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Social Supports, Stress and Birth Outcomes among Latina Mothers in Pinellas County, Florida

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by

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ABSTRACT

Social supports are linked in public health research to improved birth outcomes. This study explored the relationship of social supports, stress and birth outcomes among pregnant Latinas in Pinellas County, Florida. A sample of 411 Healthy Start women at risk of poor birth outcomes participated in this study (99 Latinas, 142 Black, and 158 White). Study methods included ANOVA, Principal Component Analysis, multivariable regression, logistic regression, and structural equation modeling to identify significant associations between social support scores, stress scores, demographics and health risk factors with infant birth weight, preterm and small for gestational age by ethnic group. Study findings indicated there was a direct association between social support and stress across all ethnic groups. However, many confounding variables did not have an effect in the study sample. Latina study participants exhibited significantly lower mean social support scores compared to White and Black participants ($p=0.000$). Latinas also presented higher stress scores that were significantly different from White and Black participants ($p=0.000$). The study also found ethnic differences in stress level perceptions using the Perceived Stress Scale. Recommendations for public health included conducting additional studies to assess if the study variables have an impact on a different population, exploring different ethnic interpretations of stress, using repeated measures to assess stress in high risk populations and considering using alternate stress measures such as biological markers and stress life event scales to assess social support, stress and birth outcomes.

CHAPTER ONE

INTRODUCTION

Public health research links social supports as one of several factors promoting positive health outcomes. Social supports like family, friends, clubs and other organizations that contribute to social integration can promote or discourage health behaviors; they can also act as buffers to stressful situations by providing coping mechanisms (Glanz, Rimer, & Viswanath, 2008). The presence of social supports as one of the protective factors in the lives of women of childbearing age, can potentially improve birth outcomes such as preterm birth, low birth weight and small for gestational age (Feldman, Dunkel-Schetter, Sandman, & Wadhwa, 2000). A disruption in social supports and social networks, like those experienced by immigrant women, can lead to poor maternal psychological adjustment which can in turn adversely affect how and when pregnant women seek care during pregnancy (Cunningham & Zayas, 2002). The resulting stress created by the disruption of social supports combined with legal status and acculturation issues have been associated to poor birth outcomes among Latinas (Campos et al., 2008; D'Anna-Hernandez et al., 2012; Dominguez, Dunkel-Schetter, Glynn, Hobel, & Sandman, 2008; Lobel et al., 2008). Although studies established that social supports are associated with poor birth outcomes, the mechanisms by which social supports affect health remain unclear (Cohen, Underwood, & Gottlieb, 2000). It is even more uncertain how disruptions in social supports influence health outcomes for populations already at risk based on medical and psychosocial factors. This study investigated the sources of social support for Latinas at risk of poor birth outcomes (preterm birth, low birth weight and small for gestational age). It examined the direct

and indirect associations between social supports, perceived stress and birth outcomes in the presence of risk factors (medical, behavioral and psychological as well as language and years in the county of residence) affecting Latina immigrants in Pinellas County, Florida. Identifying these associations can help public health practitioners develop and promote protective factors. These factors can help develop targeted interventions to reduce health disparities and improve maternal and child health.

Operational Definitions

The study of Social Supports, Stress and Birth Outcomes among Latina Mothers in Pinellas County used the following operational definitions:

- Hispanic/Latino(a): The U.S. Census defines Hispanic/Latino as a person of Cuban, Mexican, Puerto Rican, South American or Central American origin or other Spanish culture or origin regardless of race (Humes, Jones, & Ramirez, 2011). The term includes documented and undocumented Hispanics or Latinos unless specified in the text.
- Immigrant/migrant: A person that established a semi-permanent residence at a different place than the one they usually inhabited. This study refers to immigrants in terms of international migration (Urquia & Gagnon, 2011).
- Low birth weight (LBW): Live born infant weighing under 5 pounds 8 ounces (2,500 grams) regardless of gestational age (Eichenwald & Stark, 2008).
- Perceived prenatal stress: A measure of non-specific stress. It refers to a pregnant woman's perception of how unpredictable, uncontrollable and overloaded she found her life to be within the past month (Cohen, Kamarck, & Mermelstein, 1983; Dominguez et al., 2008; Lobel et al., 2008).

- Poor birth outcomes: This study refers to poor birth outcomes as low birth weight, preterm birth and small for gestational age.
- Preterm birth: Live born infant delivered before 37 weeks gestation regardless of birth weight (Leonard, Crespi, Gee, Zhu, & Whaley, 2015).
- Prenatal care trimester: Prenatal care is the medical care women receive while pregnant. It is divided into first, second and third trimester. Early prenatal care refers to a woman entering prenatal care before 12 weeks of pregnancy (gestation) (American College of Obstetricians and Gynecologists (ACOG), 2012; Centers for Disease Control and Prevention, 2000; Florida Department of Health, 2015).
- Protective factors: Characteristics or variables that can reduce the likelihood of developing a condition (Fraser, Richman, & Galinsky, 1999).
- Risk factors: Characteristics or variables that increase the likelihood to develop a condition within a timeframe (Fraser et al., 1999; Rychetnik, P., Waters, Barratt, & Frommer, 2004)
- Small for gestational age (SGA): Infants smaller in size than what is considered normal for gestational age and with a birth weight below the 10^{th} percentile for gestational age (Boulet, Alexander, Salihu, Kirby, & Carlo, 2006).
- Social support: Refers to any of the following: 1) the availability of people someone can rely on, 2) the forms of aid and assistance given by friends, family members, neighbors and others, and 3) the social interactions between provider and recipient of support/assistance (Cohen et al., 2000; Glanz et al., 2008; Hupcey, 1998; Vaux, 1988).
- Undocumented immigrant: Refers to a person entering the United States without proper legal documentation to remain in the United States and can therefore be subject to

deportation if arrested. It also refers to a person that entered the United States with legal documentation but no longer holds a legal status and can also be deported (United States Internal Revenue Service, 2015; Urquia & Gagnon, 2011).

Preterm Birth in the United States

Poor birth outcomes increase the risk of infant mortality, defined as the number of infant deaths under a year old per 1,000 births. Infant mortality is an important indicator of a nation's health as it is linked to access to health care, public health and socioeconomic conditions (McDorman, Mathews, Mohangoo, & Zeitlin, 2014). The United States infant mortality rate of 6.1 per 1,000 births compares unfavorably to other developed countries. The U.S. ranks 26th among the Organization for Economic Cooperation and Development countries, an organization composed of developed nations (McDorman et al., 2014; United Nations Statistics Division, 2014). One of the leading causes of infant mortality is preterm birth, defined as live birth at less than 37 weeks gestation (Leonard et al., 2015). In 2012, 11.4% of the births in the U.S. were preterm, accounting for approximately 1 of every 9 infants (Centers for Disease Control and Prevention, 2015; Martin, Hamilton, Osterman, Curtin, & Mathews, 2015). The incidence of preterm births among Latinos in the U.S.A. regardless of country of origin was 11.3% compared to 10.3% for Whites (March of Dimes, 2014b). When compared to less developed nations, the U.S. preterm birth rate surpasses that of many Latin American nations including Mexico (7.3%) (Blencowe et al., 2012).

Preterm birth and the resulting complications due to caring for preterm infants are estimated to cost the U.S. health care system an excess of $26 billion dollars (Centers for Disease Control and Prevention, 2015; Martin et al., 2015). Preterm birth has been linked to an increased risk for disability and other health related problems for surviving infants adding to the economic,

financial and emotional costs of these births. Preterm infants are more likely to experience breathing difficulties, feeding problems, cerebral palsy, developmental delays, hearing and vision problems among others (Andrade, Araujo, Rolo, & Da Silva Costa, 2016; Engle, Thomashek, & Wallman, 2007; Field, Diego, & Hernandez-Reif, 2008; Gilbert, 2008). Preterm births accounted for 35% of the U.S. infant deaths in 2010 (Centers for Disease Control and Prevention, 2015; Hamilton, Martin, Osterman, Curtin, & Mathews, 2015). A reduction in U.S. preterm births to 5.9% could reduce the U.S. infant mortality rate to 2.5, saving up to 7,300 infants yearly (McDorman et al., 2014). Considering the prevalence of preterm births in the United States, the cost to the health care system and the economic and emotional impact of preterm births on families, identifying modifiable and protective risk factors associated with preterm birth is a public health priority (Liu et al., 2015).

Low Birth Weight in the United States

Many low birth weight babies are born preterm and it is difficult to separate the study of one phenomenon from another since they share similar risk factors (Eichenwald & Stark, 2008; Field et al., 2008; Halbreich, 2005; Paneth, 1995). Low birth weight infants are at a higher risk of dying in their first year of life and have a higher risk of respiratory distress syndrome, intraventricular hemorrhage (brain bleeding), heart problems and vision problems (Eichenwald & Stark, 2008; Fanaroff et al., 2007). Low birth weight has also been associated to conditions later in life including diabetes, heart disease and high blood pressure (Curhan, Chertow, et al., 1996; Curhan, Willett, et al., 1996; Zandi, Luyckx, & Brenner, 2006). It is estimated that in the United States 1 out of every 12 babies are born low birth weight (8%) (Hamilton et al., 2015; March of Dimes, 2014a). The incidence of low birthweight for Latinos in the United States regardless of country of origin is 7%, the same as the percentage for Whites (Martin et al., 2015).

The United States compares unfavorably to other nations regarding low birth weight. The percent of low birth weight babies in the United States closely follows that of developing nations like Mexico (9%), despite Mexico's higher infant mortality rate of 12 per 1,000 births (The World Bank, 2015).

Small for Gestational Age (SGA) in the United States

Low birth weight can result from fetal growth restriction or babies born too small. Small for gestational age (SGA) refers to infants smaller in size than what is considered normal for gestational age. These infants have a birth weight below the 10th percentile for gestational age (Boulet et al., 2006). Since the three outcomes are so closely related, the short and long-term health consequences to the infant are similar for growth restriction as they are for preterm birth and low birth weight. Infants with fetal growth restriction are not a homogenous group. Long term disability is related to the degree of growth restriction meaning that infants between the 5th and 10th percentiles may, for example, have less risk for long term neurologic damage while those born below the 3rd and 1st percentile have a much higher risk (Boulet et al., 2006; Goldenberg & Culhane, 2007). The most recent data for small for gestational age indicates 11% of the births in the U.S. are considered SGA. The percent of U.S. Latino infants born small for gestational age is 10%, compared to 9% for Whites (National Vital Statistics System, 2008). The table below summarizes the United States percentage of the presented birth outcomes (preterm births, low birth weight and small for gestational age) by race/ethnicity.

Table 1: Percent of preterm births, LBW and SGA by race/ethnicity

	Latina	White	Black	Total
Preterm births +	11.3%	10.3%	16.5%	11.4%
Low birth weight +	7.0%	7.0%	13.0%	8.0%
SGA *	10.0%	9.0%	17.0%	11.0%

+ Year 2013

* Year 2005

Birth Outcomes and Racial Disparities

Risk factors for low birth weight, preterm birth and SGA are very similar and include chronic health conditions of the mother (high blood pressure, diabetes, heart conditions, lung and kidney problems), young maternal age, maternal infections, problems with the placenta, inadequate nutrition during pregnancy and chronic stress (Behrman & Butler, 2007; Silveira & Pekow, 2013). Behavioral factors such as smoking, drinking alcohol, prescription drug abuse and use of illegal drugs can also lead to low birth weight, preterm birth and growth restriction (Behrman & Butler, 2007; Simmons, Rubens, Darmstadt, & Gravett, 2010). However, these risk factors do not fully account for the high prevalence of these poor outcomes or the various disparities identified across different ethnic groups.

Ethnic minorities in the United States are disproportionately represented in poor birth outcomes (Dominguez et al., 2008). African Americans/Blacks in the U.S. have the highest percentages compared to other ethnic groups (Goldenberg & Culhane, 2007; Goldenberg, Culhane, Iams, & Romero, 2008). Immigration status can also play a role in ethnic disparities. Immigrant women from South Asia, especially India, have high rates of fetal growth restriction and low birth weight while those from East Asia and Latin America usually have a low percentage of preterm births and low birth weight (Goldenberg & Culhane, 2007; Madan et al., 2006). Hispanics/Latinos present a noteworthy scenario as the incidence varies by country of

origin and length of time in the United States. U.S. residency exceeding 5 years, speaking English and being a U.S. born Latino have all been associated with declining Latino health and poor birth outcomes (D'Anna-Hernandez et al., 2012; Urquia, Frank, Moineddin, & Glazier, 2010).

