NOT SO SUPPORTIVE? BLACK-WHITE DIFFERENCES IN THE PROTECTIVE EFFECT OF SOCIAL SUPPORT ON BIRTHWEIGHT AND PRETERM DELIVERY

By

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To my wonderful parents, Kim and Clay Thomas, for their never-ending love and continued support for everything that I do.

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INTRODUCTION

Enduring racial disparities in pregnancy have been the focus of social science, medical, and public health research for decades. Since 1940, a disparity in infant mortality between the African American and non-Hispanic white populations in the United States has been well-documented (Giurgescu et al. 2011). Compared to all other ethnic groups, black women experience the highest rates of infant mortality (number of infant deaths before the age of one per 1000), low birthweight (LBW; weight less than 2500 grams) and preterm birth (PTB; gestational age of less than 37 weeks) (Woods et al. 2010; Mustillo et al. 2004). The black-white disparity accounts for a large proportion of the country's overall high infant mortality rate, suggesting a larger social problem.

Infant mortality rates are often used as surrogate measures of a population's general health status, socioeconomic conditions, and availability of and access to quality health care (Alexander et al. 2008). There was a 45 percent decrease in overall infant mortality rates between 1980 and 2000 (Alexander et al. 2008), but by 2007, preterm birth rates had increased by 21 percent, and LBW rates increased by 19 percent (Giurgescu et al. 2011). Although infant mortality rates have improved over the last few decades, rates of LBW have worsened, reflecting improvement in technological and medical advances needed to preserve life. Despite a vast amount of research in this area, there have been no clear explanations for the underlying causes of the unrelenting elevation of low birthweight and premature birth rates.

The social mechanisms leading to infant mortality and poor birth outcomes deserve attention, not only for social clarification, but for the immediate costs to society that form as health issues faced by infants of poor pregnancy outcomes. Infant birthweight is a primary determinant of infant mortality risk (Singh and Yu 1995) with about 1 percent of births occurring at very low birthweight in all populations accounting for more than half of all the neonatal deaths and 63 percent of the black-white gap in infant mortality in the United States (Alexander et al. 2008). Poor pregnancy outcomes contribute to the high number of infant deaths, and also to childhood morbidities, which lead to a significant amount of health care costs reaching billions of dollars every year (Schempf et al. 2007). The most important of the major

handicaps to which low birthweight infants are susceptible is cerebral palsy, found about 25 times more commonly in children who had been very low birthweight infants. In addition, deafness, blindness, epilepsy, chronic lung disease, learning disabilities, and attention deficit disorder are all found more commonly in low birth weight and preterm babies (Paneth 1995). Poor pregnancy outcomes are clearly a significant health issue that calls for further investigation by social scientists. By understanding the societal contributions to low birthweight and prematurity, we will be better equipped to develop more effective interventions, thereby reducing the associated economic and social costs.

Investigating the causes of low birthweight and prematurity and the persistent racial gap, past research has often focused on individual-level conditions which might negatively impact pregnancy outcomes. There is a demonstrated association between adverse birth outcomes and a number of factors including education, age, socioeconomic status, maternal health behaviors (i.e. alcohol consumption, smoking and drug usage), prenatal care and spirituality, among others (Colen et al 2006, Giurgescu et al. 2011). However, none of these factors fully account for observed racial disparities in pregnancy.

More recent research has focused on differences in stress exposure as a possible explanation for continued black-white differences in pregnancy. The chronic social stress experienced by many black women is thought to produce a weathering effect (Geronimus 1996, Geronimus et al. 2006), which, over time, can cause a physiological wear and tear on the body known as allostatic load. Disparities in pregnancy could be linked to the cumulative effects of allostatic load over the course of a woman's life (Giurgescu et al.2011). Evidence suggests that issues related to race and gender create a unique stress experience for black women. Gaining an understanding of the lived experience of black women in this country may provide clearer answers about the relationship between social stress and pregnancy.

An emerging body of literature on stress, coping and health among black women has identified strengths and personal resources as factors that may reduce or exacerbate the influence of stress on their health (Woods-Giscombe & Black 2011). Social support has long been cited as a buffer to the negative effects of stress on health, including pregnancy outcomes (Nuckolls et al. 1972,Cassel 1976, Cobb 1976,

Turner et al. 1990). By further examining social support we may gain knowledge about the underlying mechanisms contributing to racial disparities in pregnancy.. Previous evidence suggests that perceived support can be especially beneficial for pregnant women, providing a buffer against the stress and anxiety that often accompanies the major life changes associated with pregnancy (Campos et al. 2008). However, while social support can have a positive effect on a woman's pregnancy, there is also evidence that such an effect does not occur equally in all women, with noted differences in effectiveness across socioeconomic position, marital status, and level of stress exposure (Turner and Lloyd 1999, Aneshensel 2009, Feldman et al 2000).

Much of the research in this area has focused on racial differences in the *amount* of perceived support pregnant women report, as black women tend to report more family support, whereas white women report more support from partners and spouses (Sagrestano et al. 1999). There is also a difference in the *type* of support perceived, with black women reporting more instrumental support from family and friends in response to acute stressors (Collins et al. 1993). In addition, previous work has mainly focused on racial differences in the independent effects of stress and social support on birth outcomes, failing to explore racial differences in the moderation effects of social support in the stress-pregnancy relationship. This study essentially seeks to investigate more comprehensively the *effectiveness* of social support as a buffer against stress in the pregnancies of black and white women.

BACKGROUND

Racial Disparities in Pregnancy

In the United States, rates of LBW have declined substantially since the 1960s (Alexander et al. 2008; Mustillo et al. 2004; Hogue and Bremner 2005).However, compared to white infants, black infants are more than twice as likely to be born low birthweight (Collins et al. 2004; Mustillo et al. 2004) and nearly three times as likely to be born prematurely (Paneth 1995, Lu and Chen 2004). Given the sheer magnitude of these disparities and their strong relationship to both immediate and long-term , there are few issues that warrant greater research attention. (Schempf et al. 2007). In addition, the fact that infant

birthweight is a primary determinant of infant mortality risk, accounting for more than 63% of the black-white gap in infant mortality in the United States, investigation of its causes is of utmost importance.

A host of studies have attempted to explain this gap in infant health by investigating a wide variety of social characteristics thought to contribute to racial differences in pregnancy outcomes. Maternal age was long considered to be an important determinant of birth outcomes, as it was thought to represent a mother's biological or psychosocial preparedness for childbearing (Geronimus 1996). Early research suggested that younger age was associated with greater risk for obstetric complications (Turner et al. 1990), but over time the general consensus has been that negative outcomes among younger mothers arise more from social and emotional circumstances than from purely physiological factors (Faursenberg 1976, Turner et al. 1990). In addition, excess risk among teenagers was considerably higher among whites than among blacks (Klienman and Kessel 1987).Thus, the black-white disparity in infant outcomes could not be largely attributable to race differences in maternal age. In fact, because , among blacks, risk increases between late teens and 20s while risk for white infants decreases between these maternal ages, there is evidence that the racial gap in outcomes only widens with maternal age (Geronimus 1992, Geronimus 1996).

