were utilized in this study. To assess the first aim secondary data was ascertained from the Healthy Start database. All available data from 2000 to 2021 were utilized. Healthy Start captures a variety of data relating to maternal and child health indicators. To properly acquire relevant variables and ensure proper usage of data, a statement of work and data agreement subject to the Iowa Department of Public Health and Des Moines Healthy Start program were established and approved before obtaining participant records. Primary data was collected using a survey instrument to address study aims 2 and 3 (Appendix E). A preamble was used to gain informed consent for each study participant (Appendix F). Primary data was collected using REDcap, a secure web-based platform approved by the University of Louisville for data collection and management. All data was secured on a password-locked computer.

Study Instrument

The study survey instrument captured experiences of racial discrimination, perceived stress, and variables associated with acculturation (i.e., age of migration, and length of residency in the US). The development of the Racial Microaggression Scale (RMAS) by Torres-Harding and colleagues expands the discrimination literature by addressing ambiguous and subtle forms of discrimination experienced by people of color, namely racial microaggressions. The scale highlights two concepts—microinsults and microinvalidations. Originally introduced by Sue and colleagues in 2007, microinsults are occurrences that are perceived as offensive, while microinvalidations are occurrences that promote one to feel devalued, ignored, or delegitimized (Torres-Harding, Andrade, & Romero Díaz, 2012).
The original scale in the RMAS included 52 questions that assessed 11 domains. Following the exploratory factor analysis amongst a diverse sample, a six-factor solution was deemed most numerically efficient reducing the scale down to 32 items covering six domains: invisibility, criminality, low-achieving/undesirable culture, sexualization, foreigner/not belonging, and environmental invalidations. Table 2 provides the definition, the number of items per domain, a sample question, and the original internal consistency score based on the validation study. RMAS measures occurrence and severity on a 4-point Likert-type scale. For each item, respondents were asked how often they experienced a racial microaggression (0= never, 1= a little/rarely, 2= sometimes/a moderate amount, 3= often/frequently); if a respondent identified experiencing at least one (i.e., scored 1 or higher on occurrence) they were asked to indicate how bothersome/stressful the experience was for them (0=not at all, 1=a little, 2= moderate level, 3= high level) (Torres-Harding et al., 2012). RMAS and each of its domains are scored on an additive scale, with higher scores indicating more occurrences. A detailed description of the survey development and validation mechanism is discussed elsewhere (Torres-Harding et al., 2012).

Table 2: Racial Microaggression Scale Domains

<table>
<thead>
<tr>
<th>Scale Domains</th>
<th>Definition</th>
<th>Items</th>
<th>Sample Question</th>
<th>Cronbach Coefficient Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invisibility</td>
<td>Not seen as a “real” person, being dismissed, or devalued, being treated as less than or of lower status</td>
<td>8</td>
<td>“I receive poorer treatment in restaurants and stores because of my race.”</td>
<td>0.89</td>
</tr>
<tr>
<td>Criminality</td>
<td>Being treated as aggressive, dangerous, or a criminal</td>
<td>4</td>
<td>“People act like they are scared of</td>
<td>0.85</td>
</tr>
</tbody>
</table>
In addition to the RMAS, the study instrument captured individual stress using the Perceived Stress Scale-10 (PSS-10). The PSS originated by Cohen in 1983 is a 14-item scale that measures how stressful one’s life is perceived (Cohen, Kamarck, & Mermelstein, 1983). In 1988, this 14-item scale was reduced to a 10-item scale and has since been the recommended scale for research purpose (Sheldon Cohen & Gail Williamson, 1988). The PSS-10 is a widely used and accepted measure of perceived stress; it has been validated in diverse populations and translated into multiple languages.

Experiences and feelings of a life event or situation are rated on a 5-point frequency scale.
with 0= never to 4= very often. Respondents are to rate their feelings about these situations in the past month. The full study instrument is presented in Appendix E.

Psychometric Analyses: Racial Microaggression Scale (RMAS)

To examine the validity and reliability of the Racial Microaggression scale, face validity and internal consistency were assessed. Face validity confirms if a questionnaire seems to be reasonable to measure the underlying construct. For instance, does the statement “I receive poorer treatment in restaurants and stores because of my race” suffice as an adequate measure of invisibility with limited explanation? The questionnaire was examined by the Healthy Start director, alongside a group of women who identify as Black and/or African American or have expertise in the discrimination literature to determine face validity. Internal consistency was measured using Cronbach's Coefficient alpha. A Cronbach’s coefficient alpha of 0.70 and above was deemed acceptable.

Outcome Assessment

Study Aim 1. The primary outcomes of interest were preterm birth and small for gestational age. Preterm birth (PTB) is defined as the birth of an infant before 37 completed weeks of gestation. Small for gestational age (SGA) is defined as infants born below the 10th percentile of birthweight, specified by gestational age. The following variables were used to calculate PTB and/or SGA: gestational age and infant birth weight. The Hadlock fetal growth equation \[ \text{fetal growth} (g) = \exp (0.578 + 0.332 \times GA - 0.00354 \times GA^2), \text{where GA is the gestational age in exact weeks} \] (Hadlock, Harrist, & Martinez-Poyer, 1991) was used to calculate cut points to determine birth weights per gestational age. Reference cut-points were specified for the study population and derived from the
mean gestational weight (in grams) at 40 weeks and the standard deviation (Mikolajczyk et al., 2011). In this sample, the mean gestational weight at 40 weeks was 3249 grams with a standard deviation of 511.01 grams.

**Study Aim 2.** The primary outcome of interest was the perception of racial discrimination. Perceived racial discrimination was measured using the Racial Microaggression Scale (RMAS). Analytically, perceived racial discrimination was expressed as a summation of item values, with higher scores representing more occurrence and/or severity of discrimination. Additionally, racial discrimination was analyzed by each underlying theme measured in the scale: invisibility, foreign/not belonging, sexualization, criminality, environmental invalidations, low-achieving/undesirable.

**Study Aim 3.** The primary outcome of interest was adverse birth outcomes. An adverse birth outcome was a composite variable of PTB, SGA, and LBW. This was determined if a participant had one of the three experiences, PTB, SGA, or LBW. The following variables were used to calculate the outcome: gestational age, infant birth weight, and sex of the infant.

**Exposure Assessment**

**Study Aim 1.** The primary exposure of interest was nativity status. For this study, the variable “country of origin” was used to dichotomize participants into foreign-born or US-born. Foreign-born is a catch-all term for anyone born outside the United States, United States territories, and the District of Columbia.
Study Aim 2. The descriptive factors of interest included socioeconomic, behavioral, psychosocial, maternal health conditions, age of migration to the US, and length of residency in the US.

Study Aim 3. The primary exposure of interest was perceived racial discrimination. Perceived racial discrimination was measured using the Racial Microaggression Scale (RMAS) survey.

Study Covariates

Relevant covariates were identified via literature assessment. Covariates were selected that fulfilled at least one of the following criteria: (1) associated with PTB and SGA and (2) associated with nativity status. Table 3 represents the study covariates.

Table 3. Study Covariates

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type of Variable</th>
<th>Definition</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Continuous</td>
<td>Age at enrollment of Healthy Start</td>
<td>Years</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Categorical</td>
<td>Hispanic/Latina Origin</td>
<td>0= Not Hispanic/Latina 1= Hispanic/Latina</td>
</tr>
<tr>
<td>Income</td>
<td>Categorical</td>
<td>Annual household income</td>
<td>0= &lt;$10,000 1= $10,000-$14,999 2= $15,000-$19,999 3= $20,000-$24,999 4= $25,000-$34,999 5= $35,000-$49,999 6= &gt;$50,000</td>
</tr>
<tr>
<td>Education</td>
<td>Categorical</td>
<td>Highest education completed</td>
<td>0=Less than high school 1= High School/GED 2= Some College 3= College 4yrs or more 4= None/Other</td>
</tr>
</tbody>
</table>
| **Insurance** | Categorical | Insurance type | 0 = No Insurance  
| | | | 1 = Medicaid/Title XIX  
| | | | 2 = Private Insurance  
| | | | 3 = Other  
| **Marital Status** | Categorical | Current relationship status | 0 = Single  
| | | | 1 = Married  
| | | | 2 = Dating/Relationship  
| | | | 3 = Divorced/Separated  
| **Language** | Dichotomous | Primary language spoken at home | 0 = Not English  
| | | | 1 = English  
| **Duration of Residency** | Continuous/Categorical | Length of time in the US from migration to date of the survey  
| | | (i.e., less than 5 years or 5 or more years) | 0 = Less than 5 years  
| | | | 1 = 5 or more years  
| **Age of migration** | Continuous/Categorical | Age when the participant first migrated to the US (i.e., less than 18 years of age or 18 years of age and older) | 0 = Less than 18 years  
| | | | 1 = 18 years or older  
| **Cigarette Smoking** | Dichotomous | Smoking cigarettes during your pregnancy | 0 = No  
| | | | 1 = Yes  
| **Alcohol** | Dichotomous | Consume alcoholic beverages during pregnancy | 0 = No  
| | | | 1 = Yes  
| **Drug Use** | Dichotomous | Drug use during pregnancy | 0 = No  
| | | | 1 = Yes  
| **Parity** | Ordinal or Dichotomous | The number of pregnancies that resulted from live or still birth. | 0 = Primigravida  
| | | | 1 = Nulliparous (2-4)  
| | | | 2 = Grand parous (5-8)  


<table>
<thead>
<tr>
<th>Variable</th>
<th>Type</th>
<th>Description</th>
<th>0 =</th>
<th>1 =</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prenatal Care</td>
<td>Dichotomous</td>
<td>Prenatal care received during pregnancy</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Depression</td>
<td>Continuous/Categorical</td>
<td>Depression based on the Edinburgh Postnatal Depression Score, with depression defined as score greater than 12</td>
<td>EPDS score &gt; 12</td>
<td>EPDS score &lt;=12</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Dichotomous</td>
<td>Medically diagnosed with hypertension diseases that developed prior to or during pregnancy</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Gestational Diabetes</td>
<td>Dichotomous</td>
<td>Medically diagnosed diabetes resulting from pregnancy</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Admission status</td>
<td>Dichotomous</td>
<td>Status of pregnancy when client started the program</td>
<td>Postpartum at Admission</td>
<td>Pregnant at Admission</td>
</tr>
</tbody>
</table>

Data Analysis

Study Aim 1. Descriptive and inferential statistics were used to analyze the data and to provide a systematic description of the study participants and variables. Demographic and other covariates were compared among foreign-born and US-born Black women. Chi-square, Fisher exact, and independent t-tests were used to determine significant differences in demographic, socioeconomic, behavioral, and maternal health.
condition variables, stratified by maternal nativity status. Univariate and multivariable logistic regression models, odds ratios, and 95% confidence intervals were used to examine the relationship between maternal nativity status and preterm birth and small for gestational age. Covariates were conceptualized as potential meditators in the association between nativity status and PTB/SGA based on the study's conceptual model (Figure 1). Thus, to examine their effect on the association of nativity status on PTB/SGA, bivariate models were used to examine the change in the beta estimate ($\beta_1$) of nativity when a covariate was present in the model. If the change in $\beta_1$ was greater than 10%, the variable remained in the fully adjusted model. The covariates examined in the bivariate models were significant in the Chi-square analysis, excluding maternal age. To further explore mediation, we used logistic regression models, odds ratios, and 95% confidence intervals to explore the direct and indirect effect of depression on the relationship between nativity and PTB.

**Study Aim 2.** Descriptive statistics were used to provide a description of the study population and examine differences in reporting of perceived racial discrimination among Black mothers. Because the perceived racial discrimination score was not normally distributed, median and IQR were utilized to summarize the findings for each scale.