Recent immigrants tend to have better birth outcomes than women born in the U.S. despite socioeconomic status, however country of origin and ethnicity play an important distinction in this paradox (Guendelman et al., 1999; Urquia et al., 2010; Wingate & Alexander, 2006). This is particularly true for Mexican immigrants. An epidemiological interest emerged from the unexpected positive birth outcomes of Mexican immigrants. These outcomes led to public health research on what was denominated as the Latino paradox: the fact that Latinas, especially those of Mexican origin, tend to have lower than expected risk for low birth weight, preterm birth and small for gestation age (Fleuriet, 2008; Flores, Simonsen, Manuck, Dyer, & Turok, 2012; Markides & Coreil, 1986; McGlade, Somnath, & Dahlstrom, 2004; Osypuk, Bates, & Acevedo-Garcia, 2010; Wingate & Alexander, 2006). The healthy migrant effect was discussed as a possible explanation to these positive birth outcomes. This hypothesis proposes that healthier more mobile populations are more able to migrate, leading to better health outcomes even among socially disadvantaged immigrant populations from less industrialized countries (Lechner & Mielck, 1998; Rumbaut & Weeks, 1996; Urquia, Frank, & Glazier, 2010; Wingate & Alexander, 2006). However, this effect does not explain the variation of these outcomes among migrant populations nor does it explain why protective factors seem to vanish with length of residency. The healthy migrant effect also fails to explain differences within immigrant groups. While recent Mexican immigrants present a reduced risk for low birth weight, groups such as Indian immigrants with an already increased incidence of low birth

weight at arrival to the U.S. persist on this trend continuing to manifest itself in U.S. born Asian Indian women despite improved socioeconomic status (Madan et al., 2006). The effects of weathering on health outcomes (the cumulative burden of adverse psychological and economic circumstances throughout the life course) is unaccounted for in the monolithic experience described by the migrant effect (Geronimus, 1992; Urquia, Frank, & Glazier, 2010). As public health continues its efforts to decrease infant mortality through a reduction of low birth weight, preterm births and SGA, it is essential to discover which risk factors affect otherwise healthy immigrant populations and the mechanisms by which these factors impact birth outcomes.

Social Supports, Stress and Birth Outcomes

Medical, economic and behavioral risk factors are insufficient to fully explain the disparities in poor birth outcomes. Attention has been given to external aspects, among them social capital, to better understand the multiple factors contributing to low birth weight, preterm birth and SGA. Social capital refers to the resources individuals obtain from their interaction with their social environment (Johnson & Marchi, 2009). It is based on the premise that social networks have value and that people obtain benefits through their links with others producing tangible assets that contribute to the well-being of individuals and groups (Johnson & Marchi, 2009). An absence of social capital and social supports can then result in a higher risk for low birth weight, preterm birth and SGA (Feldman et al., 2000; Herd, Gruenewald, Remer, & Guendelman, 2015; Johnson & Marchi, 2009).

Social supports refer to the interactions that take place between someone providing assistance and its recipient (Hupcey, 1998). These interactions can occur between primary groups like family, relatives and friends or it can be an exchange with secondary more formal groups such as work, religious organizations, schools etc. (Thoits, 2011). Both primary and

secondary groups can provide any of four types of supports: 1) instrumental supports (tangible aids and services directly assisting a person in need), 2) informational support (advice, suggestions, and information an individual can use to address problems), 3) emotional support (expressions of empathy, love, trust and caring), and 4) appraisal support (information used for self-evaluation such as constructive feedback and affirmation) (Cohen et al., 2000; Glanz et al., 2008). These types of social supports can influence health by: a) meeting basic human needs of companionship and intimacy providing individual reassurance and a sense of belonging and self-worth, b) helping individuals develop coping skills to solve problems, providing tangible community resources and increasing an individual's sense of control, c) directly encouraging health behaviors that can improve health, and d) by acting as a buffer against the effects of stress (Glanz et al., 2008). Special interest has been given to the ability of social supports to act as mediators of stress in the prevention of poor birth outcomes as stress can affect fetal and infant growth and development (Tollenaar, Beijers, Jansen, Riksen-Walraven, & De Weerth, 2011). Psychosocial stress is an essential component of the developmental origins of health and disease (DOHaD) paradigm that establishes that stress can have a lasting impact on health from inception into adulthood (Rubin, 2015). DOHaD establishes that psychosocial stress can lead to preterm delivery by distorting immune functions directly or by interacting with neuroendocrine functions (Rubin, 2015). Women under chronic stress can increase the production of hormones that can precipitate labor and affect fetal programming leading to not only an increased risk of poor birth outcomes but also an increased risk of long term health effects on the mother and infant (Lu & Halfon, 2003). For Latinas, acculturation stress, or the stress caused by members of one group adapting to the beliefs and norms of another, has been associated to an increased risk for low birth weight; while family support in particular has been associated with higher infant

birth weight (Campos et al., 2008; D'Anna-Hernandez et al., 2012). Less acculturated Mexican women are more likely to report strong psychosocial assets than more acculturated women due to an extensive informal network that includes family, neighbors and community workers (Johnson & Marchi, 2009; Sherraden & Barrera, 1996a, 1996b; Zambrana, Scrimshaw, Collins, & Dunkel-Schetter, 1997). These assets provide intergenerational knowledge and promote protective factors leading to stress reduction, proper diet and proper prenatal care (Johnson & Marchi, 2009). However, these social ties and assets can be severed by migratory processes that increase isolation, increasing the risk for poor birth outcomes over time. As Latinas lives and social supports change through immigration, protective factors that seemed embedded in their lives deteriorate and new risk factors emerge through acculturation into the new host culture (Johnson & Marchi, 2009).

Latina Immigrants, Social Supports, Stress and Birth Outcomes in Pinellas

Latinos (documented and undocumented) represent 8% of the Pinellas County population, making it the second largest minority in the county after Black/African Americans (10.9%) (United States Census Bureau, 2014). In 2014, a total of 1,077 Latino babies were delivered in Pinellas (Florida Department of Health, 2015). County data from the Florida Department of Health for the past 15 years present a deterioration of Latino birth outcomes in Pinellas (Florida Department of Health, 2015). Latino infant mortality rates in Pinellas were typically low (between 4 and 5 per 1,000 births) (Florida Department of Health, 2015). While the Latino infant mortality in Pinellas was 5.4 per 1,000 (n= 6) in 2004, the rate reached an all-time high of 13.2 per 1,000 in 2010 (n=14) (Florida Department of Health, 2015). The percent of preterm births increased for Latinos in Pinellas County from 9% in the late 1990s and early 2000s, to 11.6% in 2014 (n=125) (Florida Department of Health, 2015). The percent of low birth

weight babies among Pinellas Latinos also increased from about 5% in the late 1990's and early 2000s to 7.4% in 2014 (n=80) (Florida Department of Health, 2015). Although the actual numbers seem low, the trend over time is a concern given this population used to exhibit similar and at times better health outcomes compared to the Pinellas white population (Florida Department of Health, 2015).

The official Department of Health and Census data does not separate documented and undocumented Latinos. However, the Census states 11.4% of Pinellas County residents are foreign born and 13.2% have a primary language other than English (United States Census Bureau, 2014). Community assessments by the Healthy Start Coalition of Pinellas and the Hispanic Outreach Center indicate the county's immigrant population is mainly composed of first generation, undocumented Mexican Latinos arriving in the late 1990's and early 2000's. This deterioration of birth outcomes mirrors what was identified in studies nationwide indicating residency exceeding 5 years in the U.S. is associated to a decline in Mexican immigrant's health and birth outcomes (K. D'Anna-Hernandez, Aleman, & Flores, 2015; K. D'Anna-Hernandez et al., 2012; Urquia, Campo, & Heaman, 2012).

Pinellas County community assessments also indicate there was a rapid growth of Mexican undocumented immigrants in the late 1990s through the early 2000s. However, the influx of new Mexican immigrants stalled after the September 11, 2001 attacks with the escalation of militarization of the border and the restructuring and establishment of the Department of Homeland Security in 2003 (Massey, Durand, & Malone, 2002; United States Census Bureau, 2014; United States Citizen and Immigration Services, 2015). The post September 11 environment led to persecution of immigrants as they were perceived as criminals threatening national security (American Immigration Council, 2015). Since then the number of

new Mexican immigrants into the United States decreased to a negative net flow (Gonzalez-Barrera, 2015). The Pew Research Center reports the reduction in the number of Mexican immigrants and the return of many immigrants to Mexico is due to combined factors including: a) the slow economic recovery of the U.S. leading to job market deterioration, b) stricter enforcement of U.S. immigration laws, and c) increased number of deportations (Gonzalez-Barrera, 2015). A survey of Mexicans that left the U.S. to return to Mexico said 61% of surveyed participants reported they moved back to reunite with family or to start a family, highlighting the importance of family supports in this population (Gonzalez-Barrera, 2015). This negative growth and return migration is also documented by local Pinellas County agencies' needs assessments. For those immigrants remaining in Pinellas County, opportunities to return to their country and visit family, friends and other sources of support were also reduced, as coming back to work in the U.S. became increasingly expensive and dangerous.

As this Pinellas immigrant community extends its stay, poor birth outcomes are increasing but the causes for this increase are still undetermined. Several economic, medical, behavioral and social factors can be contributing to this deterioration. Financial problems affording health care, for example, can be one of these factors. Undocumented immigrants do not qualify for most types of government assistance and have limitations obtaining good-paying jobs due to their legal status. They do not qualify for Affordable Care Act insurance or full Medicaid despite their low incomes (United States Center for Medicare and Medicaid Services, 2015). In the state of Florida, undocumented immigrants can only apply for temporary (45 day) pregnancy Medicaid (Florida Department of Children and Families, 2014). This leaves many of the pregnancy medical costs to be self-paid and limits the number of providers that can serve them, which in turn affects access to care. Unattended medical conditions due to lack of

medical coverage could also play a role in the deteriorating health of Latino immigrants in Pinellas. These issues were present throughout the past 15 years and local organizations have been working on improving access to care through affordable sliding scale clinics (clinics that charge a lower price to low income clients). The declining trend continues despite these efforts. Other factors, such as an increase in social isolation and a breakdown in social supports, have not been explored. These social aspects could also be compounding to the already existing burdens of Latino immigrant in Pinellas. As birth outcomes continue to worsen, it is important to examine a model that includes medical, behavioral and psychosocial risk factors that may help to explain this deterioration. This study explored this model by investigating what types of social supports/social networks high risk Latina women have, what role these supports play in buffering stress and the direct and indirect association of social supports, stress and birth outcomes for Latinas in Pinellas County.

Study Purpose

The purpose of this quantitative study was to explore the sources of social support for Pinellas County Latinas at risk of poor birth outcomes (low birth weight, preterm birth, small for gestational age), and examine the direct and indirect associations between social supports, perceived stress and birth outcomes in the presence of risk factors (medical, behavioral and psychological as well as language and years in Pinellas).

This study utilizes elements of Social Networks/ Social Supports theory to better understand the factors affecting these poor birth outcomes among Latinas in Pinellas County participating in a home visitation program. The study sought to answer the following research questions:

Research question 1: What are the sources and gaps in available social supports of Healthy Start Pinellas pregnant Latina mothers at program entry?

The literature identifies that a larger number of supports leads to better health outcomes (Glanz et al., 2008; Mann, Mannan, Quinones, Palmer, & Torres, 2010; Nkansah-Amankra, Dhawain, Hussey, & Luchok, 2010; Sarason, Levine, Basham, & Sarason, 1983). Research also indicates family support is important for Latinas, but the extent of both family and non-family support in Pinellas county Latinas has not been determined (Campos et al., 2008). The answer to this research question imparted information on who provided support for Latinas participating in the program and allowed for the analysis of size and composition of Latina social networks.