Another social characteristic associated with health outcomes is socioeconomic status (SES). Most commonly conceptualized as an index of one's position in society based on income, education and occupation, low SES is thought to influence pregnancy outcomes through limited access to important educational and economic resources (Colen et al. 2006; Hoffman and Hatch 1996). Consequently, behavioral factors like smoking, alcohol intake, drug usage, and malnutrition partially explain social class differences in rates of poor infant outcomes (Hoffman and Hatch 1996). In addition, low SES individuals are less likely to seek necessary prenatal care (Braveman et al. 2000, Murray and Bernfield 1988) which has been linked to decreased risk for low birthweight and prematurity. Nonetheless, even though black mothers are often less likely to use prenatal care due to a host of reasons (lack of access, transportation, financial strain, etc.) (LaViest et al. 1995), the difference in the use of prenatal care accounts for less than

15 percent of the racial differences in low birthweight (Murray and Bernfield 1988, Hoffman and Hatch 1996). More so, there is debate over the effectiveness of prenatal care in reducing the black-white gap in outcomes (Murray and Bernfield 1988, Lu and Haflon 2003, Alexander and Kotelchuck 2001), suggesting that although lack of prenatal care utilization is often considered to be a risk factor, it does not do much to explain the widening gap in infant outcomes among black and white women.

The elevated rate of poor outcomes among black women might possibly be explained by the fact that blacks are more likely to be of lower social class than whites (Hoffman and Hatch 1996 and others). However, black-white differences in infant health are evident regardless of socioeconomic status (Colen et al. 2006 and others). Moreover, compared to their white peers, the children of college-educated black women face a significantly greater risk of being low birthweight (Schoendorf et al. 1992; McGrady et al. 1992; Collins and Butler 1997; Colen et al. 2006).In their seminal piece, Kleinman and Kessel (1987) found that increased education acts as a buffer against low and very low birthweight for white women, but rates of very low birthweight persisted despite increased education for black women, further confirming that the observed racial differences in birth outcomes are not sufficiently explained by differences in social status.

Because disparities in race cannot be easily explained by behavioral factors or socioeconomic status, some researchers have investigated the possible role of genetics in these differences. In a significant study, David and Collins (2007) found that the overall birthweight distributions for infants of US-born white women and African-born women were almost identical, while US-born black women's infants comprise a distinctly different population, weighing hundreds of grams less. Black African and Caribbean immigrants, on the other hand, gave birth to girls who were born heavier than the girls born into the established black American families. Most striking, these first-generation black girls grew up in the United States and went on to have daughters whose birthweight were lower on average than their own weights had been at birth (David and Collins 2007). As the pregnancy of African immigrants began to mirror those of native-born blacks, the explanation of genetics as a cause for racial disparities was further

proven to be inadequate. The failure to fully explain racial disparities in pregnancy outcomes is what has led researchers to propose that group differences are attributable to life stress and the availability or quality of social support (Hoffman and Hatch 1996, Lobel et al. 1992, Geroniumus 1996, Colen et al. 2006).

The Role of Stress

Stress and Health.

The stress hypothesis and the subsequent stress process models designed to test it have been used for decades to identify the ways in which life stress associated with individuals' social statuses explain variation in mental and physical health outcomes. The main premise of this concept is that social statuses determine the conditions of people's lives, such conditions create the context for differential exposure to stressful events and coping resources, and differences in mental and physical health conditions arise from variations in stress exposure (Pearlin 1983; Turner et al. 1995; Turner and Lloyd 1999; Turner and Avison 2003). Thus, by investigating differences in stress exposure, it may be possible to understand group differences in health.

Primarily measured by assessing recent life events, stressors have most often been summed or grouped into various categories (Aneshensel 2009). This method of testing for group differences was heavily criticized (Aneshensel 1992, Turner and Wheaton 1995; Turner and Avison 2003) as it often oversampled experiences more likely to occur for particular groups (Turner and Wheaton 1995, Aneshensel 2009). In more recent years, a more comprehensive and systematic assessment has been used to evaluate the occurrence of stress in individuals' lives, including recent life events, chronic stressors, traumatic events and discrimination stress (Aneshensel 2009; Turner 2010). Turner and Lloyd (1999) demonstrate that each stressor dimension has the potential to cause distinct health effects. In particular, chronic stress has been found to have significant negative effects on physical health; this phenomenon is commonly known as the weathering hypothesis (Geronomius 1992, Geronimus et al. 2006; Geronimus et al 2010). This theory suggests that, with repeated and long-term exposure to stress, the body's stress

responses become inefficient, resulting in an allostatic load on the body's systems (Geronimus et al. 2010). As exposure to chronic stress differs by race and socioeconomic status, such effects are unequally distributed, leading to differential health consequences.

The relationship between low social status and higher levels of psychological distress has long been recognized, with research suggesting that those with lower status experience higher levels of stressful events (Pearlin 1989; Aneshensel 1992; Turner et al. 1995). This can occur through several mechanisms, with one's social status influencing his or her exposure to stressful events or access to coping resources (Aneshensel 2009). Individuals of lower class status face higher exposure to ambient stressors in residential or work environments that come in the form of noise, crowding, decaying housing, etc. Blacks are disproportionately exposed, not only with greater frequency, but plausibly with greater duration and intensity than whites (Almeida et al. 2005, Gee et al. 2004; Geronimus et al. 2010). In addition to overt acts of discrimination, constraints on opportunities to achievement and success due to institutional racism may interact with other stressors and coping resources to explain higher rates of illness among blacks (LaVeist 1996; Williams and Williams-Morris 2000). By age 30, black women exhibit greater risk of having high allostatic load scores than black men or than white men or women. Although accelerated biological aging is evident among black women at all socioeconomic levels (Geronimus et al. 2006), this risk gap increases through midlife and is most severe among black women who are poor (Geronimus 1996, Geronimus et al 2010), creating negative implications for pregnancy outcomes.

Stress and Pregnancy

Many social factors have been considered for their effects on the racial disparities in pregnancy. However, many of the factors we consider to be "risk factors" are more likely to be surrogates for a host of biologic, behavioral, environmental, and medical factors that are causally related to pregnancy outcomes (Kleinman and Kessel 1987). Hence, investigation of differential exposure to stress, which captures the physical and mental effects of particular statuses and events, is likely a better measure of

individuals' lived experiences and their effects on health. With this understanding, most of the research to date on pregnancy has attempted to demonstrate the negative effects of stress on outcomes (Hoffman and Hatch 1996).