**Study Aim 3.** A univariate logistic regression model, odds ratio, and 95% confidence interval were used to determine the crude association between perceived racial discrimination and adverse birth outcomes. A series of Wilcoxon rank-sum tests were used to examine the differences in perceived racial discrimination between foreign-born Black women based on the duration of residency in the US and the age of migration.
A p-value less than the set alpha level of .05 was used to determine statistical significance. All analyses were conducted using Statistical Analysis Software (SAS) version 9.4.
V. RESULTS

Description of Study Population

The secondary analysis consisted of 1233 Black women who participated in the Des Moines Healthy Start/Empowerment initiative and met the inclusion criteria from 2000 to 2021. Among the women in the study, 904 (73.32%) were US-born and 329 (26.68%) were foreign-born. The bulk of foreign-born women were from countries in Sub-Saharan Africa (98.20%), with the Republic of Congo (27.50%), Sudan (16.25%), Democratic Republic of Congo (13.33%), and Liberia (11.25%) emerging as the top four countries of origin. The majority of women in the sample (83.29%) were between 18 and 35 years, with a maternal age range from 13 to 59 years. Those less than 18 years were excluded from the analysis. The average maternal age was 27.74 years, with foreign-born women having an average age slightly higher (29.78 years) in comparison to US-born Black women (26.98 years). A higher proportion of foreign-born Black women were of Hispanic/Latina descent (2.74% vs. < 1.00%, respectively).

Nearly half of the women had less than a high school education (47.20%). A little more than 20% of all women attained some college or higher education, with a significantly higher proportion of US-born Black women receiving some college credit compared to foreign-born Black women (22.57% US-born vs. 17.20% FB, p < .0001). Regarding income, 50% of the study population was identified as making less than $10,000 a year.
with a higher proportion observed among US-born Black mothers compared to foreign-born Black mothers (54.87% US-born vs 33.43% FB, p < .0001).

US-born Black mothers were less likely to be married in contrast to foreign-born Black women (28.43% US-born vs. 58.05% FB, p < .0001). In addition, Medicaid/ Title XIX (73.7% US-born vs 72.04% FB) coverage was the primary insurance type among the study sample. Approximately 50% of Black women identified English as their primary language. Among those, a significantly higher proportion of English speaking was observed among US-born Black women (63.05% US-born vs 14.85% FB, p < 0.0001).

US-born Black women were less likely to receive prenatal care (46.90% US-born vs 60.49% FB, p < 0.0001), yet more likely to engage in risky behaviors including tobacco use (19.36% US-born vs <1.00% FB, p < 0.0001) alcohol use (11.06% US-born vs <1.00% FB, p < 0.0001) and drug use (3.10% US-born vs <1.00% FB, p = 0.0121). US-born Black women presented with approximately the same rate of gestational diabetes (1.33%US-born vs <1.00% FB, p = 0.7709) and slightly higher rates of hypertension (7.30% US-born vs 4.56% FB, p = 0.0857) compared to foreign-born women, although the overall proportions of both (1.22% gestational diabetes and 6.57% hypertension) were low in the study population. US-born Black women were less likely to be multiparous compared to foreign-born Black women (p-value <0.0001). Lastly, there was a significant difference in mild prenatal depression defined by an EPDS score of 12 or higher with foreign-born Black women less likely to experience prenatal depression (79.03% US-born vs 20.58% FB). Table 4 provides a description of the socioeconomic, behavioral, and maternal health conditions among US-born and foreign-born Black women.
Table 4: Descriptive Table by Nativity Status

<table>
<thead>
<tr>
<th>Variable</th>
<th>US Born (N=904)</th>
<th>Foreign Born (N=329)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Age (Mean± SD)</td>
<td>26.99 ±6.38</td>
<td>29.78 ±6.46</td>
<td>0.7616</td>
</tr>
<tr>
<td>Ethnicity n (%)</td>
<td></td>
<td></td>
<td>0.0180a</td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>897 (99.23)</td>
<td>320 (97.26)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>7 (&lt;1.00)</td>
<td>9 (2.74)</td>
<td></td>
</tr>
<tr>
<td>Education n (%)</td>
<td></td>
<td></td>
<td>&lt;0.0001b</td>
</tr>
<tr>
<td>Less than High School</td>
<td>393 (43.47)</td>
<td>189 (57.45)</td>
<td></td>
</tr>
<tr>
<td>High School/GED</td>
<td>307 (33.96)</td>
<td>84 (25.53)</td>
<td></td>
</tr>
<tr>
<td>Some College</td>
<td>144 (15.93)</td>
<td>26 (7.90)</td>
<td></td>
</tr>
<tr>
<td>College 4yrs or more</td>
<td>28 (3.10)</td>
<td>21 (6.38)</td>
<td></td>
</tr>
<tr>
<td>None/Other</td>
<td>32 (3.54)</td>
<td>9 (2.74)</td>
<td></td>
</tr>
<tr>
<td>Income n (%)</td>
<td></td>
<td></td>
<td>&lt;0.0001b</td>
</tr>
<tr>
<td>&lt;$10,000</td>
<td>496 (54.87)</td>
<td>110 (33.43)</td>
<td></td>
</tr>
<tr>
<td>$10,000-$14,999</td>
<td>139 (15.38)</td>
<td>19 (5.78)</td>
<td></td>
</tr>
<tr>
<td>$15,000-$19,999</td>
<td>113 (12.50)</td>
<td>25 (7.60)</td>
<td></td>
</tr>
<tr>
<td>$20,000-$24,999</td>
<td>64 (7.08)</td>
<td>37 (11.25)</td>
<td></td>
</tr>
<tr>
<td>$25,000-$34,999</td>
<td>51 (5.64)</td>
<td>87 (26.44)</td>
<td></td>
</tr>
<tr>
<td>$35,000-$49,999</td>
<td>15 (1.66)</td>
<td>37 (11.25)</td>
<td></td>
</tr>
<tr>
<td>&gt;$50,000</td>
<td>4 (&lt;1.00)</td>
<td>11 (3.34)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>22 (2.43)</td>
<td>3 (&lt;1.00)</td>
<td></td>
</tr>
<tr>
<td>Marital Status n (%)</td>
<td></td>
<td></td>
<td>&lt;0.0001b</td>
</tr>
<tr>
<td>Single</td>
<td>446 (49.34)</td>
<td>86 (26.14)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>257 (28.43)</td>
<td>191 (58.05)</td>
<td></td>
</tr>
<tr>
<td>Dating/Relationship</td>
<td>105 (11.62)</td>
<td>32 (9.73)</td>
<td></td>
</tr>
<tr>
<td>Divorced/Separated</td>
<td>82 (9.07)</td>
<td>20 (6.08)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>14 (1.55)</td>
<td>n/a</td>
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</tr>
<tr>
<td>Insurance n (%)</td>
<td></td>
<td></td>
<td>0.0136b</td>
</tr>
<tr>
<td>No Insurance</td>
<td>88 (9.73)</td>
<td>39 (11.85)</td>
<td></td>
</tr>
<tr>
<td>Medicaid/Title XIX</td>
<td>666 (73.67)</td>
<td>237 (72.04)</td>
<td></td>
</tr>
<tr>
<td>Private Insurance</td>
<td>95 (10.51)</td>
<td>31 (9.42)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>55 (6.08)</td>
<td>18 (5.47)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>n/a</td>
<td>4 (1.22)</td>
<td></td>
</tr>
<tr>
<td>Primary Language Spoken</td>
<td></td>
<td></td>
<td>&lt;0.0001b</td>
</tr>
<tr>
<td>English</td>
<td>570 (63.05)</td>
<td>49 (14.89)</td>
<td></td>
</tr>
<tr>
<td>Not English</td>
<td>334(36.95)</td>
<td>280 (85.11)</td>
<td></td>
</tr>
<tr>
<td>Prenatal Care</td>
<td></td>
<td></td>
<td>&lt;0.0001b</td>
</tr>
<tr>
<td>Category</td>
<td>No PNC Received</td>
<td>PNC Received</td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>480 (53.10)</td>
<td>130 (39.51)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>424 (46.90)</td>
<td>199 (60.49)</td>
<td></td>
</tr>
</tbody>
</table>

**Drugs Use n (%)**

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>876 (96.90)</td>
<td>327 (99.39)</td>
</tr>
<tr>
<td>Yes</td>
<td>28 (3.10)</td>
<td>2 (&lt;1.00)</td>
</tr>
</tbody>
</table>

**Tobacco Use n (%)**

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>729 (80.64)</td>
<td>326 (99.09)</td>
</tr>
<tr>
<td>Yes</td>
<td>175 (19.36)</td>
<td>3 (&lt;1.00)</td>
</tr>
</tbody>
</table>

**Alcohol Use n (%)**

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>804 (88.94)</td>
<td>326 (99.09)</td>
</tr>
<tr>
<td>Yes</td>
<td>100 (11.06)</td>
<td>3 (&lt;1.00)</td>
</tr>
</tbody>
</table>

**Gestational Diabetes n (%)**

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>892 (98.67)</td>
<td>326 (99.09)</td>
</tr>
<tr>
<td>Yes</td>
<td>12 (1.33)</td>
<td>3 (&lt;1.00)</td>
</tr>
</tbody>
</table>

**Hypertension n (%)**

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>838 (92.70)</td>
<td>314 (95.44)</td>
</tr>
<tr>
<td>Yes</td>
<td>66 (7.30)</td>
<td>15 (4.56)</td>
</tr>
</tbody>
</table>

**Parity n (%)**

<table>
<thead>
<tr>
<th>Category</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primigravida</td>
<td>99 (10.95)</td>
<td>18 (5.47)</td>
</tr>
<tr>
<td>Nulliparous (2-4)</td>
<td>464 (51.33)</td>
<td>192 (58.36)</td>
</tr>
<tr>
<td>Grand parous (5-8)</td>
<td>287 (31.75)</td>
<td>116 (35.26)</td>
</tr>
<tr>
<td>Missing</td>
<td>54 (5.97)</td>
<td>3 (&lt; 1.00)</td>
</tr>
</tbody>
</table>

**EPDS Score n (%)**

<table>
<thead>
<tr>
<th>Category</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Prenatal Depression</td>
<td>186 (20.58)</td>
<td>260 (79.03)</td>
</tr>
<tr>
<td>Prenatal Depression</td>
<td>49 (5.42)</td>
<td>17 (5.17)</td>
</tr>
<tr>
<td>Missing</td>
<td>669 (74.00)</td>
<td>52 (15.81)</td>
</tr>
</tbody>
</table>

**Healthy Start Admission Status n (%)**

<table>
<thead>
<tr>
<th>Status</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postpartum at admission</td>
<td>478 (52.88)</td>
<td>161 (48.84)</td>
</tr>
<tr>
<td>Pregnant at Admission</td>
<td>426 (47.12)</td>
<td>168 (51.06)</td>
</tr>
</tbody>
</table>

*Fisher Exact Test, *b*Chi square Test, P-value < 0.05 = significant, n/a = not applicable*
Study Aim 1: SGA and PTB among US-born and Foreign-born Black Women

In the sample, the prevalence of PTB and SGA were 16.46% and 9.57%, respectively. US-born Black women were more likely to have preterm infants compared to foreign-born Black women (18.14% US-born vs 11.85% FB, p < 0.0085). Similarly, the prevalence of SGA was higher among US-born Black women compared to foreign-born Black women (10.73% US-born vs. 7.90% FB, p=0.32), yet no significant difference was observed by nativity status. In addition, LBW in the population was 13.5%, with a higher proportion attributed to US-born Black women (15.15% US-born vs 8.81% FB p=0.0039) (Table 5).