Research Question 2: What are the strengths of those social supports as defined by the quality of supports?

The literature commonly assumes social supports are positive, disregarding the negative influence some supports may have on individuals (Hupcey, 1998; Vaux, 1988). The research tools used in this study allowed the inclusion of a range of positive and negative influences. This range helped define the quality of support of Latina pregnant mothers.

Research Question 3: What is the direct and indirect impact of social supports and perceived stress on Latina mothers' birth outcomes (infant birth weight, preterm birth and small for gestational age)?

Social supports can have a direct impact, but may act as buffers to stress and thus potentially reduce the risk for low birth weight, preterm birth and small for gestational age (Hobel, Goldstein, & Barrett, 2008; Lobel et al., 2008). This research question measured stress levels in pregnant Latinas participating in the Healthy Start program. A statistical model was

created to examine the interaction of social supports, perceived stress and birth outcomes in the presence of known health risk factors, language spoken at home and length of time in Pinellas. This provided an overarching model of risk and protective factors that can potentially influence Latina birth outcomes and provided comparisons to other ethnic populations (White and Black/African American) in the program.

CHAPTER TWO

LITERATURE REVIEW

Social Support Construct

Defining social support is a challenge due to the complexity of the interactions involved and the multiple types of support available. Social support has been defined as a multidimensional, complex, dynamic and fluid concept involving interactions between a resource provider and a recipient (Hupcey, 1998). Sarason and colleagues also defined social support as "the existence or availability of people on whom we can rely, people who let us know that they care about, value, and love us" (1983). Interest in researching social interactions dates back to the late 1800s, when Emile Durkheim studied suicide and social ties (Vaux, 1988). His study found that suicide was most prevalent among people with fewer social ties. Since then, social disintegration became a concern in an era when society was experiencing rapid changes due to industrialization and migration patterns. Studies performed in 1920's with uprooted immigrant populations found similar findings to those in Durkheim's study (Cohen et al., 2000). This helped establish the notion that a breakdown in social ties produced less social resources leading to more social disorganization and behavioral problems (Cohen et al., 2000). Once the link was established future studies centered on characteristics of social supports that promoted individual and societal well-being.

In the 1960s, John Bowlby developed the theory of attachment behavior. This theory explored mother and child reciprocal processes of social interactions, and related such

interactions with attachment issues during early childhood making social interactions an essential part in child development (Vaux, 1988). In the 1970s and 1980s researchers explored the implications of social supports in improving health. Studies during those decades found that individuals who participated in their community and in the larger society had better mental health when compared to more isolated individuals (Cohen et al., 2000). The concept of social network participation (also known as social integration) emerged at this time and new measures were created to assess social supports. Research findings suggest the more types of relationships a person reported, the greater their level of social integration which in turn affected physical morbidity and mortality (Cohen et al., 2000; Kaplan, 1977). However, there was uncertainty regarding which characteristics of social networks were essential to good health (Cohen et al., 2000).

Types of Social Supports

Social supports refer to the functions performed for an individual by a member or members of a primary or a secondary group. Primary groups consist of small, informal, intimate groups including family, relatives and friends. Secondary groups refer to larger more formal groups such as work, religious organizations, clubs and schools (Thoits, 2011). Members of these groups can provide the following types of supports: 1) instrumental supports (tangible aids and services directly assisting a person in need), 2) informational support (advice, suggestions, and information an individual can use to address problems), 3) emotional support (expressions of empathy, love, trust and caring), and 4) appraisal support (information used for self-evaluation such as constructive feedback and affirmation) (Cohen et al., 2000; Glanz et al., 2008). The supports given can be defined by: 1) type of support provided, 2) recipients' perception of support, 3) intentions or behaviors of the provider, 4) reciprocal support, and 5) social networks

(Vaux, 1988). Type of support defines social support in terms of the resources provided by other individuals (instrumental, informational, emotional and appraisal support) (Cohen et al., 2000). Recipient's perception of support defines social support as the extent that an individual believes that his or her needs for support were met. Social support is also defined by the intentions or behaviors of the provider of support and how those enhance the recipient's well-being. Reciprocal support refers to the exchange of resources between providers and recipients. Finally, social networks define social support in terms of the people one communicates with, and the links within these relationships (Cohen et al., 2000; Vaux, 1988).

Measuring Social Support

A difficulty when measuring social supports is the assumption that social supports mostly include a positive interaction or a helpful outcome for the person needing the support. There is little discussion of what has been called the dark side of social interactions (Thoits, 2011). Social interactions can be tense, conflicting, demanding and cause stress rather than benefit. In addition, current measures of social support tend to ignore supports throughout the lifespan including early family environment, personality differences, self-esteem and feelings of control (Uchino, 2009). The mechanisms by which participants engage in social interactions are shaped across their life course and their experiences throughout their lives dictate whether they provide, fail to provide or receive social supports (Uchino, 2009).

Several reliable and validated self-administered measurements of social support are available, including the Multidimensional Scale of Perceived Social Support (MSPSS) measuring support from family, friends and significant others as a predictive of depression and anxiety symptomatology (Zimet, Dahlem, Zimet, & Farley, 1988). The Medical Outcomes Study (MOS) Social Support Survey is also self-reported and was designed to measure

emotional/informational, tangible, affectionate, and positive social interactions for patients with chronic conditions (Sherbourne & Stewart, 2009). Two of the most commonly used social support measurement instruments are the Inventory of Socially Supportive Behaviors (ISSB) (Barrera, Sandler, & Ramsay, 1981) and the Social Support Questionnaire (SSQ) (Sarason et al., 1983). The ISSB is a self-reported 40-item inventory free of cost that measures the frequency of supportive actions received by an individual in the last four weeks. It asks specifically the type (mainly emotional and tangible) and amount of support received from the primary support group (family and friends). It measures network size and perceived family support, but does not measure other types of support and supports outside of the family group such as churches, clubs and other organizations. The instrument assumes social supports are always positive. The ISSB does not measure satisfaction with supports.

The Social Support Questionnaire (SSQ) is a free, validated self-administered tool consisting of 27 items in its long version and 12 items in its short. Like the ISSB it measures number of supports available to the respondent but unlike the ISSB it measures satisfaction with those supports (Sarason et al., 1983). Satisfaction with supports can influence a person's self-esteem and feelings of control over their environment (Sarason et al., 1983). The SSQ assumes social supports are a buffer against the effects of stress. A higher number of supports, especially satisfactory ones, can increase the person's capacity to cope with problems (Sarason et al., 1983). By measuring perceived support as opposed to actual support received, the SSQ and other instruments may be measuring expectations of support instead of the reality of the supports received. The SSQ does not measure timeliness of the support received (they could have needed the help now, but received it two months later) and reciprocity (how much resources and supports were given and received in the social interaction).

All of the validated measures mentioned lack measures for personality characteristics of the giver and the recipient of support that may better explain the mechanisms by which social support influence a person's health outcomes and behaviors. The study of social supports and health outcomes should consider not only the number and satisfaction with supports, but also account for biological and psychosocial risks (medical risks, stress levels and acculturation factors) that may play an important part in shaping social supports as social ties can be disrupted by multiple factors.

Prenatal Stress

Maternal prenatal stress can affect the physical and behavioral health of the fetus and subsequently the infant (Tollenaar et al., 2011). Since the 1960s, studies on animals and humans connected the effects of maternal stress to fetal development (Morishima, Pedersen, & Finster, 1978; Turner, 1960; Ward & Weisz, 1984). In the 1990s, various studies linked the effects of stress with low birth weight, temperament and behavioral problems in infants (Gunnar & Nelson, 1994; La Marca-Ghaemmaghami et al., 2013; Seckl, 1998). Stress was also linked to an increase in the infant's susceptibility to psychopathology later in life through adulthood (Hertzman, 1999; La Marca-Ghaemmaghami et al., 2013; Spicer et al., 2013; Tollenaar et al., 2011).

Stress can increase the production of various hormones including epinephrine, norepinephrine and cortisol (Hobel, Dunkel-Schetter, & Roesch, 1998; Hobel, Dunkel-Schetter, Roesch, Castro, & Arora, 1999; Lu & Chen, 2004). Women exposed to chronic and repeated stress could respond to stressors during pregnancy by producing excessive amounts of norepinephrine and cortisol. These hormones can activate placental corticotropin-releasing hormones in gene expression that can in turn precipitate preterm labor and can affect fetal programming (Hobel et al., 1998; Lu & Halfon, 2003). Chronically elevated levels of cortisol

can also lead to immune suppression increasing the likelihood of pathogen colonization during pregnancy (Lu & Halfon, 2003; Wadhwa et al., 2001). It can also affect anti-inflammatory pathways. In response to an infection, excessive amounts of pro-inflammatory mediators are released which can precipitate preterm labor (Dudley, 1999; Lu & Halfon, 2003). Although stress is biological in nature, the factors causing stress can be environmental (unsafe neighborhood, pollutant exposure, etc.), economic (low income, unemployment), emotional (lack of partner support, poor family relationships) or circumstantial (life events). The multifactorial sources of stress combined with the individual threshold of coping with stressful experiences create a challenge for researchers to measure the multidimensionality of prenatal stress.

Measuring Stress

The American Psychological Association recognizes three levels of stress: acute stress, episodic acute stress, and chronic stress (Miller, Smith, & Rohstein, 1993). Acute stress is the most common, and refers to short term stress occurring from the demands and pressures of the recent past and the pressures of near future such as those created by new challenges or occasional problems. Episodic acute stress is perpetual acute stress and includes extended over arousal (Miller et al., 1993). Chronic stress, like that experienced by people in poverty, stems from a person being unable to see a way out of a terrible situation. Under these demands, a person can lose hope of ever being able to find a solution or a way out. Some chronic stress can result from traumatic life experiences that become internalized and remain always present. People can become accustomed to chronic stress as they get used to it however, it can continue to affect their mental and physical health despite their lack of recognition (Miller et al., 1993). For ethnic minorities and low income women already experiencing chronic stress, the prenatal period can present a number of additional physical, social and emotional stressors as they cope with

accessing prenatal services, balance daily chores and find ways to supply needed baby items with limited resources (Luecken et al., 2013).

Several reliable and valid stress scales were developed to address various levels of stress. Three of these scales are the Hassles and Uplifts Scales (HSUP) (Lazarus & Folkman, 1989), the Holmes and Rahe Stress Scale (Holmes & Rahe, 1967) and the Perceived Stress Scale (Cohen et al., 1983). The Hassles and Uplifts Scale measures respondent's attitudes to daily situations defined as negative events (hassle) and positive events (uplifts). The Holmes and Rahe Stress Scale measures ongoing life adjustments to stress as they are associated to illness. The more events the respondent had, the higher the score and the more likely the respondent will be to become ill. Both of these scales are event specific, providing a list of situations and events related to different aspects of a person's life. Stressors can occur in periods of time over 30 days.

The Perceived Stress Scale (PSS) is a brief self-reported scale that evaluates the level of perceived stress during the last month. Items in the scale measure how unpredictable, uncontrollable and overloaded respondents find their lives and also measures current levels of experienced stress (Cohen et al., 1983). The scale is available in a 14-item version (PSS) and a shorter 10-item version (PSS-10). The PSS has been tested among multiple populations and was translated into several languages (Mimura & Griffiths, 2008; Orucu & Demir, 2008; Remor, 2006). The instrument has also been used to assess perceived stress among pregnant women as a factor leading to preterm birth and low birth weight deliveries and has been used to assess perceived stress as related to racism (Dominguez et al., 2008; Glynn, Schetter, Hobel, & Sandman, 2008; Hobel et al., 2008; Lobel et al., 2008).

Some disadvantages of using these measures include the length of time used in each instrument, and the ability of the respondent to recall stressful events within the last month or at

any other given time in a respondent's life. Predictability for the PSS, for example, falls in a short period of time (4 to 8 weeks), therefore exposure to prolonged periods of stress are less reliable to assess with this tool (Lazarus & Folkman, 1986). Other criticisms that have been raised include that PSS measures overlap psychological symptoms of different conditions (Cohen, 1986). Some of the tools presented imply that stress is a single one-dimensional and global variable ignoring environmental context, personal goals and beliefs (Lazarus & Folkman, 1986).