Stress is thought to work through several pathways to affect pregnancy. These include physiological processes, through the release of stress hormones like cortisol (Hoffman and Hatch 1996) , the psychological perception of stress leading to distress (Hoffman and Hatch 1996; Zachariah 2009), as well as negative health behaviors including smoking, drinking alcohol, nutritional intake and failure to seek medical help or information (Hoffman and Hatch 1996; Zachariah 2009). Research concerning the direct effects of life events stressors has largely failed to find important associations with birth outcomes; chronic stress seems to serve more as a risk for pregnancy (Hoffman and Hatch 1996) although it is measured less often. Although we know that persistent, high-effort coping with acute and chronic stressors can have a profound effect on health over the life-course, chronic stress has been measured less often in pregnancy studies, typically because acute stressors have been thought more capable of triggering preterm labor (Hoffman and Hatch 1996, Dunkel-Schetter and Rini 2004). This effect is likely related to racial disparities in pregnancy as chronic stress is a more prominent feature in the daily lives of black women than in the lives of white women (Collins et al 2004).

Daily and lifetime experiences of racism and discrimination make black women more susceptible to the effects of stress than other racial and ethnic groups (Zachariah 2009). Since pregnancy is already a stressful event requiring significant physiological and psychological adaptation (Giscombe and Lobel 2005; Dunkel Schetter and Rini 2004; Sagrestano et al. 1999), black women with fewer coping resources may be at a disadvantage when exposed to pregnancy-specific stressors (Zachariah 2009). There have been mixed results from a host of studies assessing the plausibility of a causal association between black women's exposure to chronic stress (particularly from interpersonal racism) and poor pregnancy outcomes (Collins et al 2004, Wadhwa et al 2001, Lu and Chen 2004). Geronimus (1996), in a study investigating the plausibility of the weathering hypothesis as an explanation for continued racial

disparities in pregnancy, found that cumulative stress with increasing maternal age is associated with doubled odds of low and very low birthweight for black women. Among blacks in low-income areas, the odds of low and very low birthweight increased three and four-fold for women between the ages of 15 and 34. This study provides evidence that cumulative stress among black women, which can be exacerbated by low social status, has negative consequences for pregnancy. Conversely, Lu and Chen (2004) found that while pregnant black women reported greater exposure to stress, there was no significant effect of stress on pregnancy outcome. These results are consistent with several other studies examining the relationships between stress and pregnancy (see Hoffman and Hatch 1996 for review).

By further investigating the role of stress and its association with potential social resources, like social support, that act to regulate the impact of stress, it may become possible to improve outcomes and reduce the persistent racial gap.

Social Support

Social support has been understood as an important tool in the prevention of negative health effects for decades. Almost four decades ago, early research (Cassel 1976; Cobb 1976) conceptualized social support as protective against the strains (i.e. stressors) of life. Specifically, Cobb (1976) defined it as information leading the subject to believe that he is cared for and loved; information leading the subject to believe that he is esteemed and valued; information leading the subject to believe that he belongs to a network of communication and mutual obligation. Such information was thought to act as a buffer during the appraisal process, affecting how an individual views a potentially stressful event, as well as during the coping process following an event (Hoffman and Hatch 1996; Aneshensel 2009). Cassel (1976) asserts that such psychosocial processes should be treated as multidimensional, with consideration of how stressors and nonstressors act together to affect health. Thus, we should think of the underlying mechanisms by which social support interacts with stress to produce a particular health outcome.

In addition, social support must also be thought of as a multidimensional construct. Collins and colleagues (1993) posit that there are three broad categories of social support: emotional support

(expressions of caring and esteem), informational support (advice or guidance), and instrumental support (tangible goods or assistance with tasks). The authors also find that each type of support can have distinct effects on health, with material support predicting physical health outcomes more consistently than did emotional support. There is also a difference between perceived and received or enacted support. Perceived support concerns a person's general perception or belief that people in their social network would provide assistance in times of need, whereas received support refers to supportive exchanges that have actually occurred within a specific context (Collins et al 1993). These two, while seemingly similar, act as two independent constructs (Dunkel-Schetter and Bennett 1990; Schwarzer and Leepin 1991; Collins et al 1993). Researchers have largely concluded that perceptions of available support are more closely tied to stable individual differences in health (Turner et al 1990; Turner and Marino 1994; Collins et al 1993), particularly as received or enacted support is often in response to a particular situation (Uchino 2009).

There are several other factors that contribute to our understanding of social support as well, including the quality and source of support. Studies have found that benefits of support depend on whether the recipient is satisfied with it (Dunkel-Schetter and Bennett 1990; Collins et al. 1993; Lincoln et al. 2003). This suggests that quality of support needs to be distinguished from the amount of support in assessments of the effect of support on health. A distinction can also be made in the source of support (Sagrestano et al. 1999; Hoffman and Hatch 1996) as support from husbands or partners tending to be more beneficial than support from other family members (Feldman et al. 2000).

While there is a long history of consistent evidence suggesting the beneficial nature of social support on psychological health (Kessler and McLeod 1985, Aneshensel 1992; Collins et al 1993; Turner and Marino 1994), only more recently has there been increased investigation into the effects of social support on physical health outcomes (Cohen and Janicki-Deverts 2009; Uchino 2009). But in seeking to understand the role of supportive relationships in well-being, it is important to distinguish between the effects of social support on psychological versus physical health (Collins et al. 1993). Research

examining the role of social support in pregnancy outcomes essentially investigates how social support affects both the physical and psychological, particularly in buffering the negative effects of stress which is known to cause low birthweight and prematurity.

Social Support and Pregnancy.

Social support has been widely investigated in pregnancy for a variety of reasons, but specifically because pregnancy is short in duration, with specific endpoints. It is a defined health event for which there is a defined set of physical and mental health outcomes, specifically objective measures of infant birthweight and maternal postpartum depression (Collins et al. 1993). Early studies of support in pregnancy provide the foundation for our current understanding of how social support works to improve outcomes.

Nuckolls, Cassel, and Kaplan (1972) assessed the role of social support in the pregnancies of military wives, finding that social support, in the context of psychosocial assets, acted as a buffer against pregnancy complications. This study worked to confirm the stress-buffering nature of social support, which, up to that point, had only been speculated upon. A decade later, Norbeck and Tilden (1983) investigated the effects of social support in the presence of stress and found direct effects between high stress and pregnancy complications and low social support and complications respectively. In addition, there were significant interactions between stress and social support, suggesting that social support worked differently at various levels of stress exposure. While these studies established causal associations between stress, social support and pregnancy outcomes, more recent work has focused on exploring the ways in which variations in the many dimensions of social support can impact pregnancy.

Social Support, Status and Pregnancy

Social support is largely thought to improve pregnancy through two mechanisms: lowered rates of stress-induced biomedical responses and fewer stress-related health behaviors like smoking and alcohol use that are associated with poor pregnancy outcomes (Collins et al. 1993; Feldman et al 2000; Dunkel-Schetter and Rini 2004). However, the effects of these mechanisms can differ dramatically based on a

woman's social statuses, as it is assumed that variations in the availability of social support arise substantially out of developmental and contemporaneous conditions of life, which are determined by one's statuses (Turner and Marino 1994; Aneshensel 1992; Pearlin 1989). The basic hypothesis is that the impact of stress is diminished among persons with adequate social support, or alternatively, that the impact of stress is amplified among persons lacking in social support. Thus, social support can also act as a moderator (Aneshensel 2009). But again, these relationships differ by social status.