Table 5: Birth Outcomes by Nativity

<table>
<thead>
<tr>
<th>Variable</th>
<th>US Born (N= 904)</th>
<th>Foreign-Born (N=329)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preterm Birth n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extremely Preterm</td>
<td>18 (1.99)</td>
<td>6 (1.82)</td>
<td></td>
</tr>
<tr>
<td>Very Preterm</td>
<td>11 (1.22)</td>
<td>1 (&lt;1.00)</td>
<td></td>
</tr>
<tr>
<td>Moderate Preterm</td>
<td>135 (14.93)</td>
<td>32 (26.68)</td>
<td></td>
</tr>
<tr>
<td>Birthweight n (%)</td>
<td></td>
<td></td>
<td>0.0039a</td>
</tr>
<tr>
<td>≥2500g</td>
<td>767 (84.84)</td>
<td>300 (91.19)</td>
<td></td>
</tr>
<tr>
<td>&lt;2500g</td>
<td>137 (15.15)</td>
<td>29 (8.81)</td>
<td></td>
</tr>
<tr>
<td>SGA n (%)</td>
<td>97 (10.73)</td>
<td>26 (7.90)</td>
<td>0.3202a</td>
</tr>
<tr>
<td>Missing</td>
<td>11 (1.22)</td>
<td>5 (1.52)</td>
<td></td>
</tr>
</tbody>
</table>

*aChi-square test*
Regression Models

In the unadjusted logistic regression model, US-born Black women presented significantly higher odds of having a preterm infant compared to foreign-born Black women (cOR: 1.65; 95% CI: 1.13-2.40) (Table 6, Model 1). In addition, US-born Black mothers had higher odds of SGA compared to foreign-born Black women; however, this association was not statistically significant (cOR: 1.47; 95% CI: 0.92-2.35). Model 2 represents the adjusted logistic regression model. Covariates included in the model illustrated a 10 percent change (PC) in the beta estimate of nativity (Table 7) when compared to a model including nativity only. The fully adjusted model did not include primary language because of its high correlation to nativity status. Thus, the fully adjusted model included education, income, marital status, maternal age, tobacco use, alcohol use, and prenatal care. In the fully adjusted model, US-born Black women had 21% increased odds of PTB compared to foreign-born Black women; however, this association was not statistically significant (aOR: 1.21; 95% CI: 0.79-1.85). Likewise, while US-born Black women had 11% increased odds of SGA compared to foreign-born Black women, this association was not statistically significant (aOR: 1.11; 95% CI: 0.66-1.90).

Table 6: Association between Nativity Status and PTB and SGA: Logistic Regression Models

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cOR (95% CI)</td>
<td>aOR (95% CI)</td>
</tr>
<tr>
<td><strong>PTB</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US-Born</td>
<td>1.65 (1.13-2.40)</td>
<td>1.21 (0.79-1.85)</td>
</tr>
<tr>
<td>Foreign-Born</td>
<td>Reference</td>
<td>-</td>
</tr>
<tr>
<td><strong>SGA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US-Born</td>
<td>1.47 (.92-2.35)</td>
<td>1.11 (0.66-1.90)</td>
</tr>
<tr>
<td>Variables</td>
<td>$\beta_1$</td>
<td>Percent change (%)</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Nativity (crude)</td>
<td>0.50 (OR: 1.65 CI: 1.13-2.40)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td>0.52</td>
<td>3.52</td>
</tr>
<tr>
<td>Education*</td>
<td>0.43</td>
<td>13.49</td>
</tr>
<tr>
<td>Income*</td>
<td>0.34</td>
<td>32.35</td>
</tr>
<tr>
<td>Insurance</td>
<td>0.50</td>
<td>&lt;1.00</td>
</tr>
<tr>
<td>Marital Status*</td>
<td>0.25</td>
<td>49.97</td>
</tr>
<tr>
<td>Primary Language</td>
<td>-0.03</td>
<td>93.47</td>
</tr>
<tr>
<td>Parity</td>
<td>0.51</td>
<td>1.14</td>
</tr>
<tr>
<td>Maternal Age*</td>
<td>0.55</td>
<td>11.03</td>
</tr>
<tr>
<td>Tobacco Use*</td>
<td>0.41</td>
<td>17.62</td>
</tr>
<tr>
<td>Drug Use</td>
<td>0.48</td>
<td>3.12</td>
</tr>
<tr>
<td>Alcohol Use*</td>
<td>0.44</td>
<td>11.43</td>
</tr>
<tr>
<td>Prenatal Care*</td>
<td>0.42</td>
<td>15.90</td>
</tr>
<tr>
<td>EPDS (Depression)</td>
<td>0.54</td>
<td>7.27</td>
</tr>
<tr>
<td>Final Model*</td>
<td>0.19 (OR: 1.21, CI: .79-1.85)</td>
<td>62.44</td>
</tr>
</tbody>
</table>

*Represents variables in the final adjusted model

The specified covariates analyzed in the bivariate models presented a significant difference by nativity status in Table 4 excluding maternal age. Based on the crude beta estimate of nativity ($\beta_1$: 0.50); all covariates except ethnicity ($\beta_1$: 0.52, PC: 3.52%),
insurance ($\beta_1$: 0.50 PC $<$ 1.00%), parity ($\beta_1$: 0.51, PC: 1.14%), drug use ($\beta_1$: 0.48, PC: 3.12%), and depression ($\beta_1$: 0.54, PC: 7.27%) presented more than a 10% change in beta estimate.

**Exploration of Mediation**

To further explore the influence of covariates, a supplement analytic analysis explored depression as a mediator in the relationship between nativity status and PTB, specifically. Depression was utilized as a proxy for psychosocial stress. Figure 1 shows a directed acyclic graph (DAG) between nativity and PTB. In this figure, depression is depicted as an intermediate step (i.e., mediator) in the causal pathway. The logistic regression models were used to determine how much of the association between nativity status and PTB operated by way of depression. To determine this; (1) we identified the crude association between nativity and PTB, (2) determined if an association existed between nativity and depression (i.e., exposure-mediation path), and (3) determined if an association existed between depression and PTB (meditation-outcome path) while controlling for confounders.

Being born in the US was significantly associated with increased odds of PTB (OR: 1.65, 95% CI: 1.13-2.40) among Black women. Additionally, being born in the US was significantly associated with depression (OR: 5.35, 95% CI: 2.82-10.14) among Black women. Lastly, the crude association between depression and PTB was significant (not illustrated), yet after adjustment for known confounders, the relationship between depression and PTB was not significant (OR: 1.35 95% CI 0.67-2.75). Because path 3 was not significant (i.e., assumption 2: control for mediation-outcome confounding) a
formal meditation analysis to determine the direct and indirect effect of depression was not conducted.

**Figure 1. Directed Acyclic Graphic of Nativity Status and Preterm Birth**

Study Aim 2: Reporting of Racial Discrimination

Thirty-one mothers of singleton live births, who self-identified as Black or African American and participated in the Des Moines, Health Start/ Empowerment Initiative completed the study survey. Among the women, four (12.90%) were US-born Black women and 27 (87.10%) were foreign-born Black women. All the foreign-born Black women were from countries in Sub-Saharan Africa including the Democratic Republic of the Congo, Eritrea, Tanzania, Congo, Kenya, Liberia, and Somalia. Table 8 provides a description of the socioeconomic, behavioral, and maternal health conditions. Three participants were missing socio-demographic information reducing the sample to 29. In general, most of the sample consisted of foreign-born Black women. Most of the sample had less than a high school education and reported a household income of less than $35,000. A little less than half of the participants were married, and over a third of the participants used Medicaid as their insurance provider. Also, minimum to no alcohol,
tobacco, or drug use was reported. In addition, no one in the sample had gestational
diabetes, and one reported having hypertension. The sample presented minimum mild
depression measured by the EPDS, yet US-born Black women had a higher medium
score of perceived stress in comparison to foreign-born Black women.

**Title 8: Descriptive Table of Survey Participants**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N= 29</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maternal Age median (Q1-Q3)</strong></td>
<td>27.00 (24-33)</td>
</tr>
<tr>
<td><strong>Nativity n (%)</strong></td>
<td></td>
</tr>
<tr>
<td>US-born</td>
<td>3 (10.34)</td>
</tr>
<tr>
<td>Foreign-born</td>
<td>26 (89.66)</td>
</tr>
<tr>
<td><strong>Ethnicity n (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>29 (100%)</td>
</tr>
<tr>
<td><strong>Education n (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Less than High School</td>
<td>14 (48.28)</td>
</tr>
<tr>
<td>High School/ GED</td>
<td>9 (31.03)</td>
</tr>
<tr>
<td>Some College</td>
<td>5 (17.24)</td>
</tr>
<tr>
<td>College 4yrs or more</td>
<td>0</td>
</tr>
<tr>
<td>None/Other</td>
<td>1 (3.45)</td>
</tr>
<tr>
<td><strong>Income n (%)</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;$10,000</td>
<td>11 (37.93)</td>
</tr>
<tr>
<td>$15,000-$19,999</td>
<td>1 (3.45)</td>
</tr>
<tr>
<td>$20,000-$24,999</td>
<td>2 (6.90)</td>
</tr>
<tr>
<td>$25,000-$34,999</td>
<td>11 (37.93)</td>
</tr>
<tr>
<td>$35,000-$49,999</td>
<td>4 (13.79)</td>
</tr>
<tr>
<td><strong>Marital Status n (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>7 (24.14)</td>
</tr>
<tr>
<td>Married</td>
<td>13 (44.83)</td>
</tr>
<tr>
<td>Dating/Relationship</td>
<td>6 (20.69)</td>
</tr>
<tr>
<td>Divorced/Separated</td>
<td>3 (10.34)</td>
</tr>
<tr>
<td><strong>Insurance n (%)</strong></td>
<td></td>
</tr>
<tr>
<td>No Insurance</td>
<td>4 (13.79)</td>
</tr>
<tr>
<td>Medicaid/Title XIX</td>
<td>23 (79.31)</td>
</tr>
<tr>
<td>Private Insurance</td>
<td>1 (3.45)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (3.45)</td>
</tr>
<tr>
<td>Primary Language Spoken</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>11 (37.93)</td>
</tr>
<tr>
<td>Not English</td>
<td>18 (62.07)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prenatal Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>No PNC Received</td>
</tr>
<tr>
<td>PNC Received</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tobacco Use n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alcohol Use n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drug Use n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypertension n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gestational Diabetes n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parity n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primigravida</td>
</tr>
<tr>
<td>Nulliparous (2-4)</td>
</tr>
<tr>
<td>Grand parous (5-8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EPDS Score n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Prenatal Depression</td>
</tr>
<tr>
<td>Prenatal Depression</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived Stress median (Q1, Q3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign-Born median (Q1, Q3)</td>
</tr>
<tr>
<td>US-born median (Q1, Q3)</td>
</tr>
</tbody>
</table>
The Racial Microaggressions Scale (RMAS) displayed high to moderate internal consistency measured by Cronbach Coefficient Alpha among this study population. Table 9 provides the Cronbach Coefficient Alpha statistic for each sub-scale of RMAS.