Studies Linking Social Supports, Stress and Birth Outcomes

Since 2001, various systematic reviews have been conducted focusing on aspects linking social supports, stress birth outcomes and the Latino paradox (Buekens, Canfield, Padilla, Lona, & Lozano, 2013; Cervantes & Castro, 1985; Dennis & Kingston, 2008; Issel, Forrestal, Slaughter, Wiencrot, & Handler, 2011; Lassetter & Callister, 2009; Urquia, Frank, Moineddin, et al., 2010). This section discusses a systematic review conducted as part of the proposed study to explore published evidence from 2007-2012. The review focused on the relationship between social supports and birth outcomes and the methodological characteristics presented in empirical studies addressing this relationship. Keyword terms included three levels based on terminology found through previous literature reviews on birth outcomes and social support. The first level of terms included keywords about impact or effect, the second level included keywords for social support (who provided it and types of support provided), the third search level were keywords associated to birth outcomes. Of the 479 articles retrieved, 31 dealt specifically with the topic area of the systematic review. Results from this review were validated by a more recent systematic review conducted by Hetherington and colleagues on preterm births and social supports (2015). The reviews revealed inconsistencies measuring social supports across studies

however, they confirmed when social supports played a significant role in birth outcomes it was as a buffering mechanism to reduce stress and therefore improve outcomes (Cervantes & Castro, 1985; Hetherington et al., 2015).

Study Design and Sample of Identified Articles

The 2007-2012 systematic review found that most of the studies addressing social support and birth outcomes were observational studies that varied in study design, sample size and type of support being measured. Prospective studies comprised 32% (n=10) of the studies while retrospective studies made 29% (n=9). Cross-sectional studies represented 16% (n=5) of the studies and only two studies used a randomized design (6%). Three of the articles retrieved were systematic reviews (10%), while one article was a literature review (not systematic) (3%). Sample sizes were at times large (ranging from 87 to 99,819) but were not representative of the population with overrepresentation of ethnic minorities including single mothers, African Americans, Latino/Hispanic and low-income populations. More than half of the studies focused on minority groups (Campos et al., 2008; Ceballos & Palloni, 2010; Dailey, 2009; Dyer, Hunter, & Murphy, 2011; Harrison & Sidebottom, 2008; Zachariah, 2009). The methods used included logistic regression, multilevel modeling, ANOVA, multivariable linear regressions, correlations and two studies used structure equation modeling (Flynn, Foster, & Brost, 2011; Luecken, Purdom, & Howe, 2009). The systematic review identified the following topics: social supports as stress/depression mediators, social supports as a function of home visitation and clinical programs, environmental/neighborhood support, social supports and immigrant birth outcomes, other topics (religiosity, paternal support).

Social Support as a Mediator to Reduce Stress and/or Depression

Social support as a mediator to reduce stress was the most common topic identified in the systematic review. Nine studies (29%) measured social supports as a factor influencing stress and/or depression and its impact on birth outcomes. Increase psychosocial risk was associated with low birth weight and preterm birth (Hobel et al., 2008). According to the literature, interventions assessing psychosocial stress levels of mothers at high risk of delivering a preterm, and referring mothers to appropriate community resources had promise in reducing preterm births (Hobel et al., 1998). For Medicaid women in particular, Hobel identified a study indicating Medicaid women receiving psychosocial assessments and referrals each trimester had half the risk of having a preterm (OR=0.53; CI=0.40-0.72) or low birth weight infant (OR=0.49; CI=0.34-0.71) compared to those not receiving the intervention (Hobel et al., 1998; Wilkinson, Korenbrot, & Greene, 1998). This study suggested that programs providing support through referrals could potentially reduce stress and influence birth outcomes.

Most of the studies reviewed addressing stress and/or depression used a validated tool to measure social support. An exception was the study by Ghosh and colleagues (2010) addressing paternal support and stress during pregnancy that used a tool created for a previous study by the author, with no reliability or validity information in the text. This study found that for the 2,309 participants (60% of them were Latinas), the adjusted odds of preterm birth decreased as support increased (OR 0.73, 95% CI [0.52, 1.01]) (Ghosh et al., 2010). Among women lacking paternal supports those with moderate to high stress had increased odds of a preterm delivery (OR 2.15, 95% CI [0.92, 5.03]) (Ghosh et al., 2010). The study is still relevant due to the large number of Latina participants and the study's ability to identify a specific relevant source of support for women with moderate to high stress levels.

There was no consistency across studies regarding social support measures. Each study used a different instrument to measure social support; each used a different length of time, and measured different aspects of the support provided. All instruments measured quantity of support provided. However, some focused on perceived support received by using the Perceived Social Support Scale (Campos et al., 2008) and the Support and Intimate Relationships Rating Scale (SIRRS) (Nylen, O'Hara, & Engeldinger, 2012). Campos study of Latinas (foreign born and U.S born) and European Americans found the correlation between social supports and stress was stronger among Latinas than European Americans (2008). Among foreign-born Latinas in the study, a larger number of social support was correlated with better infant birth outcomes ($r(265)=0.31$, $p<0.10$) (Campos et al., 2008). Other studies used instruments focused on quality and satisfaction with interactions using the Modified Kendler Social Support Interview (MKSSI) (Spoozak, Gotman, Smith, Belanger, & Yonkers, 2009), the MOS Social Support Survey (Luecken et al., 2009) or the Social Support Questionnaire (Nylen et al., 2012). Nylen's study found that depressed mothers had smaller social networks and were less satisfied with their social supports (2012). The study did not find a direct association between social support and infant birth weight, but found that depressed mothers rating partners as less supportive had earlier deliveries than depressed mothers with higher perceived partner support ($F(15,171)= 3.81$, $p<.001$). What is consistent among these studies is that they measured emotional support provided by spouses or partners (questions such as whether they helped in the home, if they were supportive and the relationship status). They also measured support by family, friends as well as tangible aids.

Social Support as a Function of Home Visitation and Clinical Programs

Another category identified in the review was social supports and birth outcomes in relation to pregnant and parenting women in social programs. Seven studies addressed programs providing social support (23%). Two of these studies focused on home visitation programs using the Prenatal Risk Overview (PRO) screening tool with program clients to assess psychosocial risk, which in turn was expected to help identify risk for preterm birth and low birth weight. The first study using PRO was a tool validation study while the second study was a tool implementation study (Harrison, Godecker, & Sidebottom, 2011; Harrison & Sidebottom, 2008). Harrison and colleagues assessed elements of social support such as respondent's community involvement, support carrying out daily tasks, having someone the mother could rely on and communicate with. However, in the implementation study, participation in the home visitation program itself and the division into two groups (program participants and non-participants) created a new measure of social support since the program itself provided information/educational support, tangible assistance and referrals (Harrison et al., 2011).

The only randomized trial in this systematic review was a study to assess effectiveness of the Healthy Families New York home visitation program (a program providing support). Lee and colleagues (2009) explored whether program participation reduced risk of low birth weight in a sample of socially disadvantaged women. The measure of support was program participation. The program provided community services and instrumental support. The study found that women enrolled in the Healthy Families New York home visitation program at 30 week gestation or less were significantly less likely to have a low birth weight baby compared to those not enrolled in the program (5.1% vs. 9.8% with adjusted OR= 0.43, 95% CI [0.21, 0.89]) (Lee et al., 2009). The reduction was even more noticeable for clients enrolled in the Healthy

Families program at 24 weeks or less gestation (adjusted OR= 0.32, 95% CI [0.14-0.74])(Lee et al., 2009). What distinguished this study was that it accounted for program dosage. However, what the study did not measure was which component of the support services in the program affected low birth weight. The same measurement problem is identified in the remaining studies addressing social support programs were participation in the program itself became the most important measure of support without specifying which aspects of the programs' support influenced birth outcomes (Dunlop et al., 2008; Issel et al., 2011; Smith, Shao, Howell, Lin, & Yonkers, 2010). The study by Smith and colleagues is of particular interest as it addressed a Federal Healthy Start high-risk population and a comparison group not participating in the program. Depressed women were over 1.8 times (95% CI [1.17, 1.86], $p<0.05$) more likely to give birth to preterm babies than non-depressed women, regardless of program participation (Smith et al., 2010). However, the same association was not identified for low birth weight and small for gestational age. When comparing birth outcomes within program participants, women delivering babies after participating in the Healthy Start program were 85% less likely to deliver a preterm baby than women giving birth before they began the program (Smith et al., 2010). This might provide insights into the timing of social support for home visiting programs in order to impact subsequent pregnancies.

Environmental/Neighborhood Support

Six of the studies reviewed examined environmental and neighborhood support (19%). These studies focused on mother's place of residence, physical characteristics like building deterioration, economic factors, and geographic proximity to family members. The measurements in this category were very different from the other social support measurements in the review. Neighborhood support was clearly defined by quantifiable clusters of variables

compiled into an index. The variables used to measure neighborhood support included immigrant density, social deprivation, residential stability, social disorder (defined as crime rates), racial and economic stratification, income per capita, physical deterioration (boarded up housing), residential stability (in the same home for a period of time) and neighborhood deprivation (unemployment, educational attainment, poverty) (Auger et al., 2008; Khan et al., 2012; Mason et al., 2011; Schempf, Strobino, & O'Campo, 2009). Auger and colleagues' study explored small for gestational age (SGA) within the context of neighbohood perception (favorable or unfavorable by respondent) and immigrant density. Mothers with a more favorable perception of their neighborhood had lower odds of SGA than those with less favorable perception of their neighborhood (OR 0.87, 95% CI [0.77, 0.97]) (Auger et al., 2008). This study also identified that neighborhood immigrant density was associated with SGA (F (4,40)= 3.21, p<..023) (Auger et al., 2008) . Mothers living in neighborhoods with a lower proportion of immigrants had lower odds of SGA births compared to those living in neighborhoods with a larger proportion of immigrants (Auger et al., 2008). The research was conducted in Canada and fails to mention specifics on the ethnicity of immigrants. Nevertheless, the fact that immigrant density was associated with SGA (not crime or residential stability that were also analyzed in this study) suggests that immigration, neighborhood supports and SGA require further investigation. None of these studies measured the quality of the social interaction.

Social Support Related to Immigrant Birth Outcomes

Five studies (16%) examined social support and immigrant health outcomes. The impact of acculturation on immigrant health and subsequent birth outcomes was the main subject of these studies as the authors studied the Latino paradox. The epidemiological paradox or the Latino paradox was first identified in the 1980s by Markides and Coreil while studying

Hispanics in the southwestern United States (1986). The paradox refers to the epidemiological phenomenon indicating that despite socioeconomic disadvantages, Latinos (especially foreign born) exhibit health outcomes that are equal or better than those of the U.S. white population (Flores et al., 2012; Markides & Coreil, 1986; McGlade et al., 2004). Various explanations have been proposed to explain this immigrant paradox. One of the explanations is the healthy immigrant effect. This hypothesis states that healthier people are more mobile and therefore able to migrate, resulting in better birth outcomes being observed on foreign born women than those born in the United States (Lechner & Mielck, 1998; Rumbaut & Weeks, 1996; Wingate & Alexander, 2006). According to the healthy immigrant effect, women who are healthier in Mexico are more likely than unhealthy ones to migrate to the United States (Wingate & Alexander, 2006). The theory presents a problem as it fails to account for other potentially protective factors such as acculturation, cultural behaviors and social supports all of which have been shown to influence birth outcomes (D'Anna-Hernandez, Aleman, & Flores, 2015). The research in this systematic review addressed some of these concerns.