Turner and Marino (1994) found a linear relationship between SES and social support, with higher status levels being associated with higher levels of social support. In another study on the role of social support in the pregnancies of teenagers, Turner, Grindstaff, and Phillips (1990) found that the effect of social support on pregnancy birthweight differed by social status and level of stress exposure. These results are supported by several other studies (Sagrestano et al. 1999; Feldman et al. 2000; Aneshensel 2009). This suggests that the benefits of social support are not one size fits all, and that it is important to examine the effects of status on the role support plays in pregnancy.

A woman's race also determines how social support impacts her birth outcome, with previous research suggesting that there are racial differences in the perception and receipt of social support during pregnancy (Norbeck and Tilden 1983; Sagrestano et al 1999). These differences are most commonly cited as differences in the amount, quality, and source of support. Norbeck and Anderson (1989) find that there are differences in the sources of support among black, white and Latina women. White women report having more support and larger support networks compared to black and Latina women. Latinas report more support from the baby's father and from their mothers than do whites and blacks whereas black women report more support from other relatives than do whites and Latinas. These findings suggest that there might be different family dynamics based on race that affect social support processes during pregnancy.

Researchers have suggested that these cultural influences on relationship processes, as well as cultural norms of accepting support, may play a role in promoting healthy pregnancies (Campos et al

2008 and Dunkel-Schetter and Rini 2004). Though it is important to note that a large proportion of the observed racial differences are due to differences in demographic factors (e.g. SES and marital status), and once controlled, the differences we see in amount and source of social support are often attenuated (Sagrestano et al 1999). Nevertheless, there still seems to be race differences in the quality of support and its direct effects on pregnancy outcomes, which may also be reflective of varying cultural norms of support acceptance. Black women tend to report higher quality interactions with family than white women, which is consistent with evidence that white women are more removed from family networks and therefore, may rely more heavily on their friendship networks rather than family for support (Sagrestano et al. 1999). In addition, there is some evidence that for pregnant black women, support from their mothers is important in terms of increased gestational age and fewer complications throughout pregnancy, compared to white women for whom greater support from their mothers and other relatives is associated with poorer birth outcomes (Norbeck and Tilden 1983; and Feldman 2009). Norbeck and Tilden (1983) found that partner support predicted greater gestational age and fewer gestational complications among black women but it was not related to birth outcomes among white women. Overall, these findings illustrate how racial differences in support can influence the role that social support plays in pregnancy outcomes.

The vast majority of the research on social support and pregnancy outcomes has focused on identifying group differences in support and how such differences might account for variations in outcomes. According to Lincoln and colleagues (2003), merely accounting for race differences by introducing factors that are thought to "explain away" differences in outcomes tends to overlook the possibility that social and psychological factors may operate differently within specific racial and ethnic groups. The authors also argue that the most significant question for this and other research is whether the underlying mechanisms and processes involved vary across diverse racial and ethnic groups. Thus, the purpose of the present study is to investigate the effectiveness of social support as a buffer against the negative effects of stress in the pregnancies of black and white women. Explicitly, I will examine black-

white differences in the moderation or buffering effects of social support in the stress-pregnancy relationship. Given the work of previous studies, I expect that race will be a significant predictor of the extent to which social support moderates the effects of stress on pregnancy with a reduced buffering effect for black women, who tend to be at higher risk for chronic stress exposure. This study seeks to move beyond past research, which has largely focused on direct relationships between stress, social support and pregnancy, by examining the ways in which social support processes differ for black and white women, and how these differences impact the continued racial disparity in pregnancy outcomes.

METHOD

Sample

The data for this study come from the Pregnancy Risk Assessment Monitoring System (PRAMS), which is a US federal-state cooperative survey conducted by the Centers for Disease Control (CDC). PRAMS surveys women who recently delivered a live infant, assessing issues related to pregnancy including maternal attitudes and experiences before, during and immediately after her most recent pregnancy. This study utilizes data from Phase 5 of PRAMS data, which was collected during 2004-2008. The sample for collection is drawn from states' birth certificate files, and each year, each participating state samples between 1,300 and 3,400 women. Women are first contacted through the mail, and then via telephone interview if there is no response to repeated mailings. Data collection and procedures and instruments are standardized to allow comparisons between states. The PRAMS questionnaire consists of two parts: the core questions asked by all states and a list of standard questions from which states can choose. The core portion of the questionnaire includes questions about attitudes and feelings about the woman's most recent pregnancy, prenatal care, maternal alcohol and tobacco usage, physical abuse, pregnancy-related morbidity, infant health care, contraceptive use and mother's knowledge of pregnancy-related health issues. Questions regarding stressful life events are also part of the core survey of PRAMS. Information on the PRAMS participating states, questionnaire, and methods are described in detail elsewhere (CDC 2005; Adams et al. 1991).

For this study, a subsample of only black and white mothers was selected, controlling for Hispanic ethnicity and singleton births. The sample was further limited by those who responded to selected social support questions, which were only given to respondents in New York City, Delaware and Oklahoma. The total effective sample size for this study was 9,152 women. Additional analyses were conducted comparing the total PRAMS Phase 5 black-white sample (with the same exclusion criteria previously mentioned) to the selected subsample. Chi-squared tests of proportion equality indicate that there are some significant differences in the demographic characteristics and health behaviors between the subsample and the larger Phase 5 sample (See Appendix A). The distribution of maternal age was slightly lower in the subsample, with more 18 to 24 year olds in the subsample and fewer 35 to 39 year olds. Women in the subsample were also less likely to be married, smoke, and be in the "high" stress category. The subsample has fewer years of education, with more women having just a high school diploma and fewer women having graduate-level education. This is consistent with the distribution of income, as there is a lower percentage of women who whose household income is more than $50,000. These women were also more likely to have medical risks, have a higher BMI (body mass index), and have inadequate prenatal care (PNC). In addition, their pregnancy outcomes were more likely to be worse, as more women in the subsample had low birthweight infants and/or premature deliveries. Given the nature of these differences, there might be potential biases in the results. Such biases will be further discussed in the discussion section.

Measurement

Birth outcomes

The primary outcome variables were birthweight and preterm delivery. Birthweight is measured in grams and taken from birth certificate records. Infants born with a weight less than 2500 grams are defined as low birthweight (LBW), while very low birthweight (VLBW) is any weight below 1500 grams. Normal birthweight is any weight greater than 2500 grams. Preterm delivery is measured by gestational age, which is typically estimated in weeks from the mother's last menstrual cycle. A full term pregnancy

is at least 40 weeks. Infants who are born at less than 37 weeks are considered preterm (PTB), whereas those born before 32 weeks are very preterm (VPTB).