Table 9: Internal Consistency of RMAS

<table>
<thead>
<tr>
<th>Scale</th>
<th>Items</th>
<th>Cronbach Coefficient Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invisibility</td>
<td>8</td>
<td>0.93</td>
</tr>
<tr>
<td>Criminality</td>
<td>4</td>
<td>0.97</td>
</tr>
<tr>
<td>Low Achieving/ Undesirable culture</td>
<td>9</td>
<td>0.93</td>
</tr>
<tr>
<td>Sexualization</td>
<td>3</td>
<td>0.87</td>
</tr>
<tr>
<td>Foreigner/Not Belonging</td>
<td>3</td>
<td>0.82</td>
</tr>
<tr>
<td>Environmental Invalidations</td>
<td>5</td>
<td>0.75</td>
</tr>
<tr>
<td>RMAS</td>
<td>32</td>
<td>0.96</td>
</tr>
</tbody>
</table>

Among the 31 Black women, the median RMAS score was 7 with an interquartile range (IQR) of 25. US-born Black women had a higher median RMAS score in comparison to foreign-born Black women (median= 40 US-born vs. 7 FB) (Table 10). Regarding foreign-born Black women, those who migrated to the US before age 18 had a higher median RMAS score (median= 28) than those who migrated to the US after age 18 (median= 6). Likewise, those who have lived in the US for five years or more had a higher median RMAS (median= 9) compared to those who have lived in the US for less than five years (median score= 5) (Table 11). Additionally, US-born Black women reported higher median scores on Invisibility, Criminality, Low achieving/undesirable culture, Sexualization, and Environmental Invalidations (Table 10).
Table 10: Reporting of Median Racial Microaggression Scores by Nativity Status

<table>
<thead>
<tr>
<th>Scale*</th>
<th>Total Study Sample N=31</th>
<th>US-born N=4</th>
<th>Foreign-Born N=27</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Invisibility</strong></td>
<td>0, 2 (0-2)</td>
<td>10, 20 (0-20)</td>
<td>0, 2 (0-2)</td>
</tr>
<tr>
<td>Score Range (0-24)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Criminality</strong></td>
<td>0, 3 (0-3)</td>
<td>5, 11 (0-11)</td>
<td>0, 0 (0-0)</td>
</tr>
<tr>
<td>Score Range (0-12)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Low Achieving/Undesirable culture</strong></td>
<td>2, 10 (0-10)</td>
<td>14, 22.5 (2.5-25)</td>
<td>1, 8 (0-8)</td>
</tr>
<tr>
<td>Range (0-27)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sexualization</strong></td>
<td>0, 1 (0-1)</td>
<td>2.5, 6 (0-6)</td>
<td>0, 0 (0-0)</td>
</tr>
<tr>
<td>Score Range (0-9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Foreigner/Not Belonging</strong></td>
<td>2, 6 (0-6)</td>
<td>2, 3 (1-4)</td>
<td>2, 6 (0-6)</td>
</tr>
<tr>
<td>Score Range (0-9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Environmental Invalidations</strong></td>
<td>2, 5 (0-5)</td>
<td>5, 9.5 (0.5-10)</td>
<td>2, 4 (0-4)</td>
</tr>
<tr>
<td>Score Range (0-15)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RMAS</strong></td>
<td>7, 25 (3-28)</td>
<td>40, 70 (5-75)</td>
<td>7, 16 (3-19)</td>
</tr>
<tr>
<td>Score Range (0-96)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Reporting of Median, IQR (Q1-Q3)*

Table 11: Differences in Median Racial Microaggression Scores by Duration of Residency and Age of Migration in the US among Foreign-born Black women

<table>
<thead>
<tr>
<th>Scale*</th>
<th>US &lt; 5 N=14</th>
<th>US ≥ 5 N=13</th>
<th>Age of M &lt;18 N=7</th>
<th>Age of M ≥ 18 N=19</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Invisibility</strong></td>
<td>0, 0 (0-0)</td>
<td>2, 2 (1-3)</td>
<td>2, 5 (0-5)</td>
<td>0,1 (0-1)</td>
</tr>
<tr>
<td>Score Range (0-24)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Criminality</strong></td>
<td>0, 0 (0-0)</td>
<td>0, 0 (0-0)</td>
<td>0, 3 (0-3)</td>
<td>0, 0 (0-0)</td>
</tr>
<tr>
<td>Score Range (0-12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Aim 3a: Perceived Racial Discrimination and Adverse Birth Outcome.

An adverse birth outcome was defined as experiencing PTB, SGA, or LBW. In the sample, the prevalence of an adverse birth outcome was 16.67% (Table 12). Among foreign-born mothers, higher racial discrimination mean scores were observed among mothers who experienced an adverse birth outcome in comparison to those who did not experience an adverse birth outcome, yet the results were not significant (p =0.5605). Similarly, though the odds of having adverse birth outcomes increased by 3.0% for every 1-unit increase on the racial discrimination scale, no significant difference was observed; therefore, in this sample, perceived racial discrimination was not significantly associated with adverse birth outcome (cOR: 1.03, 95% CI 0.96, 1.10).
Table 12: Prevalence of Adverse Birth Outcomes among Foreign-born Black Women

<table>
<thead>
<tr>
<th>Birth Outcome</th>
<th>Prevalence, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=24</td>
</tr>
<tr>
<td>Preterm Birth</td>
<td>2 (8.33%)</td>
</tr>
<tr>
<td>Small for Gestational Age</td>
<td>2 (8.33%)</td>
</tr>
<tr>
<td>LBW</td>
<td>3 (12.54%)</td>
</tr>
<tr>
<td>Adverse Birth Outcomes</td>
<td>4 (16.67%)</td>
</tr>
</tbody>
</table>

Study Aim 3b: Length of Residency, Age of Migration, and Perceived Racial Discrimination

There was no significant difference in perceived racial discrimination and length of residency in the US \(p=0.10\) nor the age of migration \(p=0.53\) among foreign-born Black women. Even so, foreign-born Black women who resided in the US for five or more years had higher mean perceived racial discrimination scores (mean score =15.10) in comparison to foreign-born Black women who resided in the US for less than 5 years (mean score= 10.30). Likewise, higher mean racial discrimination scores were observed among mothers who migrated to the US before 18 years of age (mean score = 13. 58) compared to mothers who migrated to the US after age 18 (mean score= 11.44) (Table 13). Also, in a supplement analysis, a higher proportion of adverse birth outcomes were experienced among foreign-born mothers whose duration in the US was 5 years or more, or if they migrated before age 18, yet these results were not statistically significant.

Table 13: Wilcoxon Mean Scores for Perceived Racial Discrimination by Duration of Residency and Age of Migration in the US

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample</th>
<th>Mean Score</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of Residency (in years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US &lt; 5</td>
<td>13</td>
<td>10.30</td>
<td>0.10</td>
</tr>
<tr>
<td>Age of Migration (in years)</td>
<td>Count</td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>$\geq 5$</td>
<td>11</td>
<td>15.09</td>
<td></td>
</tr>
<tr>
<td>$&lt; 18$</td>
<td>6</td>
<td>13.58</td>
<td></td>
</tr>
<tr>
<td>$\geq 18$</td>
<td>17</td>
<td>11.44</td>
<td></td>
</tr>
</tbody>
</table>

The mean age of migration is 0.53 years.
VI. DISCUSSION

Our results indicate that among Black women who participated in Des Moines, Iowa Healthy Start between 2000 to 2021, US-born Black women had significantly higher odds of PTB compared to foreign-born Black women. In addition, US-born Black women presented higher odds of SGA in comparison to foreign-born Black women, yet this was not significant. After adjustment for well-known risk factors, US-born Black women still presented higher odds of PTB and SGA, yet the effect attenuated, and a significant difference was not observed between the two groups. The results of our study mimic those of Cabral and colleagues (1990) study among 817 Boston women. They found that after adjusting for covariates (e.g., education, PNC, marital status, maternal age, tobacco use, alcohol use, drug use, etc.), the foreign-born advantage persisted yet the difference between the groups was no longer statistically significant (Cabral et al., 1990).

One reason for the null association may be due to the socioeconomic background of the study population. A recent study suggested that differences in birth outcomes are commonly not observed among highly disadvantaged groups (Braveman et al., 2015). For example, Braverman and colleagues (2015) analyzed the role of socioeconomic factors (i.e., income and education) in the Black-white disparity of PTB and found among the most disadvantaged group no significant difference was observed (Braveman et al., 2015). In other words, mothers of the most socioeconomic disadvantaged group reflected an equal risk of adverse birth outcomes regardless of race. This suggests that lower
socioeconomic status may undermine other social characteristics that serve as protective factors. Among our study sample of Healthy Start Black women, many had no college education, an income of less than $12,000, and were recipients of government-based insurance, irrespective of nativity status. Thus, the lack of statistical differences observed among foreign-born and US-born Black women's odds of PTB and SGA in the fully adjusted model may be reflective of the disadvantaged socioeconomic status of the study population.

Nonetheless, despite the lack of statistical significance, our findings are suggestive that nativity status is associated with PTB and SGA, with a continued disadvantage observed among US-born Black women in comparison to foreign-born Black women. Our findings are comparable to previous studies. For example, Elo and colleagues (2014) examined vital records for 27 states and discovered foreign-born Black women had lower odds of PTB and SGA compared to US-Born Black women (Elo et al., 2014). Among Black mothers who gave birth in California from 2011 to 2017, in the unadjusted model, US-born Black women were 62% (OR: 1.62, 95% CI 1.52-1.72) and 57% (OR: 1.57, 95% CI 1.49-1.65) more likely of having an infant that was preterm and small for gestational age, respectively (Mckenzie-Sampson et al., 2021). Our study observed similar effect estimates. Furthermore, after adjustment, US-born Black women continued to have an elevated risk of PTB and SGA (PTB aRR: 1.51, 95% CI 1.39-1.65; SGA aRR: 1.52, 95% CI 1.41-1.64) (Mckenzie-Sampson et al., 2021). The results of our study mirror this relationship excluding the decline in the effect estimate and significance in our study’s adjusted model. The fully adjusted model in the Mckenzie-Sampson study included maternal age, maternal education, parity, health insurance, Women's Infant and
Child program participants, PNC, BMI, smoking/drug use, diabetes, and hypertension (McKenzie-Sampson et al., 2021). While our final adjusted model included maternal education, income, marital status, maternal age, tobacco and alcohol use, and PNC. Though similar, the differences in the models could explain why after adjustment, the effect attenuated. In our study, marital status and income had the greatest effect on nativity (refer to Table 3). These variables accounted for roughly 50% and 34% change in nativity in the bivariate models. In our study marital status and income may overshadow the effect of the nativity on PTB and SGA thus explaining why the odds of PTB and SGA declined among US-born Black women and a significant difference was not observed.

Additionally, to further understand the role of study covariates, mediation analysis was explored. In the study, depression was explored as a potential mediator in the relationship between nativity status and PTB. Conceptually depression was an ideal variable to assess mediation because it was the only captured stress variable in the Healthy Start database that could cause a biological stress response, and depression is a variable in which intervention efforts can be created. Though our study findings did not conduct a full mediation analysis because all assumptions were not met, our observations suggest that depression alongside many of the study covariates may be in the causal pathway between nativity and PTB, and thus more research should explore these variables as meditators.

Our results also indicate that US-born Black women perceive more experiences of racial discrimination than their foreign-born counterparts. Previous studies have hypothesized exposure to racial discrimination throughout the lifespan may contribute to the differences in birth outcomes among US-born and foreign-born Black women (T. P. Dominguez et al., 2009; Krieger et al., 2011). In 2011, self-reports of racial
discrimination measured by the Experiences of Discrimination scale highlighted that among a Boston cohort of working-class employees, US-born Black participants reported higher racial discrimination levels than foreign-born Black workers (Krieger et al., 2011). Likewise, Dominguez and colleagues (2014) assert that the difference in self-reporting of racial discrimination is a distinguishing factor between foreign-born and US-Born Black pregnant women, specifically (Tyan Parker Dominguez, Emily Ficklin Strong, Nancy Krieger, Matthew W. Gillman, & Janet W. Rich-Edwards, 2009). US-born Black women were twice as likely to report personal experiences of racism and three times as likely to report that their group in general experienced racial discrimination in comparison to foreign-born Black women (T. P. Dominguez et al., 2009). Although the exact biologic pathways remain unclear, racial discrimination has been identified as a chronic stressor and has been associated with higher allostasis (Leimert & Olson, 2020) and weathering among US-born Black women (A. Geronimus et al., 2006), aiding in their disproportionate burden of adverse birth outcomes. Stress throughout the life course and pregnancy is suggested to cause dysregulation of biological systems and pathways that can potentially disrupt critical pathways associated with parturition (Leimert & Olson, 2020).