Family support was the most common type of support measured in these studies. The studies reviewed examined the hypothesis that lack of social support, especially family support, was influential in the worsening of birth outcomes for Latino immigrants and that acculturation may play an important part in shaping those supports (Ceballos & Palloni, 2010; Padilla, Hamilton, & Hummer, 2009). Ceballos and Palloni's study used a sample of 539 pregnant women of Mexican origin living in the Midwest. They analyzed the effects of immigration duration and acculturation on birth outcomes in the presence of behavioral, social and emotional variables. The study analyzed birth weight, gestational age, intrauterine growth restriction and fetal growth ratio as a dichotomous variable where 1= favorable birth outcomes and

0=unfavorable. The study found that social support was not a significant predictor of favorable birth outcomes yet duration of residence was a significant predictor. Mothers with the shortest length of residence in the U.S. (less than 4 years) and the longest (more than 12 years) experienced worse outcomes than those with intermediate duration (OR=.35, and OR= .32). Including a variable of acculturation did not change this result (Ceballos & Palloni, 2010). The authors did not find evidence to support a relationship between acculturation, social supports and birth outcomes despite the abundant literature linking lack of supports and acculturation to worsening birth outcomes in Mexican immigrants (D'Anna-Hernandez et al., 2015; English, Kharrazi, & Guendelman, 1997; Scribner & Dwyer, 1989). A concern with these studies was the type of measures. The measures used for social supports were parental relationship status (married, single or cohabitating), and the individuals a pregnant woman or recent mother can count on for a loan or for housework and childcare assistance. Ceballos and Palloni consolidated all birth outcomes into one variable due to the small number of unfavorable birth outcomes (9%) in the sample (n=539). In addition, the study used the Los Angeles Epidemiologic Catchment Area Acculturation Scale (Burnam, Hough, Telles, & Escobar, 1987) but opted to reduce the items in the validated scale from 26 to 13, possibly diminishing the power of the scale in determining the impact of acculturation on social supports and birth outcomes (Ceballos & Palloni, 2010). Padilla and colleagues' study about outcomes of Mexican-American children did find a relationship between social support (relationship status) and child health outcomes (OR= 1.39, 95% CI [1.03-1.87]) (2009). The study asked three questions addressing social support: relationship status, mother reporting if she had someone she can count on for a $1,000 loan and a third measure asking a report on the number of religious services a mother attended per week in an attempt to have a measure for community involvement and religiosity (Padilla et al., 2009).

The question regarding the loan may be problematic since in the immigrant population income tends to be very low making $1,000 a very difficult loan. In addition, availability of religious services in the native language could influence religious service attendance. Despite measurement concerns, this study provided some evidence for the link between social supports and birth outcomes in U.S. Latino immigrant populations.

Other Identified Topics

Religiosity and paternal support comprised the remaining topics emerging from this systematic review. These topics were mainly in conjunction with stress (Burdette, Weeks, Hill, & Eberstein, 2012; Mann et al., 2010) and immigrant health (Padilla et al., 2009). Burdette and colleagues (2012) measured support as provided by religion in terms of attendance and religious affiliation to explore its relationship to low birth weight. They found that each unit of increase in the frequency of religious attendance reduced the odds of low birth weight by 15% (Burdette et al., 2012). Mann and colleagues (2010) differentiated between support provided by religiosity and spirituality and other types of support such as confidant, affective and instrumental support measured by the Duke UNC Functional Support Scale regarding relationship quality (Broadhead, Gehlbach, DeGruy, & Kaplan, 1988). Paternal support was discussed in three studies as related to maternal stress (Bloch et al., 2010; Ghosh et al., 2010). The study by Alio and colleagues was unique in that it discussed paternal involvement only as a function of the presence or absence of father's name in the birth certificate and not as related to quality of the relationship or a mediator to stress (Alio, Mbah, Grunsten, & Salihu, 2011). This measure is problematic since the amount and quality of paternal involvement in the child and mother's life is unknown and regulations such as child support legislation and Medicaid qualifying criteria can interfere in a parent's willingness to include the father's name in a birth certificate.

Challenges and Opportunities Stemming from the Review

Social supports were associated to birth outcomes in all topic areas related to stress, which was the largest proportion of the studies. A total of 58% of all studies identified in this systematic review found that social supports were a protective factor for birth outcomes with one study about migrant health indicating social support was not significant (Ceballos & Palloni, 2010). In Campos and colleagues study, social support was positively associated with birth weight for foreign-born Latinas only (Campos et al., 2008). Studies such as those by Padilla (2009) and Luecken (Luecken et al., 2009) provided more evidence to this association for Latina immigrants. Lassetter and Callister's systematic review (2009) suggest immigrants' health worsens as length of residency and acculturation increase, in part due by the loss of social supports.

In summary, the systematic review found inconsistencies defining and measuring social supports. The review also identified a possible indirect buffering association between social supports and birth outcomes. Findings from this review are corroborated by a recent meta-analysis of studies linking preterm births and social supports during pregnancy (Hetherington et al., 2015). Hetherington's meta-analysis suggested the same indirect, buffering association between social support and preterm birth (Hetherington et al., 2015). In addition, the meta-analysis also identified numerous tools measuring a variety of types of support with little consistency among the measures (Hetherington et al., 2015). Given findings in the literature reviews, there is sufficient evidence to justify the need to study the association between social supports and birth outcomes to help unveil some of the complexities identified in the literature.

The Socio-ecological Model and Latino Social Support, Stress and Birth Outcomes

The socio-ecological model of health behavior (also referred to as the ecological model) can be used to understand the individual, social and environmental interactions affecting the relationship between social supports, stress and birth outcomes. Initially used to explain children's social development as they interacted with their environment, the Ecological Model (also known as human ecology theory or the socio-ecological model) was developed by Urie Bronfenbrenner in 1979 and adapted for the application to health behaviors and health promotion in the late 1980's (Bronfenbrenner, 1979; Glanz et al., 2008; McLeroy, Bibeau, Steckler, & Glanz, 1988). The socio-ecological model posits that individual behaviors are influenced by individual attributes (biological, psychological and personal experiences) as well as the external conditions in which they live (social/cultural environment, organizations, community, physical environment and policy) (Bronfenbrenner, 1979; Cohen, Scribner, & Farley, 2000; Glanz et al., 2008). The model identifies multiple levels of influence to motivate and educate individuals to make healthy choices within a supportive environment, requiring multi prong approaches to solve health problems (Glanz et al., 2008).

Levels of Influence

The socio-ecological model of health behavior defines an individual level, interpersonal level, organizational level, community level and policy level. The *individual or intrapersonal* level refers to biological traits such as medical risk (previous low birth weight, hypertension, diabetes, etc.) and genetic composition (predisposition for congenital anomalies, etc.) that can affect whether the mother delivers a low birth weight, preterm or SGA baby. It also includes psychological factors such as life experiences, self-perception of stressful situations, motivation to reduce and cope with stress, and personality traits that make an individual more or less likely

to form ties and seek supports. The individual level focuses on influencing a person's knowledge attitudes and beliefs towards factors affecting medical risks (Glanz et al., 2008). At this level, mothers can be encouraged to learn coping mechanisms to reduce stress by changing their own behavior such as living a healthier lifestyle through diet and exercise, practicing meditation or yoga.

The *interpersonal level* refers to friends, family, health care providers, community health workers, patient navigators and other immediate supports that can directly influence the individual's social and cultural norms (Glanz et al., 2008). The presence of positive social supports in this level has been found to be associated with higher infant birth weight via fetal growth even when controlling for obstetric medical risk (Feldman et al., 2000). Disruptions in social networks at this interpersonal level have been shown to increase depression and reduce utilization of prenatal care (Cunningham & Zayas, 2002). Studies among pregnant women of Mexican descent in the United States showed a large number of social supports at this level can prevent some of the negative impact of acculturation to the United States since social supports were associated with encouraging an adequate diet, using prenatal vitamins and reducing smoking during pregnancy (Harley & Eskenazi, 2006).

The *organizational level* of influence corresponds to local health departments, health clinics, health insurance plans, work sites, medical institutions, professional organizations and community base organizations (Glanz et al., 2008). These organizations provide services to pregnant women of all ethnic groups. An organizations' ability to have bilingual/bicultural staff, availability of on-site mental health professionals, group classes, supporting services such as home visitation programs, and how inviting a clinic or medical institution is to clients all can affect service utilization. The direct tangible services (prenatal care, counseling), informational

support (educational materials about stress and pregnancy), and emotional support these organizations provide (home visiting care coordinators, parent groups) can provide a supportive environment to reduce stress and improve birth outcomes.

The next level of influence is the *community*. This level is represented by groups such as research institutions, the media, advocacy groups and health disparity groups among others (Glanz et al., 2008). This level is essential to prioritize topics that can be promoted to the policy level. Research institutions for example can provide evidence to policy makers on community needs and concerns regarding the effects of stress on low birth weight, preterm birth and SGA so that additional funding and programs can be created.

The final level of influence is *policy*. This level includes the Federal Government agencies such as the Department of Homeland Security (DHS) in which immigration services reside, Department of Transportation, Centers for Disease Control (CDC), National Institute of Health (NIH), the Health Resources and Services Administration, and federal legislators among others. This level also includes local and state agencies such as the Florida Department of Health and state legislators. Changes at this level can have serious ramifications for all levels of influence. The exclusion of undocumented women from full pregnancy Medicaid coverage in Florida is an example of policy with ramifications at all levels of influence. Undocumented immigrant women apply for Medicaid during pregnancy and they are only granted 45 days of coverage. After that period of time the mother must be self-pay through the remaining of the pregnancy until the baby is born (at that time she can apply for Medicaid for the U.S. citizen baby). At the community level, some community organizations are less welcoming of immigrants denying services or advocacy for undocumented pregnant women. Organizations such as Healthy Start and the local Health Department are instructing undocumented clients and

their providers to have the expensive pregnancy tests done within the 45 days of allowed Medicaid care. After the 45 days, clients are referred as needed to sliding scale clinics such as Community Health Centers of Pinellas. At the organizational level some prenatal clinics may decide to not serve undocumented women to avoid the risk of not receiving payment, therefore restricting the number of available providers for undocumented women. At the interpersonal level, mothers may rely on assistance from family and friends to cover the cost of needed services. She will also need emotional support to deal with the stress of paying and obtaining needed care. At the individual level this policy leads to high costs and possible non-compliance of the mother's prenatal care or mental health service due to cost therefore increasing the risk of poor birth outcomes.

A multilevel approach must be used in order to apply the SEM to a study examining factors associated with birth outcomes. Interventions targeting only one level of influence tend to be short term because they lack a supportive environment to sustain it (Glanz et al., 2008). Social interactions and the relationships across these levels of influence are part of several factors needed to maintain health, promote good behaviors, reduce stress and improve birth outcomes. The current study examined some of these levels of influence by studying Latina high risk women receiving Healthy Start services by a county health department, examining their interpersonal and organizational sources of support (family, friends, church members, etc.), and exploring the role of health risk factors within a model of social support, perceived stress and birth outcomes. Study findings can help address policy, as it can help programs and funders better understand the interplay between social supports, stress and birth outcomes to develop new strategies that can improve the quality of life of the families they serve.

Theoretical Model

Incorporating a strong theoretical framework to the study of social supports, stress and birth outcomes is an integral part of public health research and practice. Theoretical frameworks provide a systematic view of the events shaping health behaviors; they provide guidelines to specify, explain and predict the relationship among variables affecting birth outcomes (Glanz et al., 2008). Strong theoretical frameworks also shape the way in which researchers and practitioners collect and interpret data (Alderson, 1998). This section begins with a discussion of the theory that guided this study: the Social Network and Social Support Model (Glanz et al., 2008). It ends with the study research questions and the conceptual diagrams that informed the study design.

