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Perceived Social Status and Preterm Birth among African American Women

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Epidemiology

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Bachelor of Science
University of Texas San Antonio
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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
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Abstract

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By Krystyn Malveaux

Background: Recently, preterm birth has been increasing and research has established that African American women have been disproportionately affected by this birth outcome. Perceived social status has been proven to have a relationship with other various health outcomes such as cardiovascular disease.
Methods: The sample population was composed of women who participated in the Emory University Microbiome and Preterm Birth Study (n=425). Perceived social status was defined by the response provided on a 10-rung MacArthur status ladder. Gestational age was determined from electronic health records that listed weeks of gestation completed; the variable was categorized into three groups (Preterm, Early Term, and Term). The statistical analysis was ordinal logistic regression adjusting for sociodemographic variables.
Results: The mean social status ladder for the preterm birth group was 5.87, early term group was 5.93, and term group was 5.82. 17.9% of births were preterm, 26.3% were early term, and 55.8% were term. The adjusted odds ratio for the relationship between perceived social status and gestational age was 1.02 (95% CI: 0.92, 1.13).
Conclusions: There was not a relationship between perceived social status and gestational age among this sample. Future studies should include more diverse samples in order to determine if there is no relationship or a lessened relationship between the two variables.

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Background

Introduction

In spite of the new research that has identified potential risk factors related to preterm birth, the preterm birth rate has been rising in almost all countries around the world. Preterm birth is generally recognized as infant deliveries occurring prior to 37 weeks gestational age. Globally preterm birth is the leading cause of death for children under the age of five (1), and in the United States, about 1 in every 10 infants is delivered preterm (2).The issue has become so prevalent that reducing preterm birth is a highlighted goal in Healthy People 2020; the subobjectives include reduce total preterm births, reduce early preterm (less than 32 weeks' gestation), moderate preterm (32-33 weeks' gestation), and late preterm (34-36 weeks' gestation) (3). Over the years, research has identified various risk factors such as preeclampsia, maternal age, family history, that play a role in preterm birth, but there is not clear research on how the perception of social status can play a significant role in preterm birth too. Since perception of social factors like stress or social status has been recognized as a potential risk factor for other health outcomes, there have been creation of scales such as the perceived stress scale or the social status ladder. With the creation of these new measurement tools and the new curiosity surrounding what possible effect perception has on prenatal outcomes. Moving forward with these findings could potentially highlight areas to target future interventions.

Preterm Birth Overview

Epidemiology. Preterm birth is classified as medically indicated or spontaneous. Medically indicated preterm birth occurs when labor is induced, or the infant is delivered

by cesarean section preterm due to a medical reason. About 30-35% of preterm births that occur are classified as medically indicated (4). Over time research has been able to highlight some risk factors for medically indicated preterm delivery including but not limited to, intrauterine growth restriction, improperly monitored diabetes, and preeclampsia (5) . Spontaneous preterm birth can occur in three pathways: (1) spontaneous preterm labor, (2) preterm premature rupture of membranes (PPROM), or (3) second trimester spontaneous pregnancy loss. About 40-45% of preterm births are classified as spontaneous preterm labor and about 25-30% are attributed to PPROM (4). Risk factors for spontaneous preterm birth include multiple gestations, uterine anomalies and short inter-pregnancy intervals (5). There are additional risk factors that will be addressed further in the review.

Preterm births can be categorized by other factors such as gestational age and number of gestations (singleton/multiple). Preterm birth before 28 weeks of gestation can be defined as extreme prematurity, and only 5% of preterm births are classified as such. Severe prematurity is when preterm birth occurs during 28-31 weeks' gestation. Moderate prematurity occurs during 32-33 weeks' gestation. About 15% of preterm deliveries are categorized as severe prematurity and 20% are moderate. 60-70% of preterm births occur at 34-36 weeks, which is classified as near term (4). Regarding singleton births, there has been an increase in their preterm birth rate which has been mostly attributed to the increase in medically indicated births over time. For multiple gestations, most of those pregnancies are classified as medically indicated preterm birth through one of the pathways.

Trends. The temporal changes in preterm birth have been studied by multiple authors to represent the changes of preterm birth over time. Gyamfi-Bannerman et al. studied trends in both spontaneous and medically indicated preterm births from 2005-2012 among singleton births in the United States. The authors found that there was a 15.4% decrease in spontaneous preterm birth rates (5.3%, 2005 to 4.5%, 2012) and a 17.2% decrease in indicated preterm birth rates (3.9%, 2005 to 3.2%, 2012). When you stratify the results by gestational age, the authors found 17.1% decline in early preterm, 12.4% decline in moderate preterm, and a 15.8% decline in late preterm. Overall, the results indicated that both spontaneous and medically indicated preterm deliveries decreased at the same rate and held a similar ratio when compared to total preterm births (6).

Preterm birth trends in the United States have not remained consistent as the rate declined from about 2005 to 2012 (7), but it did not last for long as temporal research shows the preterm birth rate increasing again. Martin and Osterman completed a report for the National Center for Health Statistics describing the increase in the preterm birth rate between 2014-2016 in the United States. The authors found that the preterm birth rate increased 3% (9.57%, 2014 to 9.63%, 2016). The total preterm birth rate is attributed to the increase in late preterm births, specifically births occurring at 36 weeks gestational age. The report found that the late preterm birth increase occurred among both singleton and multiple births and across the top three racial groups and ethnic groups (non-Hispanic White, non-Hispanic Black, Hispanic) (8).

Causes of Preterm Birth. In some cases of preterm birth there are some identifiable mechanisms such as stress, hemorrhaging, inflammation or infection. Currently, there is not a specific mechanism that has been identified in a majority of preterm delivery cases

and therefore it is important to identify risk factors to help to clarify the causal pathway. Risk factors can range from preconceptional maternal factors to prenatal characteristics. Conde-Agudelo et al. completed a study that found that women with pregnancies with close proximity to a previous pregnancy raises your risk for preterm delivery (9). Maternal nutritional status can play an indirect role in the risk of preterm birth, as Neggers et al. found that a woman being thin is associated with decreased blood volume and reduced uterine blood flow (10). A woman that has had a previous preterm delivery, she will be at 2.5 times more risk of having a future preterm birth (11).

Potential Health Outcomes. Preterm deliveries can cause various physical and mental health outcomes for the infant and the mother. Premature delivery can lead to long term disabilities for the infant that can range from developmental to intellectual delays. Long term disabilities caused can include behavior problems (anxiety or attention deficit hyperactivity disorder) or neurological disorders (cerebral palsy) (12). Additionally, the infants can develop bronchopulmonary dysplasia, infections like pneumonia, hearing loss, vision problems, or intestinal problems (necrotizing enterocolitis) (12). The acute conditions of preterm infants can cause a tremendous amount of stress in the infant, but research has found that through positive child-mother interactions cortisol levels are lowered in comparison to other children lacking that interaction (13). Though having positive mother-child interactions can help to alleviate stress in preterm infants, research suggests that mothers of preterm infants experience more postnatal anxiety, fatigue and flashbacks making it harder to foster those positive interactions with their child and take care of themselves by attending their post-labor appointments (14).

Preterm Birth and Disparities (Socioeconomic Status and Race)

Research has documented the disparities that exist within women who experience preterm birth outcomes and have found both racial and socioeconomic gaps among different groups. There is a general understanding within public health that when you are within a lower socioeconomic standing that you are more likely to have poor health, in comparison to those who hold a high socioeconomic status; so, when studying SES and preterm birth the results were expected to follow the same pattern. Additionally, there is a general understanding within public health that due to the various levels of racism in society, such as institutionalized or internalized, that African Americans experience poor health outcomes in comparison to other racial or ethnic groups. Similar to SES, the thought is that racial disparities within preterm birth would follow the general consensus.

Socioeconomic Status. Phillips et al. conducted a study examining the relationship between neighborhood socioeconomic status is relation to preterm birth among Black women in the United States. The authors chose create a composite SES measurement due to belief that the intricate measurements of neighborhood characteristics would be better measured as a summary variable compromised of multiple area-level factors. The authors found that within their sample the neighborhood socioeconomic status score was not associated with preterm birth in the unadjusted models with an OR of 1.09; after adjusting for maternal factors the model yielded an OR of 0.98. Additionally, the authors did not observe a significant association between either spontaneous or medically indicated preterm birth with the exception of unmarried women who lived in low SES neighborhoods had greater odds of indicated preterm birth in comparison to unmarried mothers who lived in high SES neighborhoods. The authors contribute their findings to

the complexities of separating the effects of individual poverty and the overall neighborhood poverty in disadvantaged areas ((15).

El-Sayed & Galea conducted a study to identify the temporal changes between maternal education and preterm birth among singleton births in Michigan between 1989 to 2006. The authors included women older than 22 years old, as they felt the possibility of including women younger than 22 years old would have skewed the education demographics to include women with lower levels of education. The authors found that the preterm birth risk did not change significantly over the time period among the least educated women in their study, but they did find an increase among more educated women. The authors have two speculations as to why this finding occurs, (1) would be that the increase is attributed to the falling economic value of an additional year of education or (2) the increase is attributed to the relationship between obstetric intervention and the risk of preterm birth, specifically that the risk of preterm birth is increasing due to the increase in obstetric interventions such as cesarean section and induced labor in wealthy countries. Additionally, the authors found that late preterm birth increased by 17% among the most educated group which further supports their second suggestion that elective cesarean sections and elective inductions are more common among women in the more educated group (16).

Racial Disparities. Culhane and Goldenberg wrote a review about the racial disparities within preterm birth and what potential factors played a role. They reported that in 2007 the overall preterm birth rate in the United States was 12.7 per 1000 births; when the overall rate was stratified by race non-Hispanic white women had a rate of 11.5 per 1000 births and non-Hispanic black women had a rate of 18.3 per 1000 births. Previous

research has been dedicated to identifying the gap, but the authors found that the potential factors and possible interventions are perplexing for health officials to meet on a common ground about how to address the gap. The authors highlighted social context areas such as education, prenatal care, and smoking where Black women were found to have higher preterm birth rates than White women despite when having higher education status, entering prenatal care early or being less likely to smoke. Though the review highlights that neighborhood effects do play a large role in preterm birth outcomes, and that non-Hispanic Black women are more likely to be exposed to adverse neighborhood conditions that are associated with an increased risk of preterm birth. There are medical processes that have been researched as potential factors such as infection/inflammation or maternal preconception health. The authors note that previous research has shown that among women who test positive for bacterial vaginosis, Black women have had higher rates of mobilluncus in comparison to White women; though there is a previous relationship between bacterial vaginosis and stress which could expound why black women have elevated rates. After summarizing potential factors for the disparity, the authors called for more research into the role of social exposures such as discrimination or income inequality. Additionally, they emphasized the need for interventions focused on narrowing the disparity instead of preterm birth overall (17).

Perception of Socioeconomic Status and Health

There is not a lot of literature surrounding perception affecting health, but those that exist point towards the general assumption that a person's objective and subjective statuses' each play a role in their health outcomes. The largest research subject supporting this

conclusion is whether income inequality effects health. Sociologists have found that 'status anxiety' have played a large role in the impact, as people view their status as a competition which can either cause stress and lead to poor health or reduce stress which could potentially protect an individual from negative health outcomes such as cardiovascular disease (18). Most research completed that supports this conclusion also calls for further research using perceptions or subjective independent variables to measure how they affect outcomes individually.

Ostrove et al. measured the relationship between objective and subjective assessments of socioeconomic status in relation to health among women in the San Francisco Bay Area. Objective socioeconomic status was measured using education, income, occupation, and partner's occupation. Subjective socioeconomic status was measured using a ladder graphic with 9 rungs to select where they felt they fell in society. The authors found that the objective SES measure of income continued to account for a significant amount of variance in predicting self-rated health among Latinas and African American women. They found that at least three of the four objective measures of socioeconomic status were significantly related to self-rated health for women in each of the four ethnic groups (White, Chinese, Latina, African American) suggesting that women with a lower objective SES generally had lower self-rated health that could be attributed to a lower subjective SES (19).

Nobles et al. conducted a study measuring subjective socioeconomic status and health, in hopes of seeing how these subjective measures can reshape our current understanding of their objective relationship. The authors used a sample from Indonesia, specifically utilizing the Indonesia Family Life Survey (IFLS) to achieve their variable

measurements; to find their subjective status, there is a 6-rung ladder where individuals can rank themselves. Their outcome, subjective health, was measured using a self-rated health question and their ability and ease of completing activities of daily living. Essentially, the authors reached the conclusion that your social value or subjective status plays a large role in perceived health status (20).

Goodman et al. completed a study focused on perceived socioeconomic status and self-rated health among adolescents attending school in a Midwestern public school district. The authors measured objective socioeconomic status by parents providing parental education, total household income, self and current spouse/partner education, perceived socioeconomic status was measured using the Subjective Social Status Scale, and self-rated health was measured using a Likert scale question assessing their perception of their individual health. The authors found that subjective status declined with age significantly, and the black teens from families with low parent education has higher perceived status than white teens from families with the same circumstances. Additionally, white teens from highly educated families had higher subjective status than black teens with similar circumstances. The authors relate these findings to the notion that external markers of SES would be used to create the subjective experience as a part of "the looking glass self" and that self-esteem could model how race and objective SES intersect one another in adolescents' developing of subjective status (21).

Garcia et al. conducted a study about how perceived socioeconomic status affects cortisol among individuals on the island of Utila, Honduras. The authors decided to use a composite objective SES measure composed of years of education, income, and occupational rank. In order to measure subjective socioeconomic status, they looked at

perceived lifestyle discrepancy measured using a Material Style of Life interview and using a MacArthur ladder, a measurement of subjective social status. The authors found that individuals with higher difference between perceived lifestyle and objective SES predicted blunting of the diurnal cortisol slope, a reaction to stress activity, and that the highest influential predictor of perceived lifestyle discrepancy was lack of access to improved sanitation. The authors concluded that subjective SES incorporates different perspectives based on previous experiences and current resource access that surpass the idea of current social capital (22).

Cohen et al. assessed the relationship between objective and subjective status and susceptibility to the common cold among volunteers responding to an advertisement. The authors measured objective socioeconomic using income and education, and subjective socioeconomic status as their placement on a 9-rung ladder in comparison to other people in the United States. The authors found that increased subjective SES was correlated with a lower risk of developing a cold for both viruses measured, but contrary to previous studies the authors did not find an association between objective socioeconomic and cold susceptibility. They attribute this difference to the distribution of the objective markers, specifically income, to have an unusual distribution. The authors also offer an explanation as to why those with lower subjective statuses are more susceptible to the common cold points towards subjective status may partially work through sleep duration and efficiency (23).

Preterm Birth and Perception

In order to determine what relationship, if any, between perception of social status and preterm birth, there needs to be further research conducted. There haven't been studies examining whether perceived socioeconomic status measurements could potentially effect preterm birth, though it has already been proven that perception can play a role in objective and subjective health outcomes.

Rosenberg et.al conducted a study examining perceptions of racial discrimination and the risk of preterm birth among Black women in the United States. The authors used questions from the Black Women's Health Study that concerned their personal experiences with racial discrimination, and preterm birth was self-reported by the women on the questionnaire. They found that odds of preterm birth increased by 30% for women who reported unfair treatment on the job and 40% for women who reported that people acted afraid of them at least once a week. Additionally, the women who had less than a high school education (12 years of education) had odds ratios of 2.0 or greater. The study also found that women who had 16 years or more of education were more likely to experience unfair treatment on the job that was associated with preterm births. The authors concluded that their study adds mixed results into the previous existing literature around African American's personal racism experiences affecting their risk of preterm birth(24).

Dole et al. completed a study on the relationship between psychosocial factors and preterm birth among African American and White women in North Carolina. The authors followed a conceptual model that focused their analysis on seven psychosocial areas including but not limited to: external stressors, buffers of stress, perceived stress from racial and gender discrimination, and perceived stressors. Their study found that

African American women were at a higher risk of preterm birth (RR = 1.8) if they used distancing as a coping mechanism or reported racial discrimination and that White women were at a higher risk of preterm birth if they had a high amount of negative life events or were not currently living with a partner. Additionally, the study found that African American women who reported having experienced high levels of racial or gender-based discrimination were at a high risk of delivering preterm in comparison to those who reported lower levels of discrimination. The authors attributed some of these racial differences to a possible interpretation of the psychosocial factors within the different racial groups (25).

Girugescu et al. conducted a study that examined the relationship between the impact of neighborhood conditions and psychological distress on preterm birth among African American women. The authors measured neighborhood conditions as a combination of objective and subjective measures including physical disorder, social disorder and crime; they also measured psychological distress using the Psychological General Well-Being Index. The study found that perceived adverse neighborhood conditions were significantly associated with psychological distress on every category (physical disorder, social disorder, and crime), but objective neighborhood conditions were not significantly associated with psychological distress. Additionally, the authors ran a mediation model to determine if psychological distress had a mediating effect on preterm birth, and they found that psychological distress does mediate the effects of perceived neighborhood conditions on preterm birth. The authors do address that the perception reported of their neighborhoods reflect their personal experiences more so than the objective neighborhood measures, which could explain the relationship in

perceived compared to no relationship in objective. They conclude by calling for interventions focused on reducing psychological distress and improving coping mechanisms in neighborhoods with poor conditions (26).

Perception of Social Status and Preterm Birth

This study will contribute to the current gap in the literature surrounding the relationship between women's perceived socioeconomic status and gestational age at delivery. This unknown association will remain until there are multiple studies specifically focused on measuring perceived social status and risk of preterm birth, and if they have any association; though the literature does show that perception plays a large role in health outcomes even outweighing the actual or objective surroundings because what one person perceives is their own reality despite the world around them. Perception can only provide a piece of the puzzle when it comes to reducing preterm birth, but in order to move forward interventions need to go bigger than education or ensuring a woman takes her vitamins, as normally a women knows what's she needs to do but lacks access to the proper care or resources to provide her what she needs in order to take the correct steps towards a healthy pregnancy.

Methods

Study Population

The sample population from this study was from the Microbiome and Preterm Birth Study conducted in Atlanta, Georgia through the Emory University School of Nursing. The sample consisted of African American women aged 18 to 40 years who received prenatal care from selected hospitals in Atlanta, Georgia from June 2014 to April 2019. Patients were recruited at Grady Memorial Hospital and Emory University Hospital Midtown, these hospitals were selected to recruit women from different socioeconomic backgrounds as Grady primarily services low-income/Medicaid women and Emory services privately insured women. For the initial visit, the women were between 8- and 14-weeks gestation and if they returned to the same hospital at a later point for prenatal care a second visit occurred between 24- and 30-weeks gestation.

Variables

Perceived Social Status. Perceived social status was determined using the MacArthur Social Status Ladder tool (27). The participants were asked to indicate where they fell on a ladder, that represented where they stood in society. They were specifically asked, "Imagine that this ladder pictures how American society is set up. At the top of the social ladder are the people who are considered the best off socially – they may have the most money, the highest amount of schooling, and the jobs that bring the most respect. At the bottom are the people who are considered the worst off – they may have the least money, the lowest amount of schooling, and the jobs that bring the least respect. Now think about yourself. Please tell us where you think you would be on this ladder today?". The

variable has 10 possible choices ranging from 1 to 10 and is measured in a continuous format. The specific social status tool can be found in the **Appendix**.

Gestational Age. Gestational age was a created variable for analysis based on another variable extracted from medical records which recorded how many gestational weeks were completed. The recoded variable consisted with placing the completed gestational weeks into three categories: preterm birth, early term birth, and term births. Preterm birth included all births that occurred before 37 weeks of gestation were completed. Early term birth included all births that occurred between 37 weeks gestation and 38 weeks gestation were completed. Term births included all births that occurred after 39 weeks gestation were completed.

Other Study Variables:

Maternal Age. Age was measured in a sociodemographic form collected during the first visit. Participants were asked, "What is your age?". As there was no need to calculate age from a specific date, it was measured as a continuous variable and averaged in analysis. This specific sociodemographic tool can be found in **Appendix A**.

Education. Education was measured in a sociodemographic form collected during the first visit. Participants were asked, "What is the highest level of education that you received?". The variable used in data analysis was categorized into four groups "Less than high school", "High school", "Some college", and "College graduate or above".

Insurance Level. Insurance held prior to pregnancy was measured in a sociodemographic form collected during the first visit. Participants were asked, "How did you pay for your

healthcare BEFORE your pregnancy?". The variable used in data analysis was categorized into two groups: "Private" and "Medicaid".

Marital/Cohabitation Status. Marital status and cohabitation information was measured in a sociodemographic form collected during the first visit. This variable is a combination of two questions that asked: "What is your marital status?" and "What is your relationship status?". If they answered "Married" or "In a relationship, living together" they were coded for "Yes" in this variable. The variable used in data analysis was categorized into two groups: "Married or Cohabiting" and "Neither Married nor Cohabiting".

Statistical Analysis

Participants outcomes were grouped into "Preterm Birth"(less than 37 weeks gestation), "Early Term Birth" (37 to 39 weeks gestation), and "Term Birth"(greater than 39 weeks gestation). Descriptive statistics were then produced for the overall sample and the outcome groups for each of the other study variables used in analysis. In order to determine whether the proportional odds assumption is satisfied, a score test was completed on the crude model.

Potential confounders were identified based on the literature and selected based on bivariate analysis of confounders that showcased differences among the different outcome groups. All of the confounding variables were categorical except age, which remained a continuous variable. A collinearity assessment, interaction assessment, and confounding assessment were completed to determine what variables would stay in the

model. The confounding assessment followed the 10% rule. After the confounding assessment, the final full model was run using ordinal logistic regression.

Data cleaning, variable creation, and modeling analysis were all conducted using SAS v9.4.

Results

Study Population

The original cleaned dataset included 485 observations, and after dropping observations that were missing any values for selected variables used in analysis the total number used for data analysis was 425; a more detailed timeline of the sample size can be found in **Figure 1**.

Modeling Strategy

Ordinal logistic regression was utilized as there is a rank to the outcome categories (preterm, early term, and term) and needs to meet the proportional odds assumption, which means that the odds ratio across a pair of outcome groups will be the same despite where the cut point is determine. A score test analysis of the crude model was conducted in order to evaluate the proportional odds assumption; as the p-value was above 0.05 ($p=0.72$) the proportional odds assumption was met. Based on the literature the selected confounding variables were Insurance Status, Education Level, Age, and Marital/Cohabitation Status. No collinearity issues were found upon examination. Interaction was tested for marital/cohabitation status and education, but both were found not significant using a Wald test . Based on them being found insignificant, both interaction terms were dropped from the model. Regarding the confounding assessment, none of the selected variables actually fell outside of 10% of the crude model, but ultimately were kept in the model as those factors have been proven to be confounders for preterm birth and were specifically asked to be considered when the participant selected their exposure value.

Descriptive Statistics

Population Distribution by Gestational Age

For this sample 17.9% of births were classified as preterm, 26.3% of births were early term, and 55.8% of births were term births. Overall the average gestational age was 37.3 weeks. The baseline characteristics were stratified within the outcome birth groups and can be seen in more detail in **Table 1**. The mean age for the overall sample was 24.8 years, with early term having the highest average age of 25.4 in comparison to preterm (24.5 years) and term (24.7 years). Most of the participants had a minimum of a high school education, and that held true when stratified by birth outcome groups; though it should be noted that early term and term births had a higher percentage for "College graduate and above" than the preterm births group (17.9%, 17.7%, 10.5%, respectively). Marital/cohabitation status were relatively similar among all birth outcome groups where about half of the group fell in one category; early term did have a slightly higher percentage in those who responded "yes" (52.7%) in comparison to preterm (46.0%) and term birth (47.7%) groups. Insurance held prior to pregnancy showed that those who had preterm births had a lower percentage of women who held private (7.9%) in comparison to early term (23.2) and term births (23.6%). Most of the births in this sample were via vaginal delivery; those within the early term group had the highest percentage of 85.7 in comparison to preterm (71.4%) and term (78.5%) groups.

Population Distribution by Perceived Social Status

The MacArthur Ladder used in this analysis included 10 rungs, so the range for the exposure is 1 to 10. The average social status ladder for the preterm group was 5.87,

early term was 5.93, term group was 5.82. For the insurance level variable, those who had private insurance had a slightly higher mean social status value (5.89) compared to those who had Medicaid (5.85). Among the women who reported they were either married or cohabitating the average social status value was 5.92 and the women who reported that they were single or not cohabitating had an average social status value was 5.80. The covariate that had the largest differences between groups was the education group, where those who were reported they had a "College graduate and above" had a higher average social status of 6.25 in comparison to those that reported a "Less than high school" education (5.65). A more detailed visual of all covariates and their mean perceived social status is in **Table 2**.

To provide another view of exposure distribution in the selected covariates, tertiles for the exposure was created; perceived low status is for those who selected 1-3, perceived middle status is for those who selected 4-6, perceived high status is for those who selected 7-10. This grouped view of the distribution showed that for marital and cohabitation status all social status groups had similar distributions. For education, the distribution observed across social groups was similar for perceived low (84.6%) and perceived middle (80.8%) status groups, and the perceived high status had a higher percentage of women who had at least a high school education (88.4%). For insurance status, as perceived status increased so did the percentage of women who had private insurance (12.8% v. 20.8% v. 22.6%). A more detailed visual of all covariates and their distribution across grouped tertiles can be found in **Table 2**.

Perceived Social Status and Gestational Age

The final adjusted model showed that there was no association between perceived social status and gestational age. The distribution among the different outcome groups appears to be similar except the highest percentage of responses within the preterm group (25.0%) selected 5 while the highest percentage of early term (29.5%) selected 6 and term groups (21.1%) selected 7; a more detailed visual of the exposure distribution between birth groups can be found in **Table 3**. The odds of having a term birth increased by 2% for each increase in the social status ladder finding (OR = 1.02, 95% CI: 0.92, 1.13) **.** The logistic regression results can be found in **Table 4**.

Discussion

The data indicated that there is no relationship between perceived social status and gestational age when adjusting for maternal age, insurance status, education level, and marital/cohabitation status. These results are different than previous literature involving the MacArthur Status Ladder as an exposure. Allen, McNeely, et al. found in their research of an association between subjective socioeconomic status and cardiovascular disease using the Framingham cohort that there was an association between the two variables when adjusted for cofounders. Another finding within Allen et al.'s study was that when their model was stratified by race that Black Americans had a lower association between subjective socioeconomic status and cardiovascular disease in comparison to their White counterparts (18). Similarly, a research study looking at social status and a variety of health outcomes including hypertension, depression, and global health among British civil servants in the Whitehall II study and White and Black Americans in the CARDIA study found that there was an association between subjective social status and their chosen outcomes (28). Adler, Manoux, et al. addressed that although they did find an association between the subjective social status and hypertension that for Black Americans subjective social status wasn't as great a predictor as for the other two racial groups. Though the results of this thesis are more similar to other studies that measured socioeconomic status and risk of preterm birth. Parker, Schoendorf, Kiely examined socioeconomic status and various birth outcomes including preterm birth and found no consistent pattern across their set socioeconomic indices and preterm birth (29). Braveman, Heck, et al. completed a study that examined the role of socioeconomic status in the disparities between Black and White Americans in preterm

birth and found that higher socioeconomic status was associated with lower rates of preterm birth among White women but not for Black women (30).

This study population is composed of African American women who reside in Atlanta and is composed of women from varying socioeconomic statuses, and even though there was a lack of a statistically significant association it supports previous literature that perceived social status among African Americans may be more complex than thought. Considering the theory of potentially improved health outcomes due to perceiving oneself to be better off but finding that in this case may not apply may be due to resiliency of lived experiences (31). This study is a novel idea as there has not been any research examining perceived social status and preterm birth among African American women of varying social statuses. It is also arguable that despite this study not finding completely similar results to studies that are alike, it does potentially contribute to literature that that race and experienced racism plays a large role in a woman's risk of preterm birth as that is a possible explanation for the results. When specifically researching African American women, it showed that across all birth outcome groups similar distributions in the exposure and confounding variables and it is arguable, based on previous literature, that if this study included other race groups that the distribution across birth outcomes would not be similar.

Strengths and Limitations

This study population provided a unique look at a high risk for preterm birth population in Atlanta which gives insight into potentially determining what does and does not affect birth outcomes. The outcome data was extracted from electronic medical

records reducing the chances of self-report bias. A limitation to this study would be that not all of the socioeconomic variables could be included in the model due to missing data. Another limitation would be the coding of the insurance variable does not account for those who did not have insurance prior to pregnancy. This study utilized a subjective measure which is a complex measure to interpret as various factors can potentially alter how an individual would answer.

Conclusion

In conclusion, there was no association between perceived social status and gestational age in among African American women who reside in Atlanta. This analysis supports previous research that has showcased African Americans had no effect or a lesser effect than their White counterparts when comparing subjective social status or social status to a health outcome. It is arguable that if there were additional races included in this study that potentially there would have been a difference in between the stratified race groups, so further work should focus on expanding racial groups to solidify the effect that subjective social status on risk of preterm birth in a generalizable population. Future projects should also compare subjective social status to socioeconomic status, in order to clarify if those with differences in between the variables have created a protective or risk factor.

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Tables

Table 1. Descriptive Statistics about Sample by Outcome					
		Overall	Preterm (< 37 weeks)	Early Term 37-38 weeks	Term 39+ weeks
N (%)		425	76 (17.9)	112 (26.3)	237 (55.8)
Age Mean(sd)		24.8(4.7)	24.5(4.6)	25.4 (4.9)	24.7(4.7)
Education n(%)					
Less than high school		69 (16.2)	12 (15.8)	18 (16.0)	39 (16.5)
High school		165 (38.8)	37 (48.7)	46 (41.1)	82 (34.6)
Some college		121 (28.5)	19 (25.0)	28 (25.0)	74 (31.2)
College graduate or above		70 (16.5)	8 (10.5)	20 (17.9)	42 (17.7)
Marital or Cohabitation Status n(%)					
Yes		207 (48.7)	35 (46.0)	59 (52.7)	113 (47.7)
No		218 (51.3)	42 (53.9)	53 (47.3)	124 (52.3)
Insurance Status Prior to Pregnancy n(%)					
Private		88 (20.7)	6 (7.9)	26 (23.2)	56 (23.6)
Medicaid		337 (79.3)	70 (92.1)	86 (76.8)	181 (76.4)
Mode of Delivery n(%)*					
Vaginal		327 (79.4)	45 (71.4)	96 (85.7)	186 (78.5)
Caesarian Section		85 (20.6)	18 (28.6)	16 (14.3)	51 (21.5)
Gestational Weeks Completed Mean(SD)		37.3(5.0)	29.8(8.1)	37.6(0.5)	39.5(0.7)

Table 2. Distribution of Exposure within Covariates					
		Perceived Low Status (1-3)	Perceived Middle Status (4-6)	Perceived High Status (7-10)	Overall Mean Status (SD)
N (%)		39 (9.2)	240 (56.5)	146 (34.3)	
Education n(%)					
Less than high school		6 (15.4)	46 (19.2)	17 (11.6)	5.65 (1.95)
High school		18 (46.2)	88 (36.6)	59 (40.4)	5.91 (1.96)
Some college		10 (25.6)	76 (31.7)	35 (24.0)	5.67 (1.69)
College graduate or above		5 (12.8)	30 (12.5)	35 (24.0)	6.26 (1.63)
Marital or Cohabitation Status n(%)					
Yes		20 (51.3)	115 (47.9)	72 (49.3)	5.92 (1.88)
No		19 (48.7)	125 (52.1)	74 (50.7)	5.80 (1.81)
Insurance Status Prior to Pregnancy n(%)					
Private		5 (12.8)	50 (20.8)	33 (22.6)	5.89 (1.64)
Medicaid		34 (87.2)	190 (79.2)	113 (77.4)	5.85 (1.89)
Birth Outcome Groups n(%)					
Preterm		23 (59.0)	127 (52.9)	87 (59.6)	5.87 (2.01)
Early Term		9 (23.1)	68 (28.3)	35 (24.0)	5.93 (1.84)
Term		7 (17.9)	45 (18.8)	24 (16.4)	5.82 (1.79)
Age					
Mean (SD)		24.8 (4.4)	24.3 (4.6)	25.6 (4.9)	

Table 3. Distribution of Exposure within Outcome Groups					
		Overall	Preterm (< 37 weeks)	Early Term 37-38 weeks	Term 39+ weeks
N (%)		425	76 (17.9)	112 (26.3)	237 (55.8)
Social Status Ladder n(%)					
1		5 (1.2)	1 (1.3)	2 (1.8)	2 (0.8)
2		10 (2.4)	2 (2.6)	2 (1.8)	6 (2.5)
3		24 (5.6)	4 (5.3)	5 (4.5)	15 (6.3)
4		52 (12.2)	10 (13.2)	11 (9.8)	31 (13.1)
5		90 (21.2)	19 (25.0)	24 (21.4)	47 (19.8)
6		98 (23.1)	16 (21.0)	33 (29.5)	49 (20.7)
7		71 (16.7)	7 (9.2)	14 (12.5)	50 (21.1)
8		41 (9.6)	10 (13.2)	11 (9.8)	20 (8.4)
9		19 (4.5)	1 (1.3)	5 (4.5)	13 (5.5)
10		15 (3.53	6 (7.9)	5 (4.5)	4 (1.7)

Table 4. Logistic Regression Results				
Parameter		Odds Ratio	95% Confidence Intervals	
Final Model				
Social Status Ladder		1.02	0.92	1.13
Education		0.92	0.72	1.17
Insurance Status		1.72	0.98	3.04
Marital/Cohabitation Status		0.89	0.61	1.31
Age		1.02	0.98	1.07
Crude Model				
Social Status Ladder		1.02	0.92	1.13

Figures

Figure 1. Data Cleaning Process

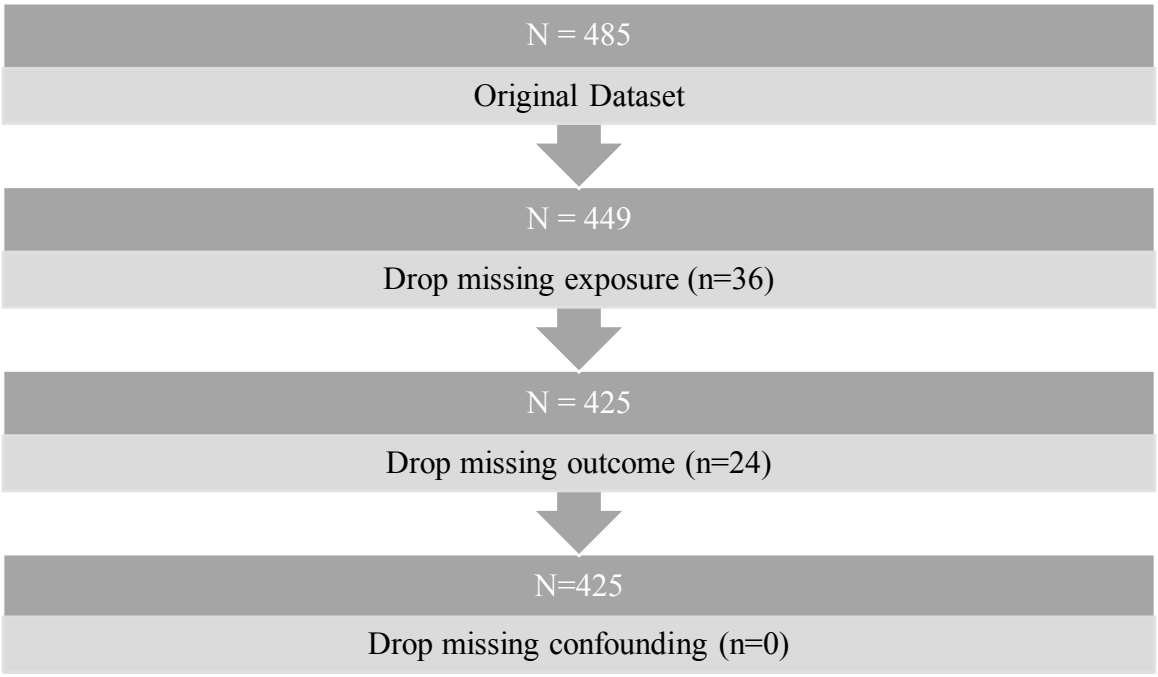
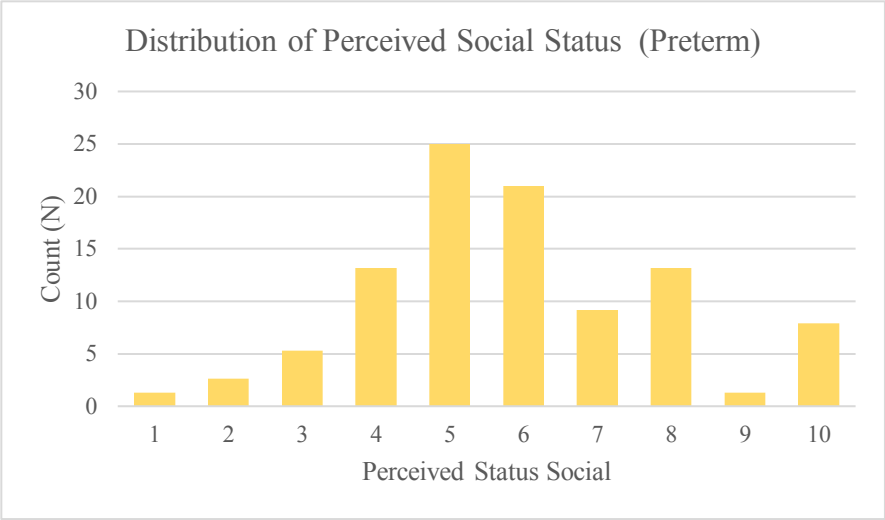
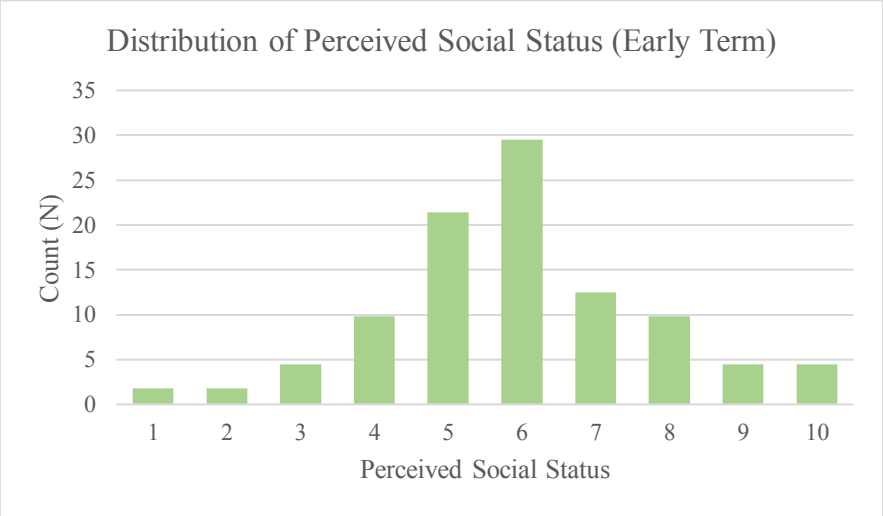
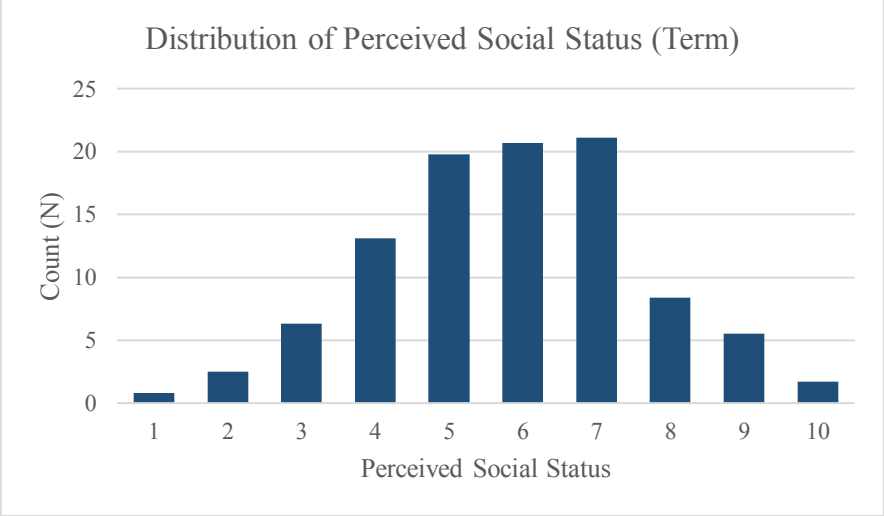


Figure 2-4. Distribution of Perceived Social Status Stratified by Birth Outcome Group







Appendix

Appendix 1. Sociodemographic Form from Microbiome and Preterm Birth Study

Sociodemographic Questionnaire

Subject ID _____

1. What is your age? _____

2. What is your marital status?
- ☐ Single
- ☐ Married

3. What is your relationship status? Please check all that apply.
- ☐ Not in a relationship
- ☐ In a relationship, not living together
- ☐ In a relationship, living together

4. What is the highest level of education that you received?
- ☐ 8th grade or less
- ☐ Some high school
- ☐ Graduated high school or GED
- ☐ Some college or technical school
- ☐ Graduated college
- ☐ Some graduate work or degree

5. How many persons (including you) live in your household? _____

6. Last year (2017), what was the total income of your household, including any money you earned or money earned by others living in the household including your husband or partner. _____

7. Do you have health insurance during this pregnancy?
- ☐ No
- ☐ Yes

If yes, type:
- ☐ Medicaid
- ☐ Low income Medicaid
- ☐ RSM (pregnancy Medicaid)
- ☐ Other

If checked 'Other', please list Other type of insurance _____

8. How did you pay for your health care BEFORE your last pregnancy?
- ☐ Self-pay
- ☐ Medicaid
- ☐ Medicare
- ☐ County Card (Pay on a sliding scale based on income)
- ☐ Private health insurance
  - ○ Through employer
  - ○ Through federal health insurance market place

9. Which of the government benefits do you receive? *(Check all that apply)*
- ☐ SSI
- ☐ WIC Nutrition Program
- ☐ County card (Pay on a sliding scale based on income)
- ☐ Healthy Start
- ☐ Food Stamps (SNAP)
- ☐ TANIF
- ☐ Section 8
- ☐ None of these (stop survey if checked)
- ☐ Other

If checked 'Other', please list other type of government benefits you receive. _____

10. When was the last time you used this Government service, if applicable?
- ☐ Never, I just signed up today
- ☐ Within last 2 days (48 hours)
- ☐ Within last 3-7 days
- ☐ Within last 8-14 days
- ☐ Within last 15-30 days (last month)
- ☐ Over a month ago

Appendix 2. Social Status Ladder Form from Microbiome and Preterm Birth Study

Social Status Ladder

Please complete the survey below.

Thank you!

Subject ID _____

Imagine that this ladder pictures how American society is set up. At the top of the social ladder are the people who are considered the best off socially - they may have the most money, the highest amount of schooling, and the jobs that bring the most respect. At the bottom are the people who are considered the worst off - they may have the least money, the lowest amount of schooling, and the jobs that bring the lest respect. Now think about yourself. Please tell us where you think you would be on this ladder today?

Select the number to place where you think you are on ladder

☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10