Unsurprisingly, US-born Black women also reported higher exposure to domain-specific experiences of racial discrimination on the RMAS. One of particular interest to the conceptualization of this dissertation study was the domain of sexualization. Historically, US-born Black women’s sexuality has been under constant scrutiny from being labeled as promiscuous to perceived as unfit mothers (Rosenthal & Lobel, 2011). These stereotypes and their acceptance among US-born Black women can create a unique
source of stress throughout life and even more so during pregnancy (Rosenthal & Lobel, 2011). The concept of intersectionality has promoted the importance of studying how one's multiple identities intersect and impact one’s health. To that end, our findings align with previous literature on the differential reporting of racial discrimination among foreign-born and US-born Black women and promote the exploration of more novel aspects of racism such as gendered racism and its potential impact on Black women's birthing outcomes.

Moreover, the findings of this study are consistent with existing literature in that reporting among foreign-born Black women differentiated based on length of residence and age of migration (Tyan Parker Dominguez et al., 2009; Elsayed et al., 2019; Krieger et al., 2011). Our study showcases that foreign-born women who have resided in the US for more than five years or migrated to the US prior to 18 years of age, perceived more experiences of racial discrimination. In addition, our study found that among foreign-born women, the odds of having an adverse birth outcome increased for each additional experience of racial discrimination, but the sample size was small, and no statistically significant differences were observed. Also, we found that among foreign-born women, a higher proportion of those who experienced an adverse birth outcome was among those who resided in the US for more than five years and migrated to the US before the age of 18. Elsayed and colleagues (2019), discovered a similar trend among foreign-born Black women and how duration in the US influences infant health outcomes. Their findings suggest that the foreign-born advantage significantly diminishes within a decade of residing in the US, but a decline in infant health can be observed as early as two-year post-migration (Elsayed et al., 2019). Research has established that the longer foreign-
born Black women reside in the US the protective effect of being foreign-born tapers, and their birth outcomes resemble that of US-born Black women within several years (Andrasfay & Goldman, 2020; Collins et al., 2002). One theory is that foreign-born Black women are being exposed to more racial discrimination, thus subjected to psychological distress that can be physiologically harmful over time (Andrasfay & Goldman, 2020). Andrassy and colleagues (2020) found that foreign-born Black women perinatal advantage diminishes faster than foreign-born white or Hispanic women and occurs as quickly as one generation even when controlling for socioeconomic factors. They postulate that exposure to racial discrimination, explicitly interpersonal experiences, are a contributing factor to the deprecation of foreign-born Black women perinatal health outcomes (Andrasfay & Goldman, 2020).

**Study Strengths**

There are several strengths of this study. The study used the Racial Microaggression Scale to explore experiences of racial discrimination. To our knowledge, this is the first study to use this scale to explore the relationship between racial discrimination and adverse birth outcomes. In addition, this scale captures multiple domains in which racial discrimination may operate. Furthermore, utilizing a cross-sectional design was deemed an efficient method for exploring this research question and allowed comparison with other cross-sectional studies. Another strength of the study is the study site of the population. Limited literature has utilized Healthy Start data to explore disparities in infant health outcomes. As a federally funded initiative targeted at reducing infant mortality, women who participate in Healthy Start serve as a source population to explore and intervene in many maternal and child health outcomes.
Furthermore, the findings of our study can be used to specifically assist in the development of evidence-based community-level interventions among participants of the Des Moines, Iowa Healthy Start Initiative.

**Study Limitations**

This study has limitations that should be taken into consideration when interpreting the results. First, the sample size for the primary data was small; therefore, we did not have enough power to detect differences between the groups, nor the ability to reject the null hypothesis. Yet, among the sample, our findings showed similar trends as previous literature. The use of a cross-sectional study design limits our ability to assess causation as temporality cannot be determined. However, the use of this study design aligns with existing literature on this topic allowing for comparison of study findings. Albeit the secondary data was missing genetic and environmental risk factors associated with adverse birth outcomes, this study highlighted factors associated mainly with social determinants of health, highlighting the importance of social conditions influencing one’s health outcomes. The use of Healthy Start secondary data could be subject to misclassification bias; all data collected was self-reported, which may have introduced recall and reporting bias, specifically social desirability bias as it relates to the reporting of risky health behaviors. Also, recruitment tactics may have introduced selection bias as case managers were charged to identify eligible participants. Due to the nature of the study, those whose language was not English may have been less likely to participate, though all participants were provided interpreter services by request. Lastly, the results of our study are not generalizable to all US-born Black women and foreign-born Black women who reside in the US. We acknowledge those represented in the study were
participants of a federally funded initiative aimed to support the improvement of maternal and child health outcomes. Also, these women cannot account for the geographical differences between foreign-born and US-born Black women.

**Study Implications**

The findings of this study confirm the need for continued research to better understand how nativity is operating as a protective factor among foreign-born Black women who live in the United States. As foreign-born Black women are afforded this perinatal advantage upon arrival to the US, exploring if this advantage is in part due to concepts such as the Healthy Immigrant effect, which is heavily illustrated by other ethnic groups, or other reasons. Specifically understanding how acculturation may differ among foreign-Born Black women in comparison to other ethnic groups is critical in part to the historical and continued marginalization of Black populations in the US. To that end, future research needs to explore understudied concepts such as migrant selectivity, cultural buffering, and ethnic enclaves specifically among foreign-born Black women.

The findings also suggest a continued need for culturally specific interventions that target individual factors associated with adverse birth outcomes. Based on this study, the Black women participating in Des Moines Healthy Start are socioeconomically disadvantaged, thus, a grave need for interventions that target issues surrounding education, access to quality prenatal care, and accessibility to health care should continue and be curated to address the unique experiences of Black women. Also, the findings of the study highlight the need for continued research on the role of racial discrimination and its impact on foreign-born and US-born Black women’s perinatal health outcomes. Specifically, future research should explore the lived experiences of foreign-born women in the US and their
perceptions of racial discrimination to gain a more comprehensive understanding beyond quantitative measures. This may provide insight into how racism is viewed, perceived, and addressed among populations who are not inherent to its pervasiveness. Lastly, this study provides insight for the expansion of Des Moines Healthy Start assessment tools to include social and structural determinants that influence health outcomes including domains related to racial discrimination and acculturation.

**Future Recommendations**

Based on the results of this study, next steps would be to further investigate perceptions of racial discrimination among foreign-born and US-born Black women. This should include a qualitative exploration of racism, including internalized, interpersonal, and institutional domains, among foreign-born and US-born Black women to gain a more comprehensive understanding. In addition, since an estimate of effect could not be determined between racial discrimination and adverse birth outcomes among foreign-born Healthy Start Clientele; we recommend conducting a follow-up study with a larger sample size to account for the prevalence of adverse birth outcomes and have enough power to detect an association between exposure and outcome. In addition, the next steps would be to investigate how socioeconomic factors influence the relationship between nativity and adverse birth outcomes. Specifically, an exploration of meditation should be conducted to potentially assess causal pathways.

**Conclusion and Public Health Significance**

This study was of public health significance because US-born Black women are disproportionately burdened by negative perinatal outcomes in comparison to other racial and ethnic groups, including their foreign-born counterparts. The disparity has persisted...
for several years, yet no known risk factors have fully explained the difference. Over the last twenty years, more research has sought to explore social factors as a contributor to this disparity. One socially constructed factor of investigation is racism. Since the insurrection of the US, racism has been a critical factor in Black health. Uniquely, experiences of racial discrimination have been associated with adverse birth outcomes among US-born women, yet not recently migrated foreign-born Black women. However, as foreign-born Black women assimilate into US society, they begin to have greater reporting of racial discrimination experiences and present more adverse birth outcomes, mirroring those of US-born Black women. This study cannot unequivocally state that the difference in birth outcomes among US-born and foreign-born Black women is due to differences in perceived racial discrimination, yet the findings of this study suggest that this theory may hold true. This study provides a basis for future research in the areas of nativity, racial discrimination, and acculturation.
REFERENCES


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Journal Immigrant Minority Health, 18, 390-396. doi:10.1007/s10903-015-0194-0


### APPENDIX A: Table 1

**Table 1: Birth Outcomes among US-born and Foreign-born Black Women**

<table>
<thead>
<tr>
<th>Study Design</th>
<th>Study Sample</th>
<th>Outcome</th>
<th>Covariates</th>
<th>Main Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cabral et al., (1990)</strong>&lt;br&gt;Subset from Parent longitudinal study 1984- Boston City Hospital</td>
<td>PCS&lt;br&gt;N= 817&lt;br&gt;USB: 616&lt;br&gt;FBB: 201</td>
<td>LBW, PTB, BW, length, HC, GA</td>
<td>Weight gain during pregnancy, pre-pregnancy weight-for-height, marital status, maternal age, education, PNC, cigarette, alcohol, marijuana, cocaine use</td>
<td>Infants of FB black women had heavier, longer, and larger infants compared to USB after adjusting for covariates. Odds of LBW (aOR= 0.81, 95% CI 0.42-1.53) and PTB (aOR= 0.54, 95%CI 0.24,1.18) remained decreased for FB women, but no significant difference to USB black women</td>
</tr>
<tr>
<td><strong>Wasse et al., (1994)</strong>&lt;br&gt;Washington State birth from 1980 to 1991</td>
<td>CS&lt;br&gt;N= 1342&lt;br&gt;USB: 532&lt;br&gt;WH: 546&lt;br&gt;FBB: 264</td>
<td>BW</td>
<td>Age, smoking, marital status, parity, PNC, diabetes, family income</td>
<td>FB Black women were less likely to have LBW infants compared to US-born Black women. After adjustment, the relative risk of LBW was similar to USB (RR= 0.90, 95%CI = 0.50-1.70) and WH (RR= 1.10, 95%CI 0.60, 2.10) FB had heavier infants after 38-week gestation (aRR=4.00 95%CI 2.30, 6.80) compared to USB</td>
</tr>
<tr>
<td><strong>Acevedo-Garcia et al., (2005)</strong>&lt;br&gt;1998 Detail Natality data set (50 states)</td>
<td>CS&lt;br&gt;N= 2,436,890&lt;br&gt;White: US:1,574,088&lt;br&gt;FB: 80,319&lt;br&gt;Black: US: 322,510&lt;br&gt;FB: 40,213&lt;br&gt;Asian: US: 10,466&lt;br&gt;FB: 74,617&lt;br&gt;Hisp: US: 130,267&lt;br&gt;FB: 204,230</td>
<td>LBW</td>
<td>Maternal age, race/ethnicity, nativity status, marital status, PNC, tobacco, alcohol, chronic hypertension, anemia, diabetes, medical risk (preeclampsia, eclampsia, placenta abruption)</td>
<td>Foreign-born status reduced the risk of LBW among Black (aOR= 0.77, 95%CI 0.74-0.80) and Hispanic (aOR=0.77, 95%CI 0.75-0.80) women</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Foreign-born status serves as more of a protective factor among Black, Hispanic, and white women with low education</td>
</tr>
<tr>
<td>Study</td>
<td>Data Source</td>
<td>N</td>
<td>Birth outcomes</td>
<td>Maternal risk factors</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>--------------------------------------</td>
<td>-----</td>
<td>-----------------------------------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>Elo et al., (2014)</td>
<td>2008 Vital Statistics (27 states)</td>
<td>344,121</td>
<td>PTB, SGA</td>
<td>Maternal age, education, marital status, PNC, smoking during pregnancy, chronic/pregnancy-induced hypertension &amp; diabetes</td>
</tr>
<tr>
<td>Taylor &amp; Sarathchandra (2016)</td>
<td>US Fragile Families and Child Wellbeing Survey, longitudinal survey 1998-2000</td>
<td>2,389</td>
<td>LBW</td>
<td>Maternal age, education, PNC, smoking, drug, alcohol use during pregnancy</td>
</tr>
<tr>
<td>Mckenzie-Sampson et al., (2021)</td>
<td>California Vital Statistics, 2011-2017</td>
<td>146,671</td>
<td>PTB, SGA</td>
<td>Maternal age, education, health insurance, WIC participate, pre-pregnancy BMI, parity, adequacy of PNC, smoking, alcohol drug use during pregnancy, pre-existing or gestational hypertension and diabetes</td>
</tr>
<tr>
<td>Belanoff et al., (2022)</td>
<td>Boston Worcester and Springfield metropolitan areas of MA, 2011-2015</td>
<td>26,648</td>
<td>PTB</td>
<td>Marital status, age, education, pre-pregnancy BMI, smoking during pregnancy, adequacy PNC, anemia, hemoglobinopathy, lung disease, prior cesarean delivery, gestational or pre-pregnancy diabetes, prenatal hospitalization, hypertension, pre-eclampsia, eclampsia, prior PTB, renal disease</td>
</tr>
</tbody>
</table>