Social Networks and Social Supports

The public health theoretical model of social networks/social supports emerged from various sociological and psychological theories (exchange theory, attachment theory, and symbolic interactionism among others) to explain the processes linking the association between social interactions and health (Glanz et al., 2008). This theory continues to focus on the types of support previously mentioned: 1) emotional support (empathy, love, trust and caring), instrumental supports (tangible aids and services directly assisting a person needing them), 3) informational support (advice, suggestions and information someone can use to address problems) and 4) appraisal support (to provide information that is useful for self-evaluation such as constructive feedback and affirmation) (Glanz et al., 2008). This public health model adds a series of structural characteristics and functions that place individuals within a larger context of a web of interactions that can potentially impact health behaviors and outcomes. The model adds the concepts of: 1) reciprocity (resources and supports given and received in a relationship), 2)

intensity or strength (emotional closeness), 3) complexity (social relationships serve many functions), 4) formality (social relationships in the context of organizational roles), 5) density (how much members know and interact with each other), 5) homogeneity (how demographically similar are the members of the network), 6) geographic dispersion (do the members of the network live in close proximity, a relevant concept with transnational immigrant sources of support), and 7) directionality (do the members have equal power and influence) (Glanz et al., 2008). The theory also adds functions to social networks: 1) social capital (resources characterized by reciprocity and social trust), 2) social influence (how thoughts and actions are changed by the actions of others, 3) social undermining (how others can hinder a person's goal attainment), 4) companionship (sharing activities with network members), and 5) social support (aid and assistance exchanged in social relationships) (Glanz et al., 2008). The social networks/social supports model illustrates the mechanisms by which social networks and social supports affect health. The model consists of a series of five pathways describing the path of support received and its effects on stressors, health and behaviors.

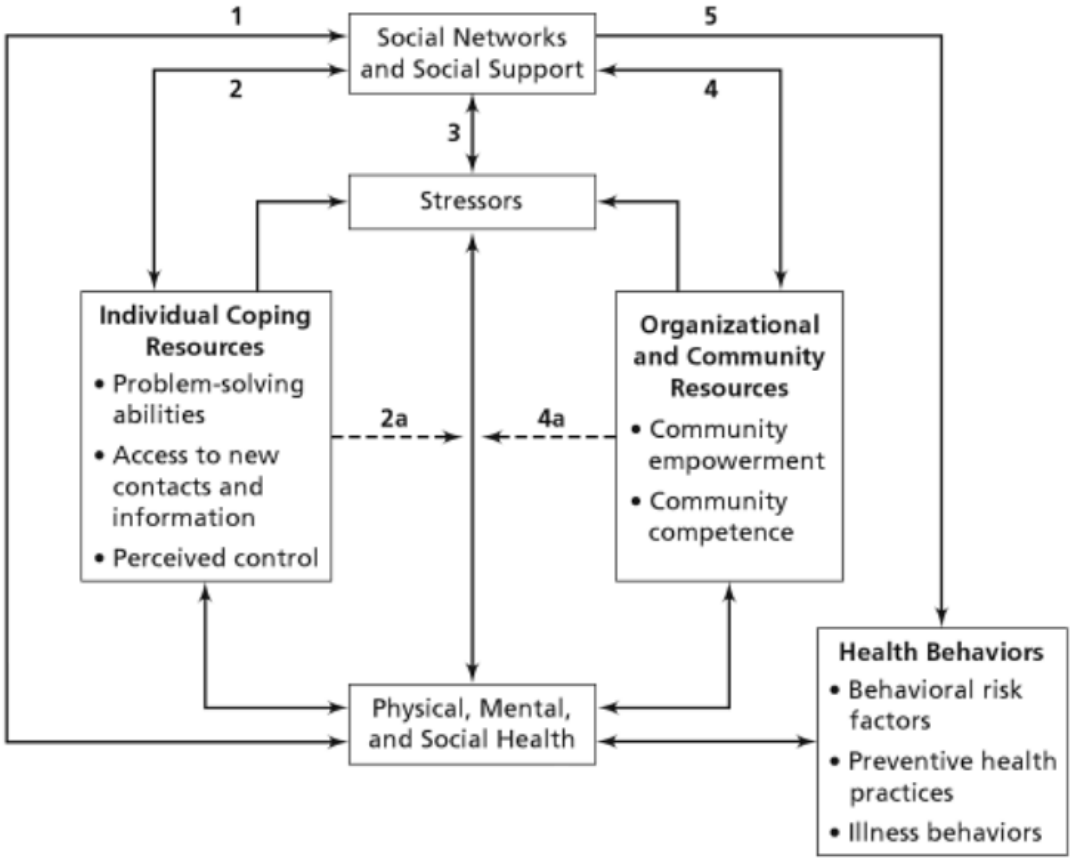

Figure 1: Social Networks/Supports model (Glanz et al., 2008)

Pathway 1 hypothesizes a direct effect of social networks and social support on physical, mental and social health. Supportive ties can enhance well-being and health regardless of stress level by meeting basic human needs of companionship, intimacy, sense of belonging and reassurance of one's worth (Glanz et al., 2008). Pathways 2 and 4 hypothesize the effect of social networks and social support on individual coping and community resources. Through pathway 2, social supports can help an individual access new contacts and information that can help them identify and solve problems, therefore increasing a sense of personal control. Pathway 4 refers to the community resources that can increase the likelihood of appropriate coping skills to buffer stressors. The buffering effects are reflected in pathways 2a and 4a and can reduce short term and long term negative health consequences (Glanz et al., 2008). Pathway 3 refers to

social networks/social supports that can influence the frequency and duration of exposure to stressors associated in turn with mental and physical health. Finally, pathway 5 refers to social support/social networks that may affect the incidence and recovery from disease (Glanz et al., 2008). The model integrates Cohen and colleagues' concept that social supports/social networks encourage positive coping mechanisms and reduce stress therefore improving health (Cohen et al., 2000).

The Social Networks/Social Supports theory can help to understand the hybrid support systems (transnational and local) Latina immigrants may have as a result of immigration processes. Stressors resulting from immigration status and language barriers through extended period of time in the host country could potentially influence the increasing percent of preterm births and low birth weight observed in Pinellas County Latinas.

Conceptual Diagram and Research Questions

The literature review and the theories previously discussed suggest that the presence of social supports can potentially reduce the risk of low birth weight, preterm birth and small for gestational age by lowering stress levels. In the presence of adequate support networks, women tend to practice protective health behaviors. However, immigration can disrupt these supports and add additional stressors such as learning a new language and adapting to a new culture (Arbona et al., 2010; Harley & Eskenazi, 2006). The goal of this study was to explore the sources of social support for Pinellas County Latinas at risk of poor birth outcomes (low birth weight, preterm birth and small for gestational age) and examine the direct and indirect associations between social supports, perceived stress and birth outcomes in the presence of risk factors (medical, behavioral and psychological as well as language and years in Pinellas).

This study explored path 3 of the Social Networks/Social Support model were social supports can improve health by influencing stress. The first part of this study analyzed social supports. The Social Support Questionnaire (SSQ6) administered at program entry provided a family support score and a non-family support score as well as a satisfaction score that in turn defined the latent variable social networks/social supports. The second part of the study addressed issues related to stress levels. The Perceived Stress Scale (PSS10) measured pregnancy stress at program entry. The expectation in this study framework was that a strong presence of a high number of quality social supports could reduce the risk for low birth weight, preterm birth and small for gestational age in study participants' newborns by reducing stress levels. Therefore, the third part of the study created a series of models to analyze the direct impact of social supports on these birth outcomes, and the indirect impact of social supports on birth outcomes as mediated by stress in the presence of socio-demographic risk factors (education, marital status, maternal age, income proxy (trouble paying bills) and health risk factors (prenatal care entry, tobacco use, medical condition such as diabetes, hypertension and BMI). The study compared ethnic groups (Latinas, White and Black) to explore any differences in contributing factors to these birth outcomes by ethnicity and determine any unique patterns for Latinas. Figure 2 presents a diagram of the model providing direct and indirect effects of social supports and perceived stress on low birth weight, preterm birth and small for gestational age in the presence of health risk factors, language and years in Pinellas County. These factors were associated in the literature with poor birth outcomes.

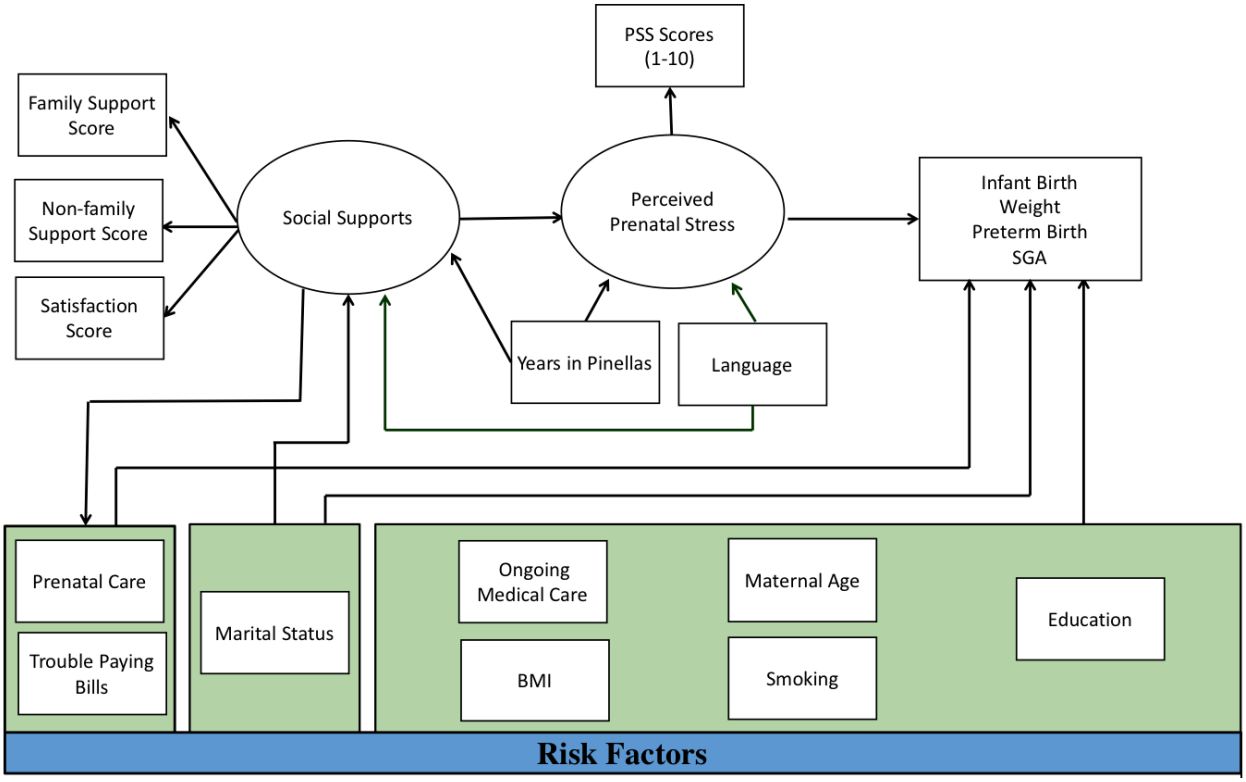

Figure 2: Social supports, stress and birth outcomes in Pinellas County

Research question 1: What are the sources and gaps in available social supports of Healthy Start Pinellas pregnant Latina mothers at program entry?

The study used the Social Support Questionnaire completed at Healthy Start program entry to understand who is providing support (family vs. non-family) to Latina participants and how they differed from other ethnic groups participating in the program. This research question described study participants' network size and composition. Figure 3 illustrates the variables that tested for research question 1.