Stress

Stress was measured in a checklist of recent life events. Respondents were told, "This question is about things that may have happened during the 12 months before your new baby was born" and asked to select from a list of 13 possible stressors. Included in the list were "a close family member was very sick and had to go into the hospital", " I moved to a new address", "I had a lot of bills I couldn't pay", and "my husband or partner said he didn't want me to be pregnant." Responses were coded yes or no and were summed as a count of total number of stressors selected. Women with scores higher than the sample mean, which was 2.1 stressors, were considered to have a "high perceived stress level" while those with fewer were coded as having a "low perceived stress level."

Social support.

The level of perceived availability of support during pregnancy was assessed by a single item stating, "During your most recent pregnancy, would you have had the kinds of help listed below if you needed them?" Respondents were to answer yes or no to the following situations assessing both tangible and emotional types of support: "someone to loan me $50"(financial support), "someone to help me if I were sick and needed to be in bed"(care support), "someone to take me to the clinic or doctor's office if I needed a ride"(transportation support), and "someone to talk with about my problems"(emotional support). An alpha coefficient of 0.81 indicated very good reliability between the items, and factor analysis confirmed that the four items loaded highly on one factor.

Sociodemographic and Health Factors

Other maternal sociodemographic and health history factors were assessed during this investigation. Sociodemographic measures included mothers' race, which was assessed as either non-Hispanic white (coded 0) or non-Hispanic black (coded 1), maternal age (less than 17, 18-24, 25-29, 30-34, 35-39, and 40 and older), marital status (married vs. non-married), education measured in years

completed (less than high school, high school, college, graduate-level and yearly household income (less than $25,000, $25,000 to $49,999, and $50,000 or more).

Health factors that might impact pregnancy outcomes were assessed as well. Mothers were asked if they had a variety of health risks (diabetes, fever, hypertension, etc.) and were coded "0" if they had no reported medical risk factors and "1" if they had at least one. They were also asked about their smoking history and were coded as "0" if they did not smoke and "1" if they did. Mothers' pre-pregnancy body mass index (BMI) was collected to get a sense of their weight status. Women were categorized as either "underweight", "normal," "overweight," or "obese." Prenatal care adequacy using the Kotelchuck Index was also assessed. This index, used in a host of studies (Kotelchuck 1994; Alexander and Kotelchuck 2001; Alexander et al. 2002), is the dominant measure of prenatal care adequacy. It measures timing of prenatal care with the assumption that earlier prenatal care is better, as well as the number of visits received based on expected number. The index combines these scores to get a single summary score with a score of at least 80 percent being classified as adequate prenatal care. The PRAMS data set categorizes women as having inadequate, intermediate, adequate and adequate plus prenatal care.

The data was analyzed using R Version 2.14.1 (The R Foundation for Statistical Computing). Descriptive and bivariate analyses were conducted to account for race differences in maternal characteristics, health status, and birth outcomes (Tables 1 and 2). Separate stepwise multinomial logistic regression analyses were conducted to assess the relationships between the covariates and birthweight (Table 3) and preterm delivery (Table 4) respectively. For each regression, odds ratios and 95% confidence intervals are presented. In step 1 of the regression, mother's race predicts risk of LBW and VLBW (or PTB and VPTB) relative to normal birthweight (or full term birth). Next (step 2), the outcomes were regressed on the controls, race, and perceived stress level. In step 3, the full model is presented, which includes the controls, race, perceived stress level, and perceived social support. Tables 5a-c test interaction effects between stress and race, stress and social support, and social support and race respectively, on birthweight. These tests for preterm delivery are shown in Tables 6a-c. Additional

analyses (not shown) were conducted in which a three-way interaction effect between stress, social support and race was tested. This investigates the possibility of race differences in the interaction of stress and social support, the main hypothesis of this study. A significant three-way interaction would indicate that there are significant race differences in the moderation or buffering effect of social support on the stress-pregnancy outcome relationship. Separate black-white analysis of the stress-social support interaction effect would further explain the magnitude of the difference (Table 7).

RESULTS

There were significant differences in maternal characteristics, health factors, and birth outcomes by race (Table 1). Overall, black women had worse pregnancy outcomes than white women, with significantly higher proportions of LBW, VLBW, PTB, and VPTB. Black women were also more likely to be in the "high stress" category. There were slight, but significant differences in the amount and type of social support reported by black and white women. White women had slightly higher percentages of perceived support in all four types (i.e. financial, care, transportation, and emotional), and were more likely to report having all four types of support compared to black women (89% vs. 86%). These results are consistent with previous studies of social support and pregnancy (Norbeck and Tilden 1983; Sagrestano et al 1999; Campos et al 2008 and Dunkel-Schetter and Rini 2004).

Demographically, the white women in the sample were more likely to be between ages 25 and 34 whereas the black women had higher percentages of those under age 24 and over age 35. White women were more likely to be married and report higher household income. The distribution of years of education differed by race as well. Seventeen percent of black women in the sample had less than a high school diploma, compared to 12% of white women. Black women had higher percentages of those with a high school diploma (38%) and at least some college (28%), compared to white women with a high school diploma (33%) and at least some college (23%). However, the number of white women with some graduate-level education (33%) was almost double the number of black women with the same level of education (18%). There were significant race differences in health factors as well. Black women were

more likely to have at least one medical risk factor, less likely to smoke, more likely to be overweight or obese, and more likely to have inadequate prenatal care.

In stepwise multinomial logistic regression analyses (Tables 3 and 4), the effects of race, stress and social support on birthweight and preterm delivery were tested. Maternal age, education, household annual income, medical risks, smoking, BMI, and prenatal care adequacy were included as controls. Table 3 shows the estimated odds ratios for birthweight. Step 1 illustrates a significant race effect on birthweight, showing that for black women, relative to having an infant with normal birthweight, the odds of having a LBW infant increases by 109% and the odds of having an VLBW infant increases by 61% . Steps 2 and 3 show the effect of adding perceived stress level and perceived social support to the model. These effects are not significant predictors of LBW and VLBW.

Table 4 shows the effect of the covariates on preterm delivery. In step one, preterm delivery is regressed on mother's race. The effect is significant and large. Compared to white women, the odds of having a PTB for black women increases by 57% and the odds of having a VPTB increases by 47%. Step 2 illustrates the minimal effect of adding perceived stress level to the model, but in step 3, we can see that there is a significant effect of perceived social support on VPTB. Holding other variables constant, for every additional type of social support reported the odds of VPTB decreases by 6%. These models suggest that perceived stress level does not have a significant effect on pregnancy outcome, while perceived social support only has a significant effect on the worst level of preterm delivery: VPTB. Race is consistently a significant predictor of each outcome. Overwhelmingly, the odds of poor pregnancy outcomes are very high for black women.

Tables 5a-c show the interaction effects between race, stress and social support, and their effect on infant birthweight. Table 5a shows the interaction effect between race and stress. Table 5b shows the interaction between stress and social support, and the interaction between social support and race is shown in Table 5c. Only the test of interaction between stress and social support yielded significant results. The effect of the stress-social support interaction only has a moderately significant effect on LBW

(OR: 0.91; 95% CI: 0.82, 1.00), but the interaction has a significant effect on the odds of VLBW. For every additional type of social support reported, the odds of VLBW for those in the high perceived stress category decreases by 16%. This is evidence of a buffering effect of social support on the stress-birthweight relationship. Tables 6a-c present similar results for preterm delivery. There were no significant results yielded in the test of the stress-race interaction (Table 6a) or the social support-race interaction (Table 6c). However, in Table 6b, there is evidence of a significant stress-social support interaction effect on preterm delivery. There is a moderately significant effect of the stress-social support interaction on PTB (OR: 0.89; 95% CI: 0.79, 1.01) and a significant effect on VPTB. For every additional type of social support reported, for those in the high stress category, the odds of VPTB decreases by 16%. These results suggest that although there is no evidence of a direct relationship between perceived stress level and pregnancy outcomes, or even a direct relationship between perceived social support and birthweight, there is evidence of a social support buffering effect.

Examining this relationship further, additional analyses were conducted to test the study's main hypothesis: there are race differences in the moderation effect of social support in the stress-pregnancy relationship. Testing this with a three-way interaction between stress, social support and race, I find no significant differences for preterm delivery, but marginally significant interaction term for birthweight (OR:0.95, 95% CI: 0.90, 1.00). Investigating this further, separate black and white analyses were conducted in order to observe the magnitude of the difference. The results of the separate models are included in Table 7. There are no significant interaction effects for black women, but for white women, the stress-social support interaction effect is significant (OR: 0.71, 0.95). This indicates that for white women only, higher levels of social support correspond with an 18% decrease in the odds of VLBW in the presence of high perceived stress. These results are consistent with black-white differences in the stress-social support interaction effect on preterm birth. Although there was not a significant difference, it should also be noted that there were race differences in effects (not shown). For black women, there was no evidence of a buffering effect, while for white women there was a marginally significant stress-social

support interaction effect on PTB (OR: 0.87; 95% CI: 0.75, 1.01) and a significant effect on VPTB. For white women only, higher levels of social support corresponded to a 16% decrease in the odds of VPTB in the presence of high perceived stress. Taken together, these results suggest that there is indeed a black-white difference in the moderation effects of social support in the stress-pregnancy relationship.

DISCUSSION

The purpose of this study is to investigate the effectiveness of social support as a buffer against the negative effects of stress in the pregnancies of black and white women. To do this, I examine black-white differences in the moderation effects of social support in the stress-pregnancy relationship. There were significant disparities across the two racial groups, with black women reporting more stress, less social support, and worse outcomes with higher percentages of infant birthweight and preterm delivery. It was expected that race differences in perceived stress would contribute to these disparities, but the evidence found in this study failed to indicate a direct effect of stress on the observed differences. .

These results are consistent with other studies that that have been unable to find strong associations between stressful life events and poor birth outcomes. Hoffman and Hatch (1996) review nearly a dozen studies that tested the direct relationship between stressful events and pregnancy, noting that only one found an association between stressful events and negative outcomes, specifically preterm delivery, and suggesting that effects of stressors might be manifested through other health behaviors like smoking, nutrition, and prenatal care utilization. Lu and Chen (2004) also found similar results using PRAMS data. Additional preliminary analyses during this investigation support those findings; when only including race and stress in models to predict birthweight and excluding health factor control variables like prenatal care adequacy, smoking and medical risks, there was a significant, negative direct effect of stress on birthweight. Once all controls were included in the model, this effect was no longer observed.

These findings, in the context of other studies, suggest that there may indeed be no association between stressful life events and poor pregnancy outcomes. More likely, however, is the inadequacy of commonly used stress measures and incorrect modeling of the relation between stress and poor outcomes.

It is possible that the 13 measures of stressful life events used by PRAMS do not fully assess life stress, and using a wider array of measures as previously discussed would provide a clearer picture of the effects of stress on pregnancy. By capturing different aspects of stress, particularly chronic stressors and discrimination stressors, it is likely that we will be better able to understand how resources like social support can serve as protective factors in the lives of pregnant women.

The work of previous studies on racial disparities in pregnancy buttresses this argument. Lu and Halfon (2003), in their examination of racial disparities in pregnancy over the life-course, propose that racial disparities in birth outcomes are the consequences of not only differential exposures during pregnancy but also differential exposures during pregnancy but also differential exposures across the life course. Their assertion provides additional evidence for a more thorough investigation into the role of chronic stress in pregnancy disparities, which has been widely argued for in the stress and health literature (Aneshensel 1992; Turner and Avison 2003; Williams et al. 1997; Turner and Brown 2012). Previous research has demonstrated that elevated levels of chronic stress are indeed racially distributed, as chronic stress is a more prominent feature in the lives of black women compared to white women (Stancil et al. 2000, Collins et al. 2004; Vines et al. 2006). There is a vast literature on the negative effects of stressors that can have a significant effect on black women before, during and after pregnancy (Colllins et al. 2000; Dominguez et al. 2005; Woods-Giscombe and Black 2010) but the inconsistencies across studies (see Dominguez et al. 2005) make it difficult to draw substantive conclusions. The overall inability to link stressful life events to the poor pregnancy outcomes of black women suggests that the current measures used may not capture events relevant to the lives of black women. Knowing this, future work should more systematically assess different dimensions of stress before, during and after pregnancy to explain the observed racial disparities.

While race differences in stress did not predict pregnancy disparities directly, there were some observed direct effects of perceived social support. The present findings suggest that increased social support does not significantly predict decreased odds of LBW, but it does predict decreased risk for

VPTB. The lack of a direct association between social support and birthweight might be also explained by previous literature. A host of studies assert that social support benefits pregnancy not only through its potential buffering effects against stress, but through its ability to motivate expectant mothers to engage in positive health behaviors and make lifestyle changes that improve her physical health (Feldman et al. 2000; Dunkel-Schetter and Bennett 1990; Hoffman and Hatch 1996). Thus, it is possible that similar to stressful life event measures, the four items indexed to measured social support might be partially captured in the health factor control variables, thereby reducing any association that might have been observed. It would be beneficial to investigate the role of social support during pregnancy in the context of a variety of stressors, as social support is typically in response to more acute, situational stressors. Future work would do well to include a wider variety of social support questions that capture a number of different aspects of support in different contexts.

The moderately significant race difference in the stress-social support interaction effect support the idea that there are indeed black-white differences in the effectiveness of social support as a protective factor. For white women, there is evidence of a buffering effect that reduces their odds of VPTB, but this effect is not present for black women. These results illustrate that although there is a vast literature on the protective effects of social support, particularly in pregnancy outcomes, these effects are not "one size fits all." By examining not only group differences in stress and social support, and focusing on differences in moderation effects, this study attempted to understand group differences in the overall process. This study was the first to investigate racial differences in the effectiveness of social support in the stress-pregnancy relationship. Striving to move beyond previous research that simply reports race-based differences in stress and support, this paper tests both the stress hypothesis and the social support buffering theory. Additional investigation of group differences in the various components of the stress-pregnancy relationship, as well as continued work in this area that use improved measures of social support and stress are needed.

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Table 1

Distribution of Selected Maternal Characteristics, Health Behaviors, and Birth Outcomes by Race* (N=9,152)

Characteristic, behavior, outcome	Black Women (N=2,055)	White Women (N=7,097)
Age***		
17 or younger	4%	3%
18-24	35%	33%
25-29	26%	29%
30-34	19%	22%
35-39	12%	11%
40+	4%	3%
Marital Status***		
Nonmarried	69%	28%
Married	31%	72%
Education Level***		
less than high school	17%	12%
high school	38%	33%
college	28%	23%
graduate level	18%	33%
Income***		
less than $25K	63%	40%
$25-$49.9K	22%	23%
$50K+	15%	37%
Medical Risk***		
no risk factors	58%	66%
one or more risk factors	42%	34%
Smoking***		
smokes	91%	85%
does not smoke	9%	15%
BMI***		
underweight	11%	14%
normal	40%	49%
overweight	15%	12%
obese	34%	24%
PNC Adequacy***		
inadequate PNC	18%	10%
intermediate PNC	13%	12%
adequate PNC	33%	43%
adequate-plus PNC	36%	35%
Stress***		
low (2 or fewer stressors)	58%	67%
high (more than 2 stressors)	42%	33%
Perceived Social Support (by type)***		
financial support	80%	86%
care support	87%	89%
*transportation support***	84%	92%
emotional support	86%	89%
Perceived Social Support (count)***		
0	5%	4%
1	4%	3%
2	7%	5%
3	15%	9%
4	68%	79%
Birthweight***		
normal BW (> 2500 g)	46%	63%
LBW (<2500g)	34%	22%
VLBW (< 1500g)	20%	15%
Preterm Delivery***		
full term (>37 weeks)	58%	70%
PTB (< 37 wks)	16%	12%
VPTB (<32 wks)	26%	18%

**May not add up to 100% because of rounding*

****p <0.001 **p< 0.01*

Table 2

Correlation Matrix of All Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	1.00												
2. Marital status	0.32 ***	1.00											
3. Education	0.43 ***	0.41 ***	1.00										
4. Income	0.44 ***	0.50 ***	0.57 ***	1.00									
5. Medical Risks	0.04 ***	-0.05 ***	-0.05 ***	-0.05 ***	1.00								
6. Smoking	-0.14 ***	-0.22 ***	-0.29 ***	-0.25 ***	0.03 **	1.00							
7. BMI	0.08 ***	0.02	-0.02 *	-0.04 ***	0.11 ***	-0.05 ***	1.00						
8. PNC Adequacy	0.09 ***	0.12 ***	0.11 ***	0.12 ***	0.06 ***	-0.06 ***	0.05 ***	1.00					
9. Race	-0.01	-0.36 ***	-0.12 ***	-0.22 ***	0.07 ***	-0.08 ***	0.10 ***	-0.07 ***	1.00				
10.Stress	-0.22 ***	-0.30 ***	-0.25 ***	-0.35 ***	0.05 ***	0.21 ***	0.03 **	-0.05 ***	0.08 ***	1.00			
11. Perceived SS	0.06 ***	0.14 ***	0.16 ***	0.22 ***	-0.01	-0.11 ***	-0.02 *	0.05 ***	-0.07 ***	-0.16 ***	1.00		
12. Birthweight	-0.07 ***	-0.16 ***	-0.16 ***	-0.16 ***	0.27 ***	0.10 ***	0.01	0.18 ***	0.13 ***	0.09 ***	-0.05 ***	1.00	
13. Preterm delivery	-0.06 ***	-0.12 ***	-0.13 ***	-0.12 ***	0.27 ***	0.05 ***	0.04 ***	0.21 ***	0.10 ***	0.07 ***	-0.05 ***	0.85 ***	1.00

p <0.05 (two-tailed test);p<0.01 (two-tailed test); ***p <0.001 (two-tailed test)*

Note: Perceived SS refers to perceived social support

Table 3

Estimated Odds Ratios for Birthweight◊: Stepwise Multinomial Logistic Regression Analyses

	Step 1				Step 2				Step 3			
	LBW		VLBW		LBW		VLBW		LBW		VLBW	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Race	2.09	(1.83, 2.39)	1.61	(1.83, 1.89)	2.09	(1.83, 2.39)	1.61	(1.38, 1.89)	2.09	(1.83, 2.39)	1.61	(1.37, 1.89)
Stress					1.04	(0.93, 1.16)	1.07	(0.93, 1.23)	1.04	(0.92, 1.17)	1.06	(0.93, 1.22)
Perceived social support									1.00	(0.95, 1.05)	0.96	(0.91, 1.02)

Maternal characteristics controlled include: maternal age, marital status, education level, income, medical risk, smoking, BMI, and prenatal care adequacy

◊Normal birthweight (>2500g) is the reference group

Table 4

Estimated Odds Ratios for Preterm Delivery◊: Stepwise Multinomial Logistic Regression Analyses

	Step 1				Step 2				Step 3			
	PTB		VPTB		PTB		VPTB		PTB		VPTB	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Race	1.57	(1.33, 1.85)	1.47	(1.28, 1.69)	1.57	(1.33, 1.85)	1.47	(1.28, 1.70)	1.57	(1.33, 1.85)	1.47	(1.27, 1.69)
Stress					1.10	(0.95, 1.27)	1.06	(0.94, 1.20)	1.09	(0.94, 1.27)	1.05	(0.93, 1.19)
Perceived social support									0.98	(0.92, 1.04)	0.94	(0.89, 0.99)

Maternal characteristics controlled include: maternal age, marital status, education level, income, medical risk, smoking, BMI, and prenatal care adequacy

◊Full term birth (>36 weeks) is the reference group

Table 5a

Estimated Odds Ratios for Birthweight◊

*Stress*Race Interaction*	LBW		VLBW	
	OR	95% CI	OR	95% CI
Race	1.97	(1.36, 2.85)	1.51	(0.97, 2.37)
Sress	0.98	(0.70, 1.38)	1.01	(0.67, 1.50)
Perceived social support	1.00	(0.95, 1.05)	0.96	(0.91, 1.02)
Stress*Race	1.04	(0.82, 1.33)	1.04	(0.78, 1.40)

Maternal characteristics controlled include: maternal age, marital status, education level, income, medical risk, smoking, BMI, and PNC adequacy

◊Normal birthweight (> 2500g) is the reference group

Table 5b

Estimated Odds Ratios for Birthweight◊

*Stress*Social Support Interaction*	LBW		VLBW	
	OR	95% CI	OR	95% CI
Race	2.10	(1.84, 2.40)	1.62	(1.38, 1.90)
Stress	1.43	(1.00, 2.05)	1.94	(1.27, 2.96)
Perceived social support	1.14	(0.98, 1.33)	1.25	(1.03, 1.50)
Stress*Social Support	0.91	(0.82, 1.00)	0.84	(0.74, 0.94)

Maternal characteristics controlled include: maternal age, marital status, education level, income, medical risk, smoking, BMI, and PNC adequacy

◊Normal birthweight (> 2500g) is the reference group

Table 5c

Estimated Odds Ratios for Birthweight◊

*Social Support*Race Interaction*	LBW		VLBW	
	OR	95% CI	OR	95% CI
Race	1.84	(1.24, 2.73)	1.85	(1.17, 2.92)
Stress	1.04	(0.92, 1.17)	1.06	(0.93, 1.22)
Perceived social support	0.95	(0.82, 1.10)	1.02	(0.85, 1.21)
Social Support*Race	1.04	(0.93, 1.16)	0.96	(0.84, 1.09)

Maternal characteristics controlled include: maternal age, marital status, education level, income, medical risk, smoking, BMI, and PNC adequacy

◊Normal birthweight (> 2500g) is the reference group

Table 6a

Estimated Odds Ratios for Preterm Delivery◊:

*Stress*Race Interaction*

	PTB		VPTB	
	OR	95% CI	OR	95% CI
Race	1.37	(0.86, 2.19)	1.50	(1.00, 2.24)
Stress	0.97	(0.63, 1.48)	1.07	(0.75, 1.54)
Perceived social support	0.97	(0.91, 1.04)	0.94	(0.89, 0.99)
Stress*Race	1.10	(0.81, 1.49)	0.99	(0.78, 1.28)

Maternal characteristics controlled include: maternal age, marital status, education level, income, medical risk, smoking, BMI, and PNC adequacy

◊Full term birth (>36 weeks) is the reference group

Table 6b

Estimated Odds Ratios for Preterm Delivery◊:

*Stress*Social Support Interaction*

	PTB		VPTB	
	OR	95% CI	OR	95% CI
Race	1.57	(1.33, 1.85)	1.47	(1.28, 1.70)
Stress	1.61	(1.02, 2.53)	1.78	(1.22, 2.60)
Perceived social support	1.15	(0.94, 1.40)	1.18	(1.00, 1.40)
Stress*Social Support	0.89	(0.79, 1.01)	0.86	(0.77, 0.95)

Maternal characteristics controlled include: maternal age, marital status, education level, income, medical risk, smoking, BMI, and PNC adequacy

◊Full term birth (>36 weeks) is the reference group

Table 6c

Estimated Odds Ratios for Preterm Delivery◊

*Social Support*Race Interaction*

	PTB		PTB	
	OR	95% CI	OR	95% CI
Race	1.45	(0.89, 2.38)	1.40	(0.93, 2.12)
Stress	1.09	(0.94, 1.27)	1.05	(0.93, 1.19)
Perceived social support	0.95	(0.79, 1.14)	0.93	(0.79, 1.08)
Social Support*Race	1.02	(0.89, 1.17)	1.01	(0.90, 1.14)

Maternal characteristics controlled include: maternal age, marital status, education level, income, medical risk, smoking, BMI, and PNC adequacy

◊Full term birth (>36 weeks) is the reference group

Table 7

Estimated Odds Ratios for Birthweight◊: Black vs. White Stress*Social Support Interaction Effect

	Black Women				*White Women*			
	LBW		VLBW		LBW		VLBW	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Stress	1.41	(0.73, 2.74)	1.64	(0.78, 3.46)	1.42	(0.92, 2.19)	2.05	(1.22, 3.44)
Perceived social support	1.15	(0.86, 1.53)	1.11	(0.79, 1.54)	1.12	(0.93, 1.35)	1.31	(1.04, 1.65)
Stress*Social Support	0.92	(0.76, 1.11)	0.89	(0.72, 1.10)	0.91	(0.81, 1.03)	0.82	(0.71, 0.95)

Maternal characteristics controlled include: age, marital status, education level, income, medical risk, smoking, BMI, & PNC adequacy

◊Normal birthweight (> 2500g) is the reference group

Table 8

Estimated Odds Ratios for Preterm Delivery◊: Black vs. White Stress*Social Support Interaction Effect

	Black Women				*White Women*			
	PTB		VPTB		PTB		VPTB	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Stress	1.37	(0.60, 3.11)	1.50	(0.76, 2.93)	1.70	(0.98, 2.92)	1.89	(1.19, 3.00)
Perceived social support	1.06	(0.74, 1.51)	1.09	(0.81, 1.48)	1.18	(0.93, 1.50)	1.22	(1.00, 1.48)
Stress*Social Support	0.95	(0.76, 1.20)	0.91	(0.75, 1.09)	0.87	(0.75, 1.01)	0.84	(0.74, 0.95)

Maternal characteristics controlled include: age, marital status, education level, income, medical risk, smoking, BMI, & PNC adequacy

◊Full term birth (> 36 weeks) is the reference group

Appendix A

Distribution of Selected Maternal Characteristics, Health Behaviors, and Birth Outcomes

Characteristic, behavior, outcome	Subsample (N=9, 152)	Full sample (N=112,030)
Age		
17 or younger	3%	3%
*18-24****	33%	32%
25-29	28%	28%
*30-34****	21%	22%
*35-39****	11%	13%
40+	3%	3%
Marital Status		
*Nonmarried****	37%	36%
*Married****	63%	64%
Education Level		
less than high school	13%	12%
*high school ****	34%	31%
*college****	24%	26%
*graduate level****	29%	31%
Income		
less than $25K	22%	21%
$25-$49.9K	23%	22%
*$50K+****	32%	36%
Medical Risk		
*no risk factors****	64%	65%
*one or more risk factors****	36%	35%
Smoking		
*smokes****	86%	85%
*does not smoke****	14%	15%
BMI		
underweight	13%	13%
*normal****	47%	49%
overweight	13%	13%
*obese****	27%	25%
PNC Adequacy		
*inadequate PNC****	12%	10%
intermediate PNC	12%	11%
adequate PNC	41%	41%
*adequate-plus PNC****	35%	38%
Race		
black	22%	22%
white	78%	78%
Stress		
*low (2 or fewer stressors)****	65%	68%
*high (more than 2 stressors)****	35%	38%
Birthweight		
*normal BW (> 2500 g)****	59%	70%
*LBW (<2500g)****	25%	23%
*VLBW (< 1500g)****	16%	7%
Preterm Delivery		
*full term (>37 weeks)****	67%	76%
PTB (< 37 wks)	25%	23%
*VPTB (<32 wks)****	20%	11%

***p < 0.001