US- US-born, FB- foreign-born, USB= US-born Black women, FBB- foreign-born Black women, WH- Non-Hispanic white women, LBW- low birthweight, PTB- preterm birth, SGA- small for gestational age, BW-birthweight, GA-gestational age, HC-Head Circumference, PNC= Prenatal Care, PCS- Prospective Cohort study, CS- cross-sectional, OR- odds ratio, RR- Risk Ratio, aOR- adjusted odds ratio, aRR- adjusted relative risk
APPENDIX B: Conceptual Model

Measures of Acculturation
- Nativity
- Age of Migration
- Duration of Residency
- Language
- Ethnicity

Social Determinants of Health
- Income, education, marital status, language, prenatal care, access to quality healthcare, employment, neighborhood

Internalized racism

Perceived Chronic Stress
- Perceived discrimination
- Depression
- Psychological distress

Health Behaviors
- Tobacco use
- Drug/Alcohol Consumption
- Physical inactivity
- Poor diet

Maternal Health Conditions
- Gestational Diabetes
- Hypertensive Disorders
- Additional health complications

Interpersonal racism

Risk of PTB and SGA

Allostatic Load/Overload
- Dysregulation of stress pathways (HPA)
- Damage overactivation of the Neurological, Immune, and Endocrine system
APPENDIX C: Study Flyer

Want to improve the health of Black infants? Are you...

Black/African American Mother & Have at least one child & Currently or pervously enrolled in Healthy Start

WE NEED YOU!
Complete a brief survey about your experiences of racial discrimination and receive 200 Stork Nest points!

INTERESTED? SCAN HERE FOR SURVEY
https://redcap.link/BLAwomenbirths

P.I. Investigator: Dr. Anne Wallis
Co-Investigator: Kendra Kelly-Taylor, MSPH
Contact for questions: kendra.kelly-taylor@louisville.edu (404) 617-9153

EveryStep
APPENDIX D: Study Recruitment

Study Snapshot

Study Title: Are their differences in birth outcomes between foreign-born and US-born Black mothers? The role of perceived racial discrimination, preterm birth, and small for gestational age.

Purpose of the study: There are two main study objectives: (1) To examine if experiences of racial discrimination impact birth outcomes, for example the birth weight of a baby, among women who identify as Black, and (2) To investigate if there are differences in the reporting of racial discrimination and other life stressors among foreign-born and US-born Black women.

Study Procedure: We are asking study participants to complete a survey about their experiences of racial discrimination and what situations they perceive to be stressful.

Survey Time: The survey is estimated to take 10 to 15 minutes.

Eligible participants: (1) Mothers of at least one live birth who are currently or previously enrolled in the Des Moines Healthy Start program and (2) Self-identify as Black and/or African American.

*If a participant does not identify as Black or African American, younger than 18 years of age at the study start date, and/or has multiple gestations (i.e., twins or triplets), they are NOT eligible to participate in the study.

Study Significance: The goal of this study is to further our understanding of the relationship between racial discrimination and birth outcomes among US-born and
foreign-born Black women. Black women residing in the US experience the worse birth outcomes compared to other racial and ethnic groups. Research suggests exposure to racial discrimination may be a driving force, yet further understanding of this risk factor is needed. Our goal is to expand our understanding of discrimination and birth outcomes beyond the historically researched Black-white dyad. We hope the findings of the study will support the development of culturally appropriate interventions and structural/policy changes that specifically target this risk factor.

Survey Access: OR code or Survey Link!

Or

https://redcap.link/BLKwomenbirths
RESEARCH AGREEMENT
BETWEEN
DES MOINES, IOWA HEALTHY START/EMPOWERMENT PROGRAM
AND
ANNE B. WALLIS, PHD AND KENDRIA KELLY-TAYLOR, MSPH
(UNIVERSITY OF LOUISVILLE- RESEARCHER NAMES)

This agreement is made and entered into this 8th day of June 2022, by and between the Des Moines, Iowa Healthy Start and University of Louisville’s Anne B. Wallis and Kendria Kelly-Taylor (Researchers).

I. Purpose. Des Moines, Iowa Healthy Start supports research activities which benefit the health and well-being of Iowans. Healthy Start recognizes that conducting research for new insights and innovative solutions to health problems is one of the ten essential public health services. It is the mutual desire of Healthy Start and the Researchers to provide the researchers with limited access to Healthy Start records for the purpose of enabling the Researcher to implement the research protocol (“Study Protocol” Attachment 1) described in the University of Louisville Institutional Review Broad Application: IRB 22.0014 (“Outcome letter” Attachment 2).

II. Duties of the Parties.

A. Duties of Des Moines, Iowa Healthy Start. Following a review of the Application, Healthy Start has found the requested variables (Attachment 3) to be essential for the research project described, has found such project to be for bona fide research purposes, and has found that such project is not for private gain. Healthy Start therefore agrees to release to Researcher the requested limited data records in the Application.

B. Duties of Researcher. The Researcher agrees to the following:
Use All records shall be used only for bona fide research purposes as set forth in the study protocol. The Researcher shall not use or permit others to use the data in anyway expect for statistical reporting and analysis.

A. No personally identifiable data provided. If Healthy Start has not provided Researchers with personally identifiable data, the Researcher shall not use nor allow anyone else to use the records to learn the identity of any person contained in the data provided. If the identity of any person is discovered inadvertently the Researchers will not make use of this knowledge; will immediately notify Healthy Start; will safeguard or destroy the information which led to the identification of the individual; and will inform no one else of the discovery.

B. Personally identifiable data provided. If Healthy Start has provided Researcher with personally identifiable data, such data or information from the records shall not be used to establish contact with the named person his/her family without prior written approval from Healthy Start.

Storage All Healthy Start Records received shall be stored in a secure locked area with access restricted to project personnel for research purposes only set forth in the Study Protocol.

Confidentially The Researchers shall maintain the confidentiality of all Records obtained from Healthy Start. The Researcher shall not disclose any confidential information contained in the records, including but not limited to names and other identifying information of persons who are the subject of such record, either during the period of this Agreement or hereafter. All identifiable and personal indicators shall be kept strictly confidential and shall not be used or released for any purpose.

The Researcher shall provide to Healthy Start a written description of procedures to safeguard confidential information. The research shall designate one individual who shall remain the responsible authority in charge of all the data records collected or used by the Researcher in connection with this Agreement.

Information from Healthy Start Records shall not be used to establish contact with the named person or his/her family without prior written approval from Healthy Start.

This Agreement requires that the organization will ensure the confidentiality of the Healthy Start Records it may provide to a sponsoring agency.

The Researcher shall immediately report to Healthy Start any unauthorized disclosure of confidential information. Such disclosure shall be grounds for immediate termination of Agreement.
(4) **Destruction** All data received from Healthy Start shall be destroyed at the termination of the research project unless need for further retention is explained in the project description and approved by University of Louisville IRB and Healthy Start through an addendum to this Agreement. Destruction shall be by means which render the records unidentifiable and useless. The Researchers should provide notification to Healthy Start of this destruction of the records.

(5) **Future Requests** All future records requested, relative to the described project, shall make reference to the above agreement number.

(6) **Modifications** If during the research study, there is a modification to the project or if the project is terminated notice shall be sent to Healthy Start explaining the modifications or stating date of termination. All modifications will undergo review through the University of Louisville Institutional Review Board prior to notice and implementation to Healthy Start. The Researcher shall not modify the use of Records from that contained in the Study Protocol without prior written approval from Healthy Start.

(7) **Ownership** Data Records provided by Healthy Start to the Researcher pursuant to this Agreement shall remain the property of Healthy Start at all times.

(8) **Publication** If the Researchers is associated with an Iowa regent institution, the Researchers agrees to comply with the conditions regarding publications and presentations contained in Section 8(b)”i” of the General Conditions for Contracts with States Universities, effective August 25, 2004. If the Researchers is not associated with an Iowa regent institution, the Research agrees to provide a copy of the proposed publication to Healthy State prior to dissemination date. The publication shall not be published in any format without the prior notification to Healthy Start.

### III. Material Breach, Enforcement and Termination

**A. Term.** This Agreement shall be effective as of the Agreement Effective Date and shall continue until the Agreement is terminated in accordance with the provisions below or the Agreement between the parties terminates.

**B. Covered Entity’s Rights of Access and Inspection.** From time to time upon reasonable notice, or upon a reasonable determination that the Researcher has breached this Agreement, Healthy Start may inspect the facilities, systems, books, and records of the Researcher to monitor compliance with this Agreement. The fact that Healthy Start inspects, or fails to inspect, or has the right to inspect, Researcher’s facilities, systems and procedures does not relieve the Researcher of its responsibility to comply with this Agreement, nor does Healthy Start’s (1) failure to detect or (2) detection of, but failure to notify the Researcher, any unsatisfactory practices constitute acceptance of such practice or a waiver of Covered Entity’s enforcement or termination rights under this Agreement.
C. **Termination.** Healthy Start may terminate this Agreement:

1. immediately if Researcher is named as a defendant in a criminal proceeding for a violation of HIPAA or the HIPAA Regulations;

2. immediately if a finding or stipulation that Research has violated any standard or requirement of HIPAA, the HIPAA Regulations, or any other security or privacy laws is made in any administrative or civil proceeding in which Research has been joined; or

3. immediately in the event Researcher’s funding to support this project is terminated. Researcher must provide evidence of such loss of funding upon request of Healthy Start.

D. **Remedies.** If Healthy State determines that Research has breached or violated a material term of this Agreement, Healthy Start may, at its option, pursue any and all of the following remedies:

1. exercise any of its rights of access and inspection under Section III.B. of this agreement;

2. take any other reasonable steps that, in its sole discretion, shall deem necessary to cure such breach or end such violation; and/or

3. terminate this Agreement immediately.

E. **Knowledge of Non-Compliance.** Any non-compliance by Researcher with this Agreement or with HIPAA or the HIPAA Regulations automatically will be considered a breach or violation of a material term of this Agreement if Research knew or reasonably should have known of such non-compliance and failed to immediately take reasonable steps to cure the non-compliance.

F. **Injunctions.** Healthy Start and Researcher agree that any violation of the provisions of this Agreement may cause irreparable harm. Accordingly, in addition to any other remedies available, in the event of any violation by the Researcher of any of the provisions of this Agreement, or any explicit threat thereof, Healthy Start shall be entitled to an injunction or other decree of specific performance with respect to such violation or explicit threat thereof, without any bond or other security being required and without the necessity of demonstrating actual damages. The parties’ respective rights and obligations under this section shall survive termination of the Agreement.

G. **Indemnification.** Researcher shall indemnify, hold harmless and defend Healthy Start from and against any and all claims, losses, liabilities, costs and other expenses resulting from, or relating to, the acts or omissions of Researcher in connection with the representations, duties and obligations of Researcher under this Agreement. The parties’
respective rights and obligations under this section shall survive termination of the Agreement.

IV. Miscellaneous Terms.

A. State Law. Nothing in this Agreement shall be construed to require Researcher to use or disclose the Limited Data Records without a written authorization from an individual who is a subject of the PHI from which the Limited Data Records were created, or written authorization from any other person, where such authorization would be required under state law for such use or disclosure.

B. No Third-Party Beneficiaries. Nothing express or implied in this Agreement is intended or shall be deemed to confer upon any person other than Healthy Start and Researcher, and their respective successors and assigns, any rights, obligations, remedies, or liabilities.

C. Ambiguities. The parties agree that any ambiguity in this Agreement shall be resolved in favor of a meaning that complies and is consistent with applicable law protecting the privacy, security and confidentiality of Protected Health Information and the Limited Data Records, including, but not limited to, HIPAA and the HIPAA Regulations.

D. Primacy. To the extent that any provisions of this Agreement conflict with the provisions of any other agreement or understanding between the parties, this Agreement shall control with respect to the subject matter of this Agreement.

V. Execution

IN WITNESS WHEREOF, in consideration of the mutual covenants set forth above and for other goods and valuable consideration, the receipt, adequacy and legal sufficiency of which are hereby acknowledge, the parties have entered into the above Agreement and have caused their duly authorized representative to execute this Agreement.
APPENDIX F: Study Instrument

Please answer the following questions about yourself.

1. Regarding your race, do you self-identify as Black?
   ___ Yes          ___ No

2. Are you 18 years or older?
   ___ Yes          ___ No

3. Are you a mother of at least one live birth (Are you a mother of at least one living child who is not a twin and/or triplet)?
   ___ Yes          ___ No

4. Are you currently enrolled in the Des Moines, Iowa Healthy Start Program?
   ___ Yes          ___ No
   If no, have you previously been enrolled in the program? (Y or N)

*If participants mark “no” to any of the above questions, they will not be eligible to participate*

5. Were you born in the United States of America?
   ___ Yes          ___ No

If participant click “YES” to question 5, go to Section 2 of the survey.

If participant click “NO” to question 5, proceed to questions 6-9 then to Section 2.

6. What country were you born in?

7. What year did you move to the United States
8. How old were you when you moved to the United States?

9. How many years have you lived in the United States?

**Section 2.**

First Name______________________ Last Name __________________

Date of Birth ____________________

**Please go to Section 3**

**Section 3. Perceived Stress (Cohen, 1994)**

The following questions will ask you about your feelings and thoughts during the last month. For each statement, you will indicate how often you felt or thought a certain way.

0 = Never  1 = Almost Never  2 = Sometimes  3 = Fairly Often  4 = Very Often

<table>
<thead>
<tr>
<th>Question</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In the last month, how often have you been upset because of something that happened unexpectedly?</td>
<td></td>
<td></td>
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<tr>
<td>2. In the last month, how often have you felt that you were unable to control the important things in your life?</td>
<td></td>
<td></td>
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<tr>
<td>3. In the last month, how often have you felt nervous or “stressed”?</td>
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</tr>
<tr>
<td>4. In the last month, how often have you felt confident about your ability to handle your personal problems?</td>
<td></td>
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</tr>
<tr>
<td>5. In the last month, how often have you felt that things were going your way?</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6. In the last month, how often have you found that you could not cope with all the things you had to do?</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>7. In the last month, how often have you been able to control irritations in your life?</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>8. In the last month, how often have you felt that you were on top of things?</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
9. In the last month, how often have you been angered because of things that were outside of your control?

10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

Please go to Section 4.

Section 4. Experience of Racial Microaggressions
Racial microaggressions are defined as brief and commonplace daily verbal, behavioral, and environmental humiliations, whether intentional or unintentional, that communicate hostile, offensive, or negative racial slights and insults to target a person or group.

The following questions will ask you how often a statement has occurred in your life. If the statement has occurred in your life, then indicate how bothersome/stressful the experience was for you.

Q1. Because of my race, other people assume that I am a foreigner.

Never__ A little/rarely__ Sometimes/moderate__
Often/frequently__

1a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__ A little__ Moderate__ High__

Q2. Because of my race, people suggest that I am not a “true” American.

Never__ A little/rarely__ Sometimes/moderate__
Often/frequently__

2a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__ A little__ Moderate__ High__

Q3. Other people often ask me where I am from, suggesting that I don’t belong.

Never__ A little/rarely__ Sometimes/moderate__
Often/frequently__

3a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__ A little__ Moderate__ High__

Q4. Other people treat me like a criminal because of my race.
4a. How stressful, upsetting, or bothersome was this experience for you.
Not at all__  A little__  Moderate__  High__

Q5. People act like they are scared of me because of my race.

Never__  A little/rarely__  Sometimes/ moderate__  Often/frequently__

5a. How stressful, upsetting, or bothersome was this experience for you.
Not at all__  A little__  Moderate__  High__

Q6. Others assume that I will behave aggressively because of my race.

Never__  A little/rarely__  Sometimes/ moderate__  Often/frequently__

6a. How stressful, upsetting, or bothersome was this experience for you.
Not at all__  A little__  Moderate__  High__

Q7. I am singled out by police or security people because of my race.

Never__  A little/rarely__  Sometimes/ moderate__  Often/frequently__

7a. How stressful, upsetting, or bothersome was this experience for you.
Not at all__  A little__  Moderate__  High__

Q8. People suggest that I am “exotic” in a sexual way because of my race.

Never__  A little/rarely__  Sometimes/ moderate__  Often/frequently__

8a. How stressful, upsetting, or bothersome was this experience for you.
Not at all__  A little__  Moderate__  High__
Q9. Other people view me in an overly sexual way because of my race.

Never__ A little/rarely__ Sometimes/moderate__
Often/frequently__

9a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__ A little__ Moderate__ High__

Q10. Other people hold sexual stereotypes about me because of my racial background.

Never__ A little/rarely__ Sometimes/moderate__
Often/frequently__

10a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__ A little__ Moderate__ High__

Q11. Other people act as if they can fully understand my racial identity, even though they are not of my racial background.

Never__ A little/rarely__ Sometimes/moderate__
Often/frequently__

11a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__ A little__ Moderate__ High__

Q12. Other people act as if all the people of my race are alike.

Never__ A little/rarely__ Sometimes/moderate__
Often/frequently__

12a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__ A little__ Moderate__ High__

Q13. Others suggest that people of my racial background get unfair benefits.

Never__ A little/rarely__ Sometimes/moderate__
Often/frequently__

13a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__ A little__ Moderate__ High__
Q14. Others assume that people of my background would succeed in life if they simply worked harder.

Never___ A little/rarely___ Sometimes/moderate___
Often/frequently___

14a. How stressful, upsetting, or bothersome was this experience for you.
Not at all___ A little___ Moderate___ High___

Q15. Other people deny that people of my race face extra obstacles when compared to Whites.

Never___ A little/rarely___ Sometimes/moderate___
Often/frequently___

15a. How stressful, upsetting, or bothersome was this experience for you.
Not at all___ A little___ Moderate___ High___

Q16. Other people assume that I am successful because of affirmative action, not because I earned my accomplishments.

Never___ A little/rarely___ Sometimes/moderate___
Often/frequently___

16a. How stressful, upsetting, or bothersome was this experience for you.
Not at all___ A little___ Moderate___ High___

Q17. Others hint that I should work hard to prove that I am not like other people of my race.

Never___ A little/rarely___ Sometimes/moderate___
Often/frequently___

17a. How stressful, upsetting, or bothersome was this experience for you.
Not at all___ A little___ Moderate___ High___

Q18. Others suggest that my racial heritage is dysfunctional or undesirable.

Never___ A little/rarely___ Sometimes/moderate___
Often/frequently___

18a. How stressful, upsetting, or bothersome was this experience for you.
Q19. Others focus only on the negative aspects of my racial background.

Never  A little/rarely  Sometimes/moderate
Often/frequently

19a. How stressful, upsetting, or bothersome was this experience for you.

Not at all  A little  Moderate  High

Q20. Others prefer that I assimilate to the White culture and downplay my racial background.

Never  A little/rarely  Sometimes/moderate
Often/frequently

20a. How stressful, upsetting, or bothersome was this experience for you.

Not at all  A little  Moderate  High

Q21. I am mistaken for being a service worker or lower-status worker simple because of my race.

Never  A little/rarely  Sometimes/moderate
Often/frequently

21a. How stressful, upsetting, or bothersome was this experience for you.

Not at all  A little  Moderate  High

Q22. I am treated like a second-class citizen because of my race.

Never  A little/rarely  Sometimes/moderate
Often/frequently

22a. How stressful, upsetting, or bothersome was this experience for you.

Not at all  A little  Moderate  High

Q23. I receive poorer treatment in restaurants and stores because of my race.

Never  A little/rarely  Sometimes/moderate
Often/frequently
23a. How stressful, upsetting, or bothersome was this experience for you.

Not at all  A little  Moderate  High

Q24. Sometimes I feel as if people look past me or don’t see me as a real person because of my race.

Never  A little/rarely  Sometimes/moderate  Often/frequently

24a. How stressful, upsetting, or bothersome was this experience for you.

Not at all  A little  Moderate  High

Q25. I feel invisible because of my race.

Never  A little/rarely  Sometimes/moderate  Often/frequently

25a. How stressful, upsetting, or bothersome was this experience for you.

Not at all  A little  Moderate  High

Q26. I am ignored in school or work environments because of my race.

Never  A little/rarely  Sometimes/moderate  Often/frequently

26a. How stressful, upsetting, or bothersome was this experience for you.

Not at all  A little  Moderate  High

Q27. My contributions are dismissed or devalued because of my racial background.

Never  A little/rarely  Sometimes/moderate  Often/frequently

27a. How stressful, upsetting, or bothersome was this experience for you.

Not at all  A little  Moderate  High

Q28. When I interact with authority figures, they are usually of a different racial background.

Never  A little/rarely  Sometimes/moderate  Often/frequently
28a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__  A little__  Moderate__  High__

Q29. I notice that there are few role models in my racial background in my chosen career.

Never____  A little/rarely__  Sometimes/ moderate__
Often/frequently__

29a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__  A little__  Moderate__  High__

Q30. Sometimes I am the only person of my racial background in my class or workplace.

Never____  A little/rarely__  Sometimes/ moderate__
Often/frequently__

30a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__  A little__  Moderate__  High__

Q31. Where I work or go to school, I see few people of my racial background.

Never____  A little/rarely__  Sometimes/ moderate__
Often/frequently__

31a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__  A little__  Moderate__  High__

Q32. I notice that there are few people of my racial background on the TV, books, and magazines.

Never____  A little/rarely__  Sometimes/ moderate__
Often/frequently__

32a. How stressful, upsetting, or bothersome was this experience for you.

Not at all__  A little__  Moderate__  High__

Q33. Have you ever experienced prejudice and/or discrimination because of your race before living in the United States?
Never____ A little/rarely____ Sometimes/moderate____
Often/frequently____

33a. How stressful, upsetting, or bothersome was this experience for you?
Not at all____ A little____ Moderate____ High____

THANK YOU FOR COMPLETING THIS SURVEY!
If you have questions, please contact
Kendria Kelly-Taylor
Kendria.kelly-taylor@louisville.edu
APPENDIX G: INFORMED CONSENT

ARE THERE DIFFERENCES IN BIRTH OUTCOMES BETWEEN FOREIGN-BORN AND US-BORN BLACK MOTHERS? THE ROLE OF PERCEIVED RACIAL DISCRIMINATION, PRETERM BIRTH, AND SMALL FOR GESTATIONAL AGE.

Dear Participant:

You are being invited to participate in a research study. The purpose of this study is to: (1) determine if perceived racial discrimination is associated with birth outcomes, preterm birth and small for gestational age among foreign-born and US-born Black women, (2) better understand how foreign-born and US-born Black women report experiences of racial discrimination and other related stressors, and (3) determine if length of residency in the US influence the reporting of these experiences This study is conducted by Dr. Anne Wallis and Kendria Kelly-Taylor of the University of Louisville in collaboration with Des Moines, Iowa Healthy Start.

Your participation in the study will involve completing a survey about your experiences of racial discrimination. The study will take approximately 10 -15 minutes to complete. Risk to individual participants is minimal. Time to complete the survey may cause an inconvenience to your schedule. Participants may experience some discomfort from the survey questions. The information you provide will further our understanding of the role of perceived racial discrimination and birth outcomes among Black women and support the development of culturally appropriate interventions and structural/policy changes that target these risk factors. Your information will be stored using an online secure database on a password protected computer. The information collected may not benefit you directly. The information learned in this study may be helpful to others.

Individuals from the Des Moines, Iowa Healthy Start Program, the Institutional Review Board (IRB) and Human Subjects Protection Program Office (HSPPO) at the University of Louisville, and other regulatory agencies may inspect these records. In all other respects, however, the data will be held in confidence to the extent permitted by law. Should the data be published, your identity will not be disclosed.

If you participate in this study, identifiable information such as your name or date of birth may be removed from the information collected in this study. After removal, the information may be used for future research or shared with other researchers without additional consent from you.

In this study we will use your name and date of birth along with your health information relevant to this study such as birthweight of live birth, maternal age, and income. We will
keep this data safe by storing data on a password protected computer accessible by study personals and we will destroy all identifiers when they are no longer needed for the study.

Each study participant will receive $10 dollars in the form of Stork’s Nest points for their participation in the study. This amount equates to 200 Stork’s Nest points (i.e., 1 dollar = 20 points). Points can be redeemed to earn new, unused infant and child health products.

Taking part in this study is voluntary. By answering survey questions, you agree to take part in this research study. You do not have to answer any questions that make you uncomfortable. You may choose not to take part at all. If you decide to be in this study, you may stop taking part at any time. You will not lose any benefits for which you may qualify.

If you have any questions, concerns, or complaints about the research study, please contact: Kendria Kelly-Taylor at (404) 617-9153 or kendria.kelly-taylor@louisville.edu

If you have any questions about your rights as a research participant, you may call the Human Subjects Protection Program Office at the University of Louisville at (502) 852-5188. You can discuss any questions about your rights as a research participant, in private, with a member of the Institutional Review Board (IRB). The IRB is an independent committee made up of people from the University community, staff of the institutions, as well as people from the community not connected with these institutions. The IRB has reviewed this research study.

If you have concerns or complaints about the research or research staff and you do not wish to give your name, you may call 1-877-852-1167. This is a 24-hour hot line answered by people who do not work at the University of Louisville.

If you wish to proceed to the survey, click “NEXT”.

Sincerely,
Kendria Kelly-Taylor
CURRICULUM VITAE

Kendria Kelly-Taylor

EDUCATION

**Ph.D.** University of Louisville, Public Health  Aug 2018-Present
Concentration: Epidemiology
Committee: Dr. Anne Wallis (chair)

**MSPH** Meharry Medical College  May 2018
Master of Science in Public Health
Thesis: “The Relationship between Knowledge, Attitude, Culture, and African American Male College Students’ Intention to Receive the Human Papillomavirus Vaccine.”
Committee: Dr. Leah Alexander (chair)

**BS** Purdue University, Movement and Sports Science  May 2014

RESEARCH EXPERIENCE

University of Louisville  Jan 2021-Present
Title: Fighting Injustices Among African American Youth HIV Testing Project
Principal Investigator: Dr. Jelani Kerr
- Collaborate with community organizations for study recruitment of over 300 African American young adults 18-24 years old
- Create tailored participant retention strategies and materials
- Implement sexual health and HIV prevention workshops for community-based organization
• Collect baseline, 12-month, and 24-month post-test data using Audio Computer Assisted Self Interview
• Lead quantitative analysis on research examining the association between HIV knowledge, HIV prevention, racial discrimination, and incarceration status among African American young adults

University of Louisville
Title: Racial Trauma & Healthcare Advocacy Study
Principal Investigator: Dr. Emma Sterrett-Hong
• Develop content and resource materials for healthcare advocacy sessions

University of Louisville
Title: A Hopeful Future: Using photovoice to depict hope and an equitable future in various U.S. communities
Principal Investigator: Dr. Aisha Brown
• Applied community-based participatory research methods to create and host a photovoice exhibition in collaboration with Kentucky Humana Foundation and nine community-based organizations
• Conducted thematic analysis using Attribute, NVivo, and Value coding
• Assisted in the development of a manuscript for peer-review publication

Meharry-Vanderbilt Alliance, Meharry Medical College
Title: Assessing Views of the Immunization Neighborhood to Help Improve HPV Vaccination Rates
Principal Investigator: Dr. Jennifer Cunningham-Erves
• Assisted in recruitment of community partners, scheduling and conducting interviews, data analysis, development of intervention and manuscript

Project 2: Vanderbilt Ingram Cancer Center Education Pilot
Principal Investigator: Dr. Jennifer Cunningham-Erves
• Designed, implemented, and evaluated a community-informed public health intervention among underrepresented populations

Project 3: Comparative Effectiveness Study of Patient-Centered Interventions to Improve HPV vaccine Rates among African American Adolescents
Principal Investigator: Dr. Jennifer Cunningham-Erves
• Interviewed key stakeholders to understand their knowledge and perception of HPV and the HPV vaccine
• Assisted in grant writing and development of a manuscript

TEACHING EXPERIENCE

University of Louisville
Jan 2019-May 2022
Global Public Health PHEP 301
Co-Instructor/Teaching Assistant
- Taught Global Public Health, a general education undergraduate course for 7 semesters, with an average of 65 students per semester
- Designed course content and lecture material covering topics including but not limited to: demographic/epidemiologic transition, conflict, human rights abuses, migration, and social factors that contribute to the distribution of disease.
- Developed and graded quizzes, exams, and discussion assessments
- Created syllabus to meet accreditation standards

University of Louisville Jan 2019-May 2022
Foundation of Global Maternal and Child Health PHPH 615
Child Health and Development PHPH 625
Teaching Assistant, Department of Epidemiology
- Assisted professor in classroom instruction and course implementation in two master’s-level courses
- Taught lectures on maternal and child health topics specific to Black Reproductive and Perinatal health

Meharry Medical College Aug 2017-May 2018
Epidemiology I MSPH7001 & Epidemiology II MSPH 71401
Teaching Assistant
- Assisted professor in classroom instructions
- Proctored student examinations
- Addressed topics in epidemiology related to application and interpretation of fundamental terminology, calculating and interpreting disease frequency, and study design application
- Instructed two class sessions on epidemiologic measures of association

EMPLOYMENT EXPERIENCE

Communicable Disease Investigator Jun 2020-Present
North Central District Health Department, Shelbyville, KY
- Conduct interviews with COVID-positive cases located in Shelby, Spencer, Trimble, and Henry County, Kentucky
- Educate and inform COVID-cases and their close contacts about CDC isolation and/or quarantine guidelines to follow based on assessment interview
- Complete daily follow-ups for each case and record disease progression during the set isolation period
- Import and manage state and county COVID data using the National Electronic Disease Surveillance System

Community Health Educator Mar 2018-Apr 2020
Vanderbilt Ingram Cancer Center, Nashville, TN
• Created culturally tailored educational presentations for community partners about the racial disparities in cancer diagnosis and treatment
• Educated community members on clinical trial participation
• Evaluated the effectiveness of outreach educational programs

Customer Service Manager
Aug 2014-May 2017
Hobby Lobby, Snellville, GA/Nashville, TN
• Trained employees on company policies, merchandise, and monetary transaction protocol
• Resolved customer inquiries and manage customer concerns

RESEARCH GRANTS

Funded:
Graduate Student Council Research Grant
2/9/2022
$500 direct/ 1yr
Role: Principal Investigator

Office of Community Engagement Gheens Mini-grant Program
9/19/2022
Project title: Exploring the perceptions of fatherhood engagement as it relates to maternal and child health outcomes within underserved communities in Louisville, KY.
Requested $718.40 direct/ 5 months
Role: Principal Investigator

PUBLICATIONS

Journal Publications


Conference Presentation

(Abstract-Accepted)


**Kelly-Taylor, K.**, Cunningham-Erves, J., Mayo-Gamble, T., Deakings, J. (2017). Factors Associated with African American mothers being more likely to comply with a physician’s recommendation for the HPV vaccination. Poster presentation at 2017 American Public Health Association Conference, Atlanta, GA.

Factors influencing Parental Trust in Medical Researchers for Adolescent Participation in Clinical Trials.
Poster Presentation at 2017 American Public Health Association Conference, Atlanta, GA.

PRESENTATIONS AND INVITED LECTURES

Seminar Presentation
Lecture Title: The Field of Epidemiology: From Cholera to COVID

Guest Lecture
Lecture Presentation: Black Women’s Reproductive Health: Racial Discrimination, Epigenetics, and Birth outcomes

PROFESSIONAL AFFILIATIONS

Society for Epidemiologic Research, 2021-Present
Kentucky Public Health Association, 2019-Present
American Public Health Association, 2017-Present

PROFESSIONAL SERVICE

American Public Health Association
Abstract reviewer for Maternal and Child Health Section [2022 Annual Conference]

Black Graduate and Professional Student Association
University of Louisville
Communication Coordinator [Jan 2022-Present]

Graduate School Student Ambassador
University of Louisville [Aug 2021-Present]

Graduate Student Council
University of Louisville
Graduate Student Representative [2019-2021]

Division of Public Health Practice Student Association
Meharry Medical College
Treasurer [Jan 2017-May 2018]
COMMUNITY PARTNERSHIPS

Healthy Start/ Empowerment Initiative, Des Moines, Iowa  Jan 2023-
Present
Project: Risk Assessment Questionaries
  • Conduct a review of the literature to identify risk assessment measures for
  pregnancy, childbirth, and the postnatal period
  • Create a new evidence-based risk assessment tool to be administered to healthy
  start clientele

Healthy Start/Empowerment Initiative, Des Moines, Iowa  June 2022-Aug
2022
Black Mothers Prenatal Workshop
Role: Course Evaluator
  • Developed weekly evaluation merits to assess knowledge and skill development
  in areas related to childbirth, labor and delivery, and pre/postnatal care

SERVICE AND INVOLVEMENT

Goodwill Kentucky
Presenter, Louisville, KY, 2021-present
  • Provide biweekly comprehensive sexual health education presentation to young
  adults participating in Goodwill’s Reintegrating Individuals Successfully Every
  Day (RISE) program

Salt Wagon Community Clinic
Clinic Coordinator, Nashville, TN, 2017-2018
  • Trained student volunteers on clinic operations and protocol
  • Scheduled patient appointments using an electric health record

HONORS AND AWARDS

2023 Graduate Student Excellence in Teaching Award  April 2023
University of Louisville

2023 Outstanding Community Engagement Award  March 2023
University of Louisville

Diversity Fellow  Aug 2019-May 2021
University of Louisville

School of Public Health and Information Sciences Student of the Month  Feb 2020
University of Louisville

Master of Science in Public Health Academic Achievement Award  May 2017
Meharry Medical College

**Dean List**
Meharry Medical College

**Outstanding Second Year, Master of Science in Public Health Award**
Meharry Medical College

**Black Cactus Award**
Purdue University

**Statistical Skills**

**Applications**: Statistical Analysis System 9.4, Statistical Packages for Social Sciences