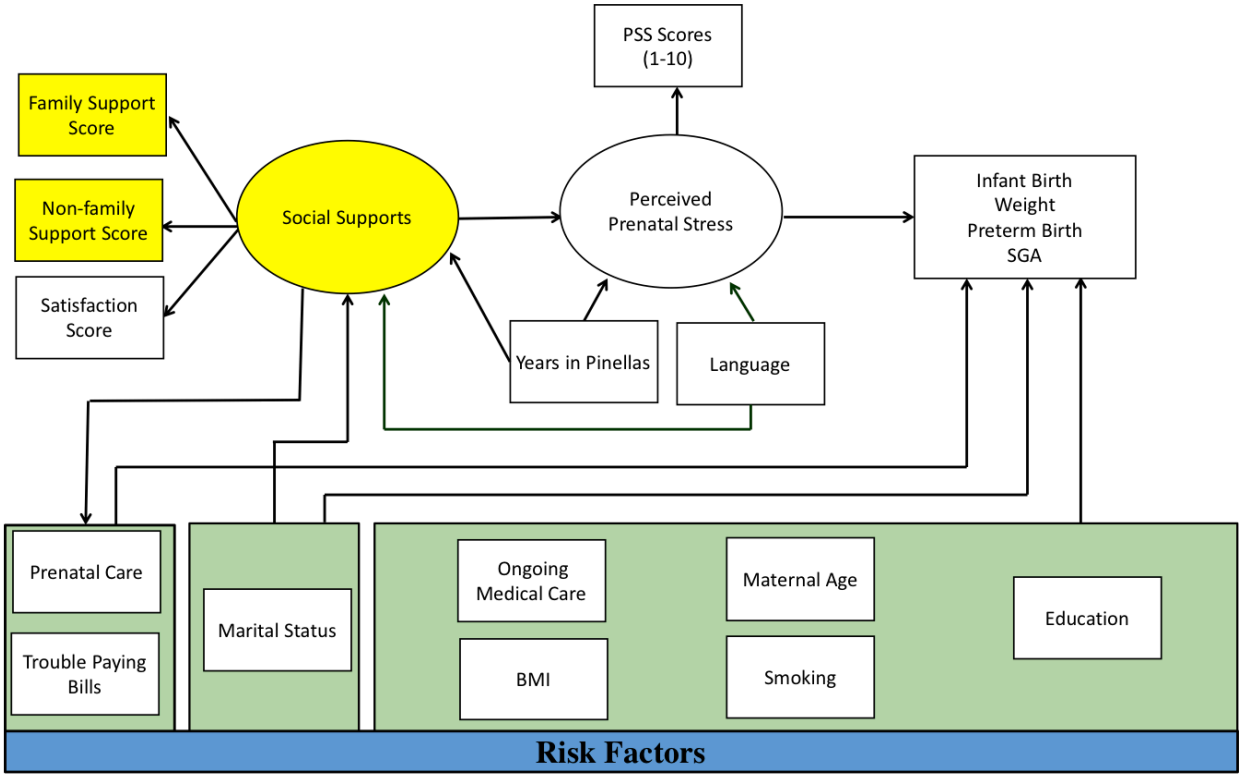

Figure 3: Sources of social support

Research question 2: What are the strengths of those social supports as defined by the quality of support?

Using the Social Support Questionnaire administered at program entry, the study measured how satisfied Latina women were with their current supports and how they differed from other ethnic groups in the program. This research question provided information on the positive and negative influences on Latina pregnant mothers.

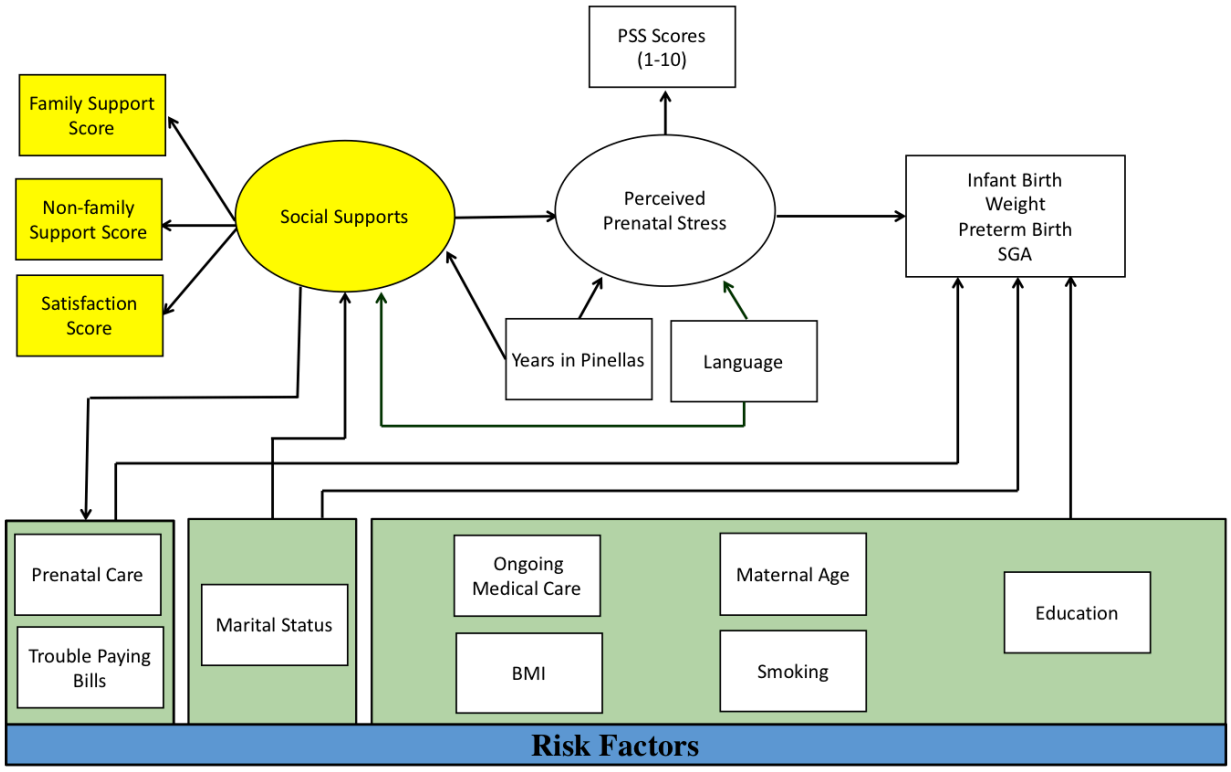

Figure 4: Quality of social supports

Research question 3: What is the direct and indirect impact of social supports and perceived stress on Latina mothers' birth outcomes (infant birth weight, preterm birth and small for gestational age)?

The literature indicates social supports can have a direct impact, but can also act as buffers to stress reducing the risk for low birth weight, preterm birth and small for gestational age (Hobel et al., 2008; Lobel et al., 2008). This research question first measured perceived stress for all study participants. Answers to this research question also helped identify differences in perceived stress by participants' ethnic group (White, Black, and Latina).

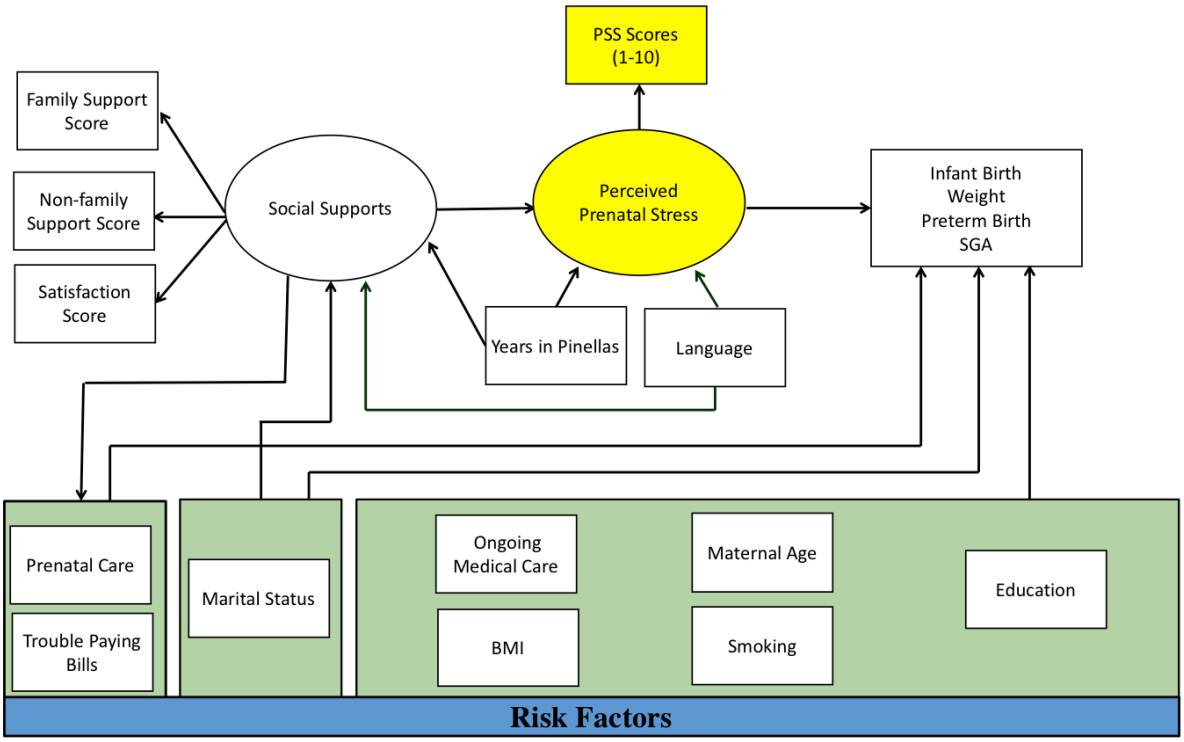

Figure 5: Perceived stress in program participants

For Latinas, language and length of time residing in the United States can affect birth outcomes (D'Anna-Hernandez et al., 2015; D'Anna-Hernandez et al., 2012). Therefore, this analysis accounted for Latinas' language spoken and years in Pinellas County as variables that can influence perceived stress and social supports.

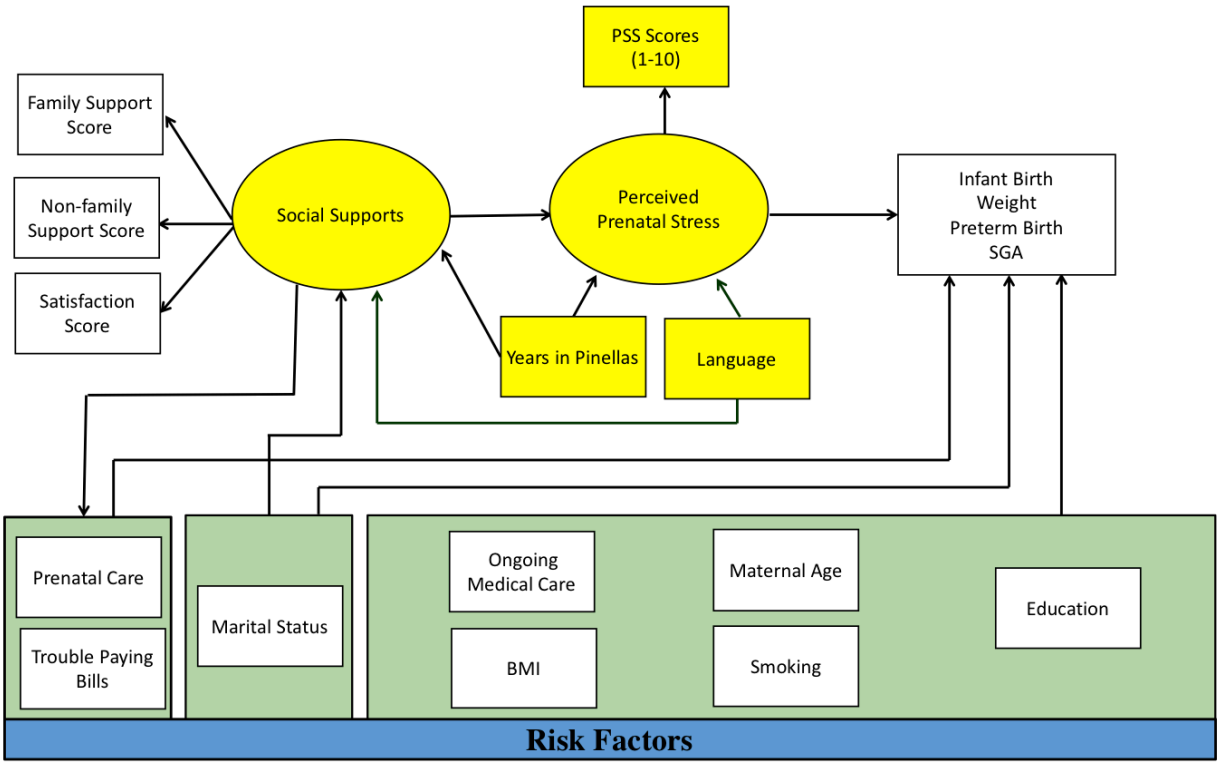

Figure 6: Perceived stress in Latina study participants

Finally, a structural equation model analysis created a quantifiable model fit to determine if there are direct and indirect factors that significantly contributed to low birth weight, preterm birth and SGA in the presence of health risks and psychosocial variables. The model included observed variables (family support, non-family support, satisfaction score, PSS scores) and latent variables (social supports, perceived prenatal stress) in addition to socio-demographic risk factors, health risk factors, and birth outcomes (birth weight, preterm birth, and small for gestational age). A model for all program participants was created as well as models for White, Black and Latina participants. The Latina model included language and years in Pinellas County. A discussion of the methods explaining how these models were created appears in the following chapter.

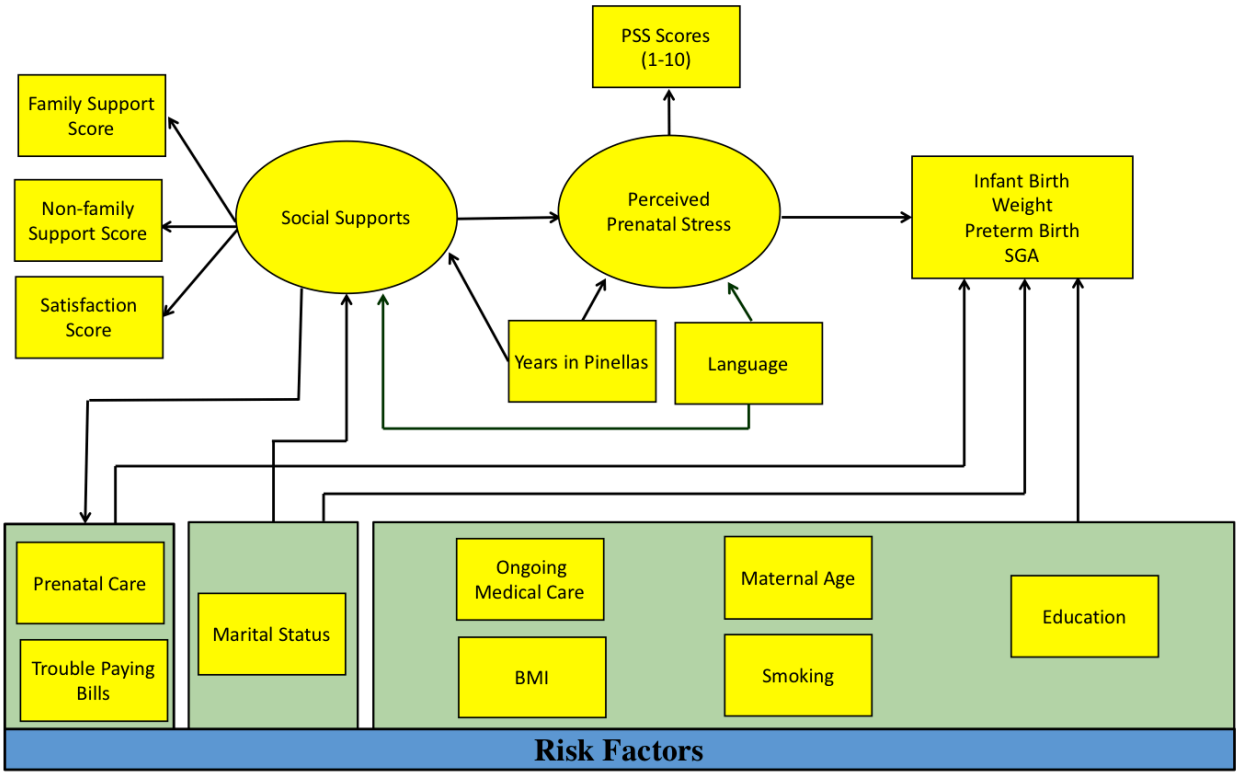

Figure 7: Latina social supports, stress and birth outcomes in Pinellas County

CHAPTER THREE

METHODS

The design for the study of social supports, stress and birth outcomes among Latina mothers in Pinellas County, Florida is a retrospective cohort. The study used secondary Healthy Start program data abstracted from the Health Management System (HMS) and the Well Family System (WFS). These electronic record systems are used for all Healthy Start clients countywide. The inclusion criteria were Healthy Start Pinellas program participants that entered the program for prenatal services between July 1, 2013 and June 30, 2015. Twins and infant deaths were excluded from this study. Study participants completed a prenatal Healthy Start screen, a Social Support Questionnaire (SSQ6) and a Perceived Stress Scale (PSS10). Both the Florida Department of Health and the University of South Florida Institutional Review Board determined the study exempt from IRB.

Study Setting: Healthy Start Pinellas

Healthy Start is a program created as a result of 1991 Florida legislation intended to identify risk factors for poor birth outcomes by screening all pregnant women and newborns. Risk factors reported on the Healthy Start screening form include marital status, ethnicity, poverty, mental health issues, obesity, tobacco, previous preterm delivery, previous low birth weight and infant congenital anomalies among others. The program includes support services such as information, referrals and on-going care coordination to help link women to needed community services (Florida Department of Health, 2014). The program also provides

psychosocial counseling, nutritional services, smoking cessation, childbirth education, breastfeeding and parenting support and education through at home services or services at a medical provider's office (Florida Department of Health, 2014). Pregnant women scoring 6 and higher in the Healthy Start prenatal screening form and newborns scoring 4 and higher in the Healthy Start newborn screening form are considered high risk and qualify for Healthy Start support services. Legal residency is not required in order to obtain services.

In July 2013, the program added local measures for stress and social supports to assess their client support systems and stress levels, and to provide better referrals to community resources. Program staff only used individual social support and stress scores to refer clients to community resources (i.e. parent support groups, stress relief activities). The program had not been able to evaluate these measures by ethnicity or for all program participants. The overall impact of social supports and stress in program participant birth outcomes was unknown. This study provided this information to program planners to help them tailor their services to population needs.

Study Sample

The sample consisted of all Healthy Start participants regardless of ethnicity entering the Healthy Start Pinellas program while pregnant and delivering a single birth during the previously stated period. All ethnicities were needed to construct an initial model and obtain general trends for this high risk participant population; subsequent models were created for each ethnic group (Latina, Black and White) to compare groups and better understand unique issues surrounding Latina mothers.

During the study period, 492 were eligible for the study. Of those 9 were excluded due to missing an SSQ6 or PSS10 instrument, 70 had incomplete SSQ6 or PSS10 forms and 2 were missing baby outcome information. The final sample size was 411 Healthy Start participants.

Power analysis

Three different power analyses were computed to determine whether the various statistical analyses used in this study had sufficient sensitivity, significance and magnitude to provide reliable answers to the study research questions. The literature from the systematic review suggested a small to medium effect size can detect significant findings (see table 2).

Table 2: Effect size analysis based on articles from the social support and birth outcomes systematic review

Author	**Dependent variable**	**Independent variable**	**Cohen's *d***	**Effect size**
Hobel et al., 2008	preterm birth	stress and support	-0.35	small
	low birth weight	stress and support	-0.39	small
Ghosh, et al., 2010	preterm birth	support	-0.17	small
	preterm birth	stress	0.42	small
Campos, et al., 2008	birth outcomes	support	0.65	medium
Nylen, 2012	preterm birth	support and depression	0.51	medium
Lee, et al., 2009	low birth weight	support	-0.46	small
	low birth weight	support	-0.62	medium
Smith, 2010	preterm birth	depression	0.33	small
Auger, et al. 2008	SGA	support	-0.02	small
	SGA	immigrant neighborhood density	0.96	large
Ceballos & Palloni, 2010	birth outcomes	immigrant residence short duration	-0.57	medium
	birth outcomes	immigrant residence long duration	-0.62	medium
Padilla, 2009	child health	support	0.18	small

An initial power analysis for multivariable linear regressions was conducted with G*Power based on the number of variables. This power analysis indicated a minimum sample of 210 Healthy Start participants was needed for this study for a small-medium effect size (f^2=0.09) at a power of 0.80 and a significance level of 0.05. A second power analysis was conducted using the Raosoft sample size calculator (Raosoft Inc, 2004). This calculator used the expected sample size based on the average number of Healthy Start program participants providing a

confidence level. The analysis concluded a minimum sample size of 270 was appropriate at a confidence level of 95%.

Finally, the study created structural equation models (SEM). SEM models typically use sample sizes between 200-300 participants (Kline, 2011). If the sample is too large small data discrepancies can result in a statistical significant value of the chi square statistic, however small samples under 200 can make it difficult to reject the model (Kline, 2011). A Monte Carlo simulation study was conducted for this study to calculate sample size and determine power. Monte Carlo simulation takes into account parameter estimates, standard errors, estimated confidence intervals and power in models that have been specified for SEM (Muthen & Muthen, 2002). The Monte Carlo simulation study generated the data from the parameter values of a hypothesized population with large sample numbers. A simulated model was estimated for each sample and parameters and standard errors were averaged across the samples (Muthen & Muthen, 2002). The results of the Monte Carlo power analysis indicated the proposed study needed a sample size of 400 at a power of 0.80 and a significance level of 0.05 in order to detect small to moderate effects. Based on the power analyses the current sample size of 411 participants is adequate for the statistical analyses conducted.

Instruments

The study used three instruments to collect participant data on social supports, perceived stress and birth outcomes. Complete versions of these tools can be found in Appendix A, B and C.

Social Support Questionnaire (SSQ6)

The study used the Social Support Questionnaire (SSQ6), a self-administered six item scale available in English and Spanish (Acuña & Bruner, 1999; Sarason et al., 1983) completed by all Healthy Start participants at program entry. It is a validated self-administered instrument consisting of 12 items (6 questions about who provides specific supports, and 6 asking about satisfaction with those supports). The instrument measured the number of supports available to the respondent and satisfaction with those supports (Sarason et al., 1983). The items in the scale ask subjects to list up to nine persons by relationship (mother, sister, friend etc.) they can turn to or rely on in given circumstances. Each question then asks participants to indicate how satisfied they are with the support received. The number of individuals is the "N" score for each item. Satisfaction is assessed with a satisfaction score (S) for each item ranging from 1 (very dissatisfied) to 6 (very satisfied). Overall N and S scores are obtained by adding N or S scores for all items in the scale and dividing by 6 which is the number of items for each category (Sarason et al., 1983).

Validity tests show significant correlation between the SSQ and a depression scale (range from -0.22 to -.043) and strong correlations between an optimism scale and the satisfaction score (S; $r = .57$), and the number score (N; $r = .34$) (Sarason et al., 1983). Reliability of the questionnaire yielded an inter-item correlation ranging from 0.35 to 0.71 ($M = 0.54$). The Cronbach's alpha for internal reliability was 0.97. Inter-item correlations for satisfaction scores (S) ranged from 0.21 to 0.74 and the coefficient alpha was 0.94. Test-retest correlations of 0.90 for overall "N" scores and "S" scores of 0.83 were reported (Sarason et al., 1983). The SSQ was stable over a 4-week period.

Perceived Stress Scale (PSS10)

Healthy Start Pinellas participants also completed the PSS10 at program entry. The PSS10 is a brief self-reported scale that evaluated the level of perceived stress during the last month (Cohen et al., 1983). The tool is available free of charge in English and Spanish. It measures stress using items that assess how unpredictable, uncontrollable and overloaded respondents found their lives to be during the last month (Cohen et al., 1983). By measuring perceived stress, PSS10 is expected to predict a respondent's increased risk for psychological and physical symptoms of disease as well as health behaviors (Cohen et al., 1983). There are 10 items rated on a 5-point scale ranging from 0 (never) to 4 (very often), for a range of 0 to 40. Total scores are obtained by reversing responses of items 6, 7, 8 and 9 (such as 0=4, 1=3, 2=2, 3=1, and 4=0) and then adding the 10 item scores. The scale has adequate reliability $\alpha = .82$, test-retest r=.77, validity (concurrent) and sensitivity (Remor, 2006).

Healthy Start Prenatal Screens

Florida Law Code 383.216 requires obstetric providers to screen all pregnant women at their first prenatal care visit for Healthy Start services using the Healthy Start screening form ("Community based prenatal and infant health care," 2001). The instrument is self-reported and available in English and Spanish. The mother responds to the screening questions asked by a nurse or a Healthy Start care coordinator at their obstetric office.

The Healthy Start screen addressed a list of demographic, medical and psