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RACE/ETHNICITY, TIMING OF PREGNANCY RECOGNITION AND WOMEN'S RISK OF

DELIVERING A LOW BIRTH WEIGHT INFANT

A Thesis in

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by

Angela G. Campbell

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The thesis of Angela G. Campbell was reviewed and approved* by the following:

Michelle Frisco
Associate Professor of Sociology and Demography
Thesis Advisor

Nancy Landale
Liberal Arts Research Professor of Sociology and Demography

Kristen Kjerluff
Professor of Public Health Sciences

John Iceland
Professor of Sociology and Demography
Head of the Department of Sociology

*Signatures are on file in the Graduate School.

Abstract:

This paper examines four distinct research questions about the relationships between race/ethnicity, pregnancy recognition, and low birth weight. First, do Black women recognize their pregnancies later than White women? Second, is the standard measure of late pregnancy recognition an appropriate predictor of low birth weight risk? Third, does late pregnancy recognition partially mediate the established association between race and low birth weight? Finally, does late pregnancy recognition amplify Black women's risk of bearing a low birth weight infant? To investigate these research questions, data from the Early Childhood Longitudinal Study-Birth Cohort are analyzed (N=4400) using weighted ordinary least square (OLS) and logistic regression models. Results indicate that Black women are significantly more likely than White women to recognize their pregnancies late. In addition, the standard measure of late pregnancy recognition that dichotomizes recognition into pregnancies recognized at six weeks and earlier or seven and later is not optimal in models predicting low birth weight risk. Instead these findings appear to be driven by women who recognize pregnancy much later—after the 12th week of gestation. In unadjusted models, recognition of pregnancy in the 12th week or later is significantly associated with an increase in low birth weight risk, and White women who recognize their pregnancies this late have a higher risk of low birth weight than Black women recognizing their pregnancies in the same time frame. When statistical models are adjusted for confounders, these associations were no longer significant. This suggests that timing of pregnancy recognition is not a significant predictor of low birth weight risk net of women's background characteristics and it does not partially explain why Black women have a higher risk of bearing a low birth weight infant, despite the fact that Black women do recognize

their pregnancies later than White women. Intervention efforts may be warranted to help Black

women recognize their pregnancies earlier so that they can seek prenatal care earlier, but this

is unlikely to change Black women's risk of low birth weight.

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Introduction

In the United States, low birth weight infants account for more than ninety percent of all neonatal deaths (Greene 2002). Low birth weight, defined as weighing less than twenty five hundred grams at birth, is caused by either fetal growth restriction in utero or premature birth (Goldenberg 2007). Both causes of low birth weight can have devastating effects on child health and well-being. Besides death, low birth weight infants are at increased risk for child handicaps (Paneth 1995, Goldenberg 2007) and problems in adulthood such as decreased IQ (Greene 2002) and lowered educational attainment (Greene 2002, Paneth 1995).

The health and developmental risks associated with low birth weight have led to scholarly interest in factors that increase women's likelihood of delivering low birth weight babies. One factor that has received widespread attention is a woman's race/ethnicity. Substantial evidence suggests that Black women are more likely to give birth to a low birth weight infant than White women (Collins et al 2009, David et al 1997, Ferre 2011, Paneth 1995). Black mothers tend to be younger, poorer, and are more likely to be unmarried than the general population (Peacock et al 2001). They are more likely to live in racially segregated neighborhoods with high levels of poverty (Wilkes et al 2004) and experience high levels of structural and interpersonal racism during their lifetimes (Collins et al 2004, Collins et al 2000, Williams 1999). These risks, however, only partially mediate the relationship between race and low birth weight (Goldenberg et al 2007, Collins et al 2009). To date, the persistent association between race and the risk for bearing a low birth weight infant has not been fully explained by either racism (Goldenberg 2007, Paneth 1995) or any other theories (David et al 1997).

Pregnancy recognition after six weeks has also recently been identified as a risk factor for low birth weight in a single study of live births in 29 states (Ayoola et al 2009). Women who do not realize they are pregnant until after 6 weeks of gestation had an eight percent increase (net of confounders) in the odds of delivering a low birth weight baby relative to White women who recognized their pregnancy by the sixth week of gestation (Ayoola et al 2009).

In the study just cited, there was also a statistically significant bivariate difference in the proportion of Black and White women who recognized their pregnancy after 6 weeks gestation. What has not been explored is whether this association is evident net of confounders or whether late pregnancy recognition could be a factor that further helps to explain Black women's increased odds of bearing a low birth weight infant.   It is also possible that late pregnancy recognition could be more consequential for Black versus White women when theory regarding cumulative disadvantage is considered. The current study will examine each of these issues. It also tests the sensitivity of the relationship between late pregnancy recognition and low birth weight to different definitions of late recognition. I address these issues by analyzing data from the restricted use version of the Early Childhood Longitudinal Study-Birth Cohort (ECLS-B), a nationally representative sample of all infants born in the United States in 2001.

Background

There has been a long-standing interest in identifying risk factors for low birth weight (Paneth 1995). This is especially true for Black women, who are more likely to deliver low birth weight infants than women from other racial/ethnic groups (Goldenberg 2007, Paneth 1995). All efforts to decrease the proportion of Black infants born below the twenty five hundred gram

cut-off have made little to no improvement (Goldenberg 2007, Ferre et al 2011). Black women still have an increased risk of bearing moderately low birth weight and very low birth weight infants relative to women of all other ethnicities (Goldenberg 2007, Paneth 1995).

Black women's increased risk for having low birth weight infants stems from a myriad of factors that play out over a lifetime and compound. Black mothers tend to be younger, poorer, and are more likely to be unmarried (Peacock et al 2001). These factors are all significant predictors of a woman's risk for bearing a low birth weight infant (Goldenberg et al 1996). Even when variables for socioeconomic or heath status are controlled, however, Black women still remain at greater risk for bearing low birth weight infants than White infants (David et al 1997, Paneth 1995, Mustillo 2004).

One explanation posed for Black women's increased risk for bearing low birth weight infants is exposure to racism over the life course (Mustillo et al, Collins et al 2009). A clear dose/response relationship between the number of exposures to racism Black women experience in their lifetimes and an increased risk for bearing a low birth weight infant has been demonstrated (Mustillo et al 2004), but racism only partially mediates the effect of being Black on low birth weight risk (Mustillo et al 2004). Thus, the search for other mediators that may explain the relationship between race and low birth weight continues.

Late pregnancy recognition has recently been identified as a significant risk factor for bearing a low birth weight infant in a single study by Ayoola et al (2009). This risk may operate through mechanisms such as late initiation of prenatal care (Ayoola et al 2010) and prolonged use of teratogenic substances such as tobacco and alcohol (Ebrahim et al 1998).

In previous studies, late recognition has been defined as recognizing a pregnancy after six weeks of gestation (Ayoola et al 2009, Ayoola Nettleman & Stommel 2010, Ayoola et al 2010, Kost et al 1998). One justification given for this cut off is that the average pregnancy recognition time for the study sample was six weeks (Ayoola et al 2009). However, it is possible that the risk of bearing a low birth weight infant increases every week a woman delays pregnancy recognition or that Ayoola et al.'s (2009, 2010a, 2010 b) findings are driven by women who recognize pregnancies much later than six weeks of gestation.

On the other hand, not all women are equally likely to recognize their pregnancies late. In the Ayoola et al. (2009) study, Black women were significantly more likely to recognize pregnancy after 6 weeks of gestation in a bivariate analysis (Ayoola et al 2009). To my knowledge, however, no one has examined whether this association remains after accounting for important confounders such as previous pregnancies, women's health and socioeconomic status. If Black women are still more likely to recognize their pregnancies later than White women after controlling for confounders, it is possible that late pregnancy recognition partially mediates the association between race/ethnicity and the odds of bearing a low birth weight infant. Full mediation is unlikely given the extensive evidence of Black women's risk of bearing low birth weight infants. Even partial mediation, however, could suggest relatively simple intervention efforts to help improve Black women's birth outcomes, such as provision of free pregnancy tests in public health clinics and health education outreach to aid women in recognizing the early symptoms of pregnancy.

It is also possible that the association between late pregnancy recognition and women's risk of having a low birth weight infant is stronger for Black women than White women. This

supposition is supported by cumulative disadvantage theory, which describes how the accumulation of risk factors may lead to poor health outcomes for individuals (House et al 1994). Strong evidence in support of this theory has been found in previous research. For example, people with less education have been shown to have shorter life spans due to disadvantages accumulated over the life course (Ross & Wu 1996). This is because education shapes the type of job a person is able to obtain, their probability of being hired and the salary they are able to negotiate (Ross & Wu 1996). When a person has lower education they accumulate lower human capital and have poorer health outcomes relative to those with higher education.

Cumulative disadvantage theory has also been used to explain racial/ethnic gaps in functional health over the life course. Poor childhood health and early life socioeconomic deprivation are both significant predictors of a person's functional health trajectory in later life (Haas & Rohfsen 2007), but the functional health trajectory of Black individuals is lower than that of White people even after adjusting for confounders (Haas & Rohfsen 2007). Haas & Rohfsen (2007) suggest that this difference stems from the cumulative disadvantage of risk factors that Black individuals face over the life course. While never directly tested, cumulative disadvantage theory may also explain why elevated job stress during pregnancy increases the risk for delivering a low birth weight infant among Black but not White women (Oths et al 2001).

The Current Study

The previous research on race, timing of pregnancy recognition and the effects of cumulative disadvantage on the birth outcomes of Black women motives four distinct research

questions. First, are Black women at an increased risk of late pregnancy recognition when controlling for other variables? Second, is the six week dichotomous measure of pregnancy recognition the optimal way to operationalize this variable when predicting low birth weight? Third, if race/ethnicity is associated with late pregnancy recognition, could this variable partially or fully mediate the relationship between race/ethnicity and the odds of having a low birth weight baby? Finally, does race/ethnicity moderate the relationship between late pregnancy recognition and the risk of bearing a low weight infant?

Methods

Data and Sample

The Early Childhood Longitudinal Program – Birth Cohort (ECLS-B) is a nationally representative survey of all children born in the United States in 2001 (Najarian 2010). Children were sampled by randomly selecting birth certificates registered with the National Center for Health Statistics (U.S. Department of Health and Human Services 2006). Ninety-six core counties were used as primary sampling units (U.S. Department of Health and Human Services 2006). Low birth weight infants and twins were oversampled. The ECLS-B is longitudinal by design (Najarian 2010), but the current study only uses data obtained from the birth certificates and survey information collected at the first wave of data collection when the children are nine months old.

The original sample has 10,700 cases[1]. I make several purposeful sample constraints. First, only non-Hispanic, Black and non-Hispanic, White women are retained for analysis (N = 6600). Second, I only include biological mothers who are the main respondent for the parent

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[1] All sample size numbers are rounded to the nearest 50 in accordance with privacy regulations for publication of ECLS-B restricted data.

questionnaire (N=6500). I also only retain mothers who had singleton births (N = 5200). Finally, list-wise deletion of cases with missing data on any of the study variables led to the elimination of approximately an additional eight hundred cases (N =4400).

I analyzed how well the study sample represented the total sample of Black and White ECLS-B mothers and children using weighted t-tests. When comparing the Black and White sample before cases with missing data were dropped to the final analytic sample that has no missing data, weighted t-tests show that children who have mothers with more education are more likely to have missing data and so are children born low birth weight. There was no significant difference in the mean number of weeks a woman took to recognize her pregnancy in the final analytic sample compared to the full Black and White sample before missing data was dropped. This suggests that our study may be slightly biased away from more educated women and not completely representative of all low birth weight births to black and white women but is representative in terms of timing of pregnancy recognition.

Measures

Low Birth Weight. Infant birth weight was recorded on the child's birth certificate and is coded continuously in grams in the ECLS-B . The standard cut-off for low birth weight is 2,500 grams and below (Paneth 1995). Therefore, a dichotomous measure of low birth weight was created by coding all children born weighing 2500 grams or less as "1" and all children born weighing more than 2500 grams as "0".

Timing of Pregnancy Recognition. Timing of pregnancy recognition was based on responses to a question in the first survey wave asking, "when was the first time you realized you were pregnant?" Responses were given in weeks. I operationalized timing of pregnancy recognition

in three different ways. The first measure is a continuous variable indicating how many weeks of gestation it took for women to recognize her pregnancy. It is top-coded at 13 because less than 4% of the sample recognized their pregnancy in the 13th week of gestation or later. The second measure of timing of pregnancy recognition indicates whether timing of pregnancy recognition was within the first six weeks of gestation (1= yes). This measure has been used in previous literature (Ayoola et al 2009, Ayoola, Nettleman & Stommel 2010, Ayoola et al 2010, Kost 1998). The third measure defines timing of pregnancy recognition using three dummy variables: "standard" recognition (the reference category) indicates that women recognized pregnancy within the first six weeks of gestation. The second group indicates "late" recognizers, but these women still recognized their pregnancy within the seventh to eleventh week of gestation, or within the first trimester of pregnancy. "Very late recognizers" did not recognize their pregnancy until at or after the twelfth week of gestation. This measure attempts to isolate women whose late recognition may have put their infant at risk, but were still able to carry the child to term, because miscarriage risk drops significantly in the twelfth week (Goldhaber 1991).

Race/Ethnicity. Mother's race/ethnicity was taken from the first wave questionnaire. Women who self-identified as Black were coded as 1 and women who self-identified as White were coded as 0.

Control Variables. I control for several variables associated with low birth weight such as sociodemographic characteristics, risk behavior during pregnancy and previous pregnancies that may result in earlier recognition. All of these variables are created using information from infants' birth certificates.

The sociodemographic characteristics included are mother's age, education and marital status. Mother's education is measured in years of schooling (ranging from 0 to 17). Mother's age at birth was recoded into three dummy variables because the relationship between mother's age at birth and the risk of low birth weight is curvilinear with both teenagers and women over age 35 at higher risk of bearing a low birth weight baby. These categories indicate that women were 15-19, 20-34 (the reference) or 35 years or older at the time of their child's birth. Mother's marital status is a dichotomous measure (1= married at the time of the child's birth).

Pregnancy risk behaviors included in the model are smoking and drinking. Smoking is a dichotomous variable indicating whether or not a woman smoked at least one cigarette a day while pregnant (1 = yes). Alcohol use is also a dichotomous variable indicating whether or not a woman averaged at least one drink per week (1 = yes). Timing of pregnancy recognition controls are previous preterm birth, number of previous live births and total number of previous pregnancies that ended in either miscarriage or termination. Preterm birth is dichotomous (1=yes). Total number of live births and total number of previous pregnancies ending in a miscarriage or termination are continuous and top-coded at four.

Statistical Analyses

My analysis proceeds in four steps. Across steps, all estimates are weighted and corrected for the ECLS-B study design. Table 1 presents weighted descriptive statistics to show how similar Black and White women are with respect to all analytic variables.

I then corroborate prior research by showing whether a bivariate association between race/ethnicity and timing of pregnancy recognition exists in Table 2. In these analyses, I use

weighted OLS regression models to predict timing of recognition using the continuous variable. Control variables are then added to the previous model to assess whether any bivariate association observed in the previous analysis is evident net of confounders.

I then move to an analysis in Table 3 that shows how timing of pregnancy recognition is related to low birth weight risk when it is operationalized in three different ways. These analyses show whether the relationship between timing of pregnancy recognition and women's risk of having a low birth weight baby is sensitive to different specifications of timing of recognition.

Finally, Table 4 presents results from weighted logistic regression models examining how race, late pregnancy recognition, and the interaction between these two variables are related to a woman's risk of bearing a low birth weight infant. The first model in Table 4 shows the established relationship between race/ethnicity and low birth weight, the second model tests if timing of pregnancy recognition mediates this relationship, the third model tests the potential interaction between race/ethnicity and timing of pregnancy recognition and fourth model adds controls for sociodemographic factors, risk behaviors, pregnancy recognition confounders.

Results

Sample Characteristics

Table 1 shows the characteristics of White and Black women in the analytic sample, which largely reflect the characteristics of other samples used to estimate the incidence of low birth weight among Black and White women (Ayoola et al 2009, Mustillo et al 2004, David et al 1997). Black women are more than twice as likely to bear a low birth weight infant than White

women. 10% of Black women bear a low birth weight infant while only 4.6% of White women do. Black women are also more likely to recognize their pregnancies later regardless of how timing of pregnancy recognition is measured. Black women recognize their pregnancies more than a week later than White women, almost two-fifths of Black women do not recognize their pregnancy until seventh week or later (38.52%) compared to one-fifth of White women (19.85%), and Black women are more likely than White women to recognize their pregnancies in the seventh through eleventh week or the twelfth week or later.

Estimates in Table 1 also show other differences between Black and White women. White women have almost one year more education than black one average. A larger proportion of Black mothers gave birth as teenagers (19.05%) than White mothers (8.2%) and more than twice as many White women are married at the time of birth as Black women. Black women have a slightly higher average for total number of live births (1.11) than white women (.90), but they are comparable to white women in terms of average number of births that end in miscarriage or termination. A greater percentage of White women smoke one cigarette a day while pregnant (13.77%) compared to Black women (6.68%) but there is no difference between Black and White women in the percentage of women who average one drink a week.

Table 1. Descriptive Statistics by Race/Ethnicity for Black and White Women

Variable	White Sample (N=3200)		Black Sample (N=1200)	
	Mean or Percent	SD	Mean or Percent	SD
Low Birth Weight (1=yes)	4.85		10.13	
Timing of Pregnancy Recognition				
Continuous Measure				
Week Recognized Pregnancy	4.94	.07	6.28	.17
Dichotomous Measure				
Pregnancy Recognition after 6 weeks (1=yes)	19.85		38.52	
Pregnancy Recognition At Three Different Stages				
In the first 6 weeks of pregnancy (reference)	80.15		61.48	
In the 7th -11th week	15.40		23.43	
12th week of pregnancy and after	4.45		15.09	
Pregnancy Recognition Controls				
Total Number of Previous Births	.90	.02	1.11	.05
Number of Pregnancies not ending in a live birth	.40	.02	.44	.04
Previous Preterm Birth	.92		1.19	
Sociodemographic Characteristics				
Mother's Education at time of birth	13.75	.08	12.41	.09
Mother's Age				
Mother is 15-19 years old at birth	8.2		19.50	
Mother is 20-34 years old at birth (reference)	79.2		72.75	
Mother is 35 plus years old at birth	12.08		7.75	
Married at time of birth (1=yes)	78.90		32.59	
Risk-taking Behaviors during Pregnancy				
Drank at least one alcoholic beverage a week during pregnancy (1=yes)	.54		.54	
Smoked at least one cigarette a day during pregnancy (1=yes)	13.77		6.68	

* rounded N = 4400

Source: Wave 1 of Early Childhood Longitudinal Study-Birth Cohort (ECLS-B)

The relationship between Race/ethnicity and Timing Of Pregnancy Recognition

       The first model in Table 2 shows whether the descriptive differences in timing of pregnancy recognition shown in Table 1 are statistically significant. Model 1, which only includes race/ethnicity, suggests that Black women recognize their pregnancies significantly later than White women. On average Black women recognize their pregnancies 1.34 weeks later than White women. When control variables are added to Model 2, the association between race and timing of pregnancy recognition remains significant, but the estimated effect size is reduced in magnitude. Black women recognize their pregnancies four fifths of a week (.85 weeks) later than White women.

Table 2. Weighted OLS regression estimates showing the unadjusted and adjusted relationship between race and timing of pregnancy recognition (N=4400)

	Model 1	Model 2
Black (1=yes)	1.34***	.85***
	(.13)	(.13)
Pregnancy Recognition Controls		
Total Number of Previous Births		0.01
		(.06)
Number of Pregnancies not ending in a live birth		-0.09
		(.07)
Previous Preterm Birth		-0.84
		(.40)
Sociodemographics		
Mother's Education at time of birth		-0.15***
		(.03)
Married at time of birth (1=yes)		-0.60***
		(.14)
Mother's Age: 20-34 years old at birth (reference)		
Mother is 15-19 years old at birth		0.33
		(.19)
Mother is 35 plus years old at birth		(.00)
		(.17)
Risk-taking Behaviors during Pregnancy		
Drank at least one alcoholic beverage a week during pregnancy (1=yes)		1.04
		(.65)
Smoked at least one cigarette a day during pregnancy (1=yes)		.45*
		(.17)
Construct	4.94***	7.38***
	(.05)	(.43)

*p<.05 **p<.01 ***p<.001

Source: Wave 1 of Early Childhood Longitudinal Study-Birth Cohort (ECLS-B)

Timing of Pregnancy Recognition Measurement

To understand whether the relationship between low birth weight and timing of pregnancy recognition depends on the measurement of the timing of pregnancy recognition, Table 3 presents results from statistical models that define timing of pregnancy recognition

three different ways. Model 1 estimates how the measure of late pregnancy recognition used in previous studies (recognition before or after 6 weeks of gestation) (Ayoola et al 2009, Kost 1998) is related to women's risk of having a low birth weight infant. Results from this model indicate that women who do not recognize their pregnancy until the seventh week of gestation or later have 43% higher odds of bearing a low birth weight infant than women who recognize their pregnancy in the first six weeks of gestation. Model 2 examines how each week delay in the timing of pregnancy recognition is related to a woman's odds of bearing a low birth weight infant. For each week later that a woman recognizes her pregnancy, the estimated odds of bearing a low birth weight infant increase by 7%. In the third model, timing of pregnancy recognition is categorized as 'standard,' 'late' and 'very late.' Women who recognize their pregnancies 'very late,' in the twelfth week or later, are more than twice as likely to bear a low birth weight infant than women who recognize their pregnancies in the standard time frame. Women who recognize their pregnancies "late", (in the seventh through eleventh week of gestation) but not "very late" do not show a significant increase in their odds of a low birth weight birth relative to women who recognize in the first six weeks. This suggests that the findings in Model 1 and 2 are being driven by women who recognize their pregnancies "very late." Thus, I use the 3 category variable of timing of pregnancy recognition in my analyses examining how race and timing of pregnancy recognition are related to women's risk of having a low birth weight baby.

Table 3. Weighted Odds Ratios from Models Estimating the Relationship between different specifications of timing of pregnancy recognition and low birth weight for Women (N=4400)

Models	Odds Ratios
Panel 1: Estimate from a model operationalizing pregnancy recognition as recognition after 6 weeks (1=yes)	1.43***
Panel 2: Estimate from a model operationalizing pregnancy recognition as a week recognized pregnancy	1.07**
Panel 3: Estimates from a model operationalizing pregnancy recognition as "standard," "late," and "very late"	
In the first 6 weeks of pregnancy (reference)	
In the 7th -11th week	1.18
12th week of pregnancy and after	2.13***

*p<.05 **p<.01 ***p<.001

Source: Wave 1 of Early Childhood Longitudinal Study-Birth Cohort (ECLS-B)

Timing of Pregnancy Recognition, Race/Ethnicity, and Low Birth Weight Risk

Using cumulative disadvantage theory as a basis for my inquiry, in Table 4 I progress to an examination of race, late pregnancy recognition and how the interaction of the two are related to a woman's risk of a low birth weight birth. Model 1 establishes the unadjusted relationship between race/ethnicity and increased risk for low birth weight births. Compared to White women, Black women are twice as likely to have a low birth weight infant. The inclusion of late pregnancy recognition into Model 2 tests whether late pregnancy mediates the relationship between race/ethnicity and bearing a low birth weight infant. In other words, does a portion of the risk that Black women face for bearing low birth weight infants operate through their likelihood of recognizing their pregnancy 'late' or 'very late?' It is clear that pregnancy recognition does not mediate the relationship between race and low birth weight, because the odds ratio for Black women is not significantly reduced. Instead, both variables exhibit significant, independent relationships with low birth weight.

An interaction between race/ethnicity and timing of pregnancy recognition is included in Model 3 to test whether the risk of recognizing a pregnancy "late" or "very late" is different for Black and White women. It is, but not in the way hypothesized. White women who recognize their pregnancies "very late," are more likely to bear a low birth weight infant than Black women who recognize their pregnancies "very late." Model 4 includes confounders, which explain why White women who recognize their pregnancies very late have higher odds of having a low birth weight infant than Black women who recognize their pregnancies late. Supplementary models showed that risk behaviors during pregnancy (smoking, alcohol), previous preterm births, previous pregnancies ending in a miscarriage or termination, marriage and mother's education explained the interaction term. Supplementary analyses also showed that the direct estimated effect of very late pregnancy recognition established in Model 2 is explained by basic demographic characteristics: mother's age, marital status and education at time of birth. Risk behaviors during pregnancy mediated the effect of "very late" pregnancy recognition when added to the model, but did not completely remove its significance. Previous live births, preterm births and pregnancies that ended in a miscarriage or termination did not mediate the effect of "very late" pregnancy recognition.

Table 4. Odds Ratios for Low Birth Risk of Black and White Women (N=4400)

	Model 1	Model 2	Model 3	Model 4
Black (1=yes)	2.21***	2.06***	2.27***	2.08***
Timing of Pregnancy Recognition				
In the first 6 weeks of pregnancy (reference)				
In the 7th -11th week		1.07	1.11	1.00
12th week of pregnancy and after		1.70***	2.25***	1.62
Black * Pregnancy Recognition in the 7th -11th week			0.90	0.98
Black *Pregnancy Recognition in 12th week of pregnancy and after			.57*	0.68
Pregnancy Recognition Controls				
Total Number of Previous Births				0.86**
Number of Pregnancies not ending in a live birth				1.11*
Previous Preterm Birth				6.02***
Sociodemographic Characteristics				
Mother's Education at time of birth				.94*
Mother's Age: 20-34 years old at birth (reference)				
Mother is 15-19 years old at birth				1.10
Mother is 35 plus years old at birth				1.46*
Married=1				0.80
Risk-taking Behaviors during Pregnancy				
Drank at least one alcoholic beverage a week during pregnancy (1=yes)				3.19**
Smoked at least one cigarette a day during pregnancy (1=yes)				1.62***
Construct	.05***	.05***	.05***	0.12***

*p<.05 **p<.01 ***p<.001

Notes: Odds ratios from weighted logistic regressions
Data come from Wave 1 of Early Childhood Longitudinal Study-Birth Cohort

Discussion

The United States currently lags behind other developed countries in the reducing the proportion of low birth weight births occurring each year (Goldenberg 2007). Despite intervention efforts, Black women in the United States continue to carry the largest portion of this burden for many reasons including their disadvantaged socioeconomic position (Goldenberg 2007, Paneth 1995) and the burden that Black women face as a minority race

(Mustillo et al 2004). Late pregnancy recognition has recently been shown to be a significant predictor of low birth weight births (Ayoola et al 2009). This paper is the first to my knowledge to test this finding using a nationally representative sample, to test the sensitivity of this finding to different specifications of timing of pregnancy recognition, and to test whether the timing of pregnancy recognition differentially increases the risk of low birth weight for Black and White women. In this way, this paper makes several important contributions.

Results are the first to show that racial/ethnic differences in timing of pregnancy recognition are evident even after statistical models account for confounders. Black women recognize their pregnancies about 6 days, or four-fifths of a week later than White women. This is important because late pregnancy recognition may indirectly influence low birth weight risk via risk behaviors that are subject to change woman realizes she is pregnant, such as smoking, drinking. Late recognition of pregnancy can also lead to late initiation of prenatal care (Edwards 2006, Kost et al 1998).

Findings also suggest that only very late timing of pregnancy recognition (after the first trimester) significantly influences women's risk of low birth weight, but that this estimated effect is explained by basic demographic characteristics and thus, not surprisingly does not mediate the relationship between race/ethnicity and women's risk of having a low birth weight infant. This is different than findings in previous research, which showed that late pregnancy recognition had an independent effect on low birth weight risk after adjustment for confounders (Ayoola et al 2009). However, given that this is a nationally representative sample, these results are more easily generalized to all non-Hispanic Black and White women in the United States than any previous study investigating the effects of timing of pregnancy

recognition on the risk of delivering a low birth weight infant. It is also important to note these mediation effects when thinking about possible interventions. If this increased risk for low birth weight births due to late pregnancy recognition that was previously observed (Ayoola et al 2009) is explained by basic demographic characteristics such as mother's education, marital status and age, then an intervention targeted specifically at recognizing pregnancies earlier may not be effective.

Given that timing of pregnancy recognition is not associated with women's risk of low birth weight once statistical models are adjusted for confounders, it is not surprising that race/ethnicity did not moderate this relationship. This does not mean that cumulative disadvantage does not play a role in the increased risk for low birth weight births faced by Black women relative to white women but it does mean that the cumulative disadvantage faced by Black women does not amplify the effects of timing of pregnancy recognition. This again suggests that interventions focused on improving pregnancy recognition would not be useful and most importantly, would not improve birth outcomes for Black women.

However, reasons why this study may differ from the Ayoola et al (2009) should be taken into account. First, the PRAMS survey is conducted in only 29 states in the United States. PRAMS data is weighted to be generalizable to the state in which it was gathered. The ECLS-B is nationally representative and is weighted to reflect this. If women in the 29 states surveyed by PRAMS are somehow different in their risk behaviors surrounding timing of pregnancy recognition, then this may account for the different results. Second, this study looks that the differences in low birth weight between non-Hispanic Black and White women only while Ayoola et al (2009) includes Black, Hispanic, White and other. That should not lead to different

estimates however, unless Hispanics and women in the other category are significantly from Black and White women in the way timing of pregnancy recognition effects their low birth weight risk, which is unlikely. Finally, the question used in the two surveys is slightly different. The PRAMS survey asks, "how many weeks or months pregnant were you when you were sure you were pregnant?" The ECLS-B asks, "[t]hinking back to when you were pregnant with [child], how many weeks pregnant were you when you first found out that you were pregnant?" The PRAMS question could be interpreted as the first time the woman had official confirmation from a doctor while the ECLS-B question could be interpreted as the first time the woman felt pregnancy symptoms. This difference could potentially lead to a large bias.

Limitations

This study has several strengths, it oversamples low birth weight births and minorities in order to insure adequate sample size and variation and is weighted to be nationally representative. It uses both survey questions and birth certificate data to get a full picture of circumstances surrounding timing of pregnancy recognition and factors that may influence a low birth weight birth. That said, it also has limitations that must be taken into consideration.

The list-wise deletion of missing data and sample filtering that was done in order to create the analytic sample leads to some sample biases. For example, children born low birth weight are more likely to have missing data and so are children whose mothers have more education. While losing the more educated mothers may not cause any direct bias, losing low birth weight children is of concern because this is my principle dependent variable. Even though low birth weight children are oversampled, it is important to keep as many of these children in the dataset as possible to have adequate variation in mother characteristics.

In addition, all data from birth certificates was collected at the child's birth, but timing of pregnancy recognition and mother's race are based on the first wave of the ECLS-B data collected from mothers at least nine months after the child was born. This means that the question regarding pregnancy recognition was asked after the child was born which places the recognition period at considerable distance in the past. This may bias the respondents' answer, but it is not clear if women are more likely to report that they recognized their pregnancy earlier or later as time passes. There is also reason to believe that unintended births are recognized later (Kost et al 1998, Peacock et 2001), but the question measuring birth intentions had substantial missing data and could not be included without substantial loss of observations.

Conclusion

This study contributes several new findings to the literature. First, Black women are significantly more likely to recognize their pregnancies later than White women. Second, timing of pregnancy recognition does not increase risk for a low birth weight birth after adjustment for confounders. Finally, race/ethnicity does not moderate the relationship between timing of pregnancy recognition and low birth weight risk in adjusted models. Thus, the finding that Black women are significantly more likely to recognize their pregnancies late may be inconsequential to their risk of delivering a low birth weight infant. Further, based on the findings presented in this study, I would not recommend focusing on pregnancy recognition for future research or interventions, especially when targeting Black women. Focusing on established predictors of low birth weight for interventions while searching for more distal causes of low birth weight among Black women, such as poor preconception care, may be more useful at the current time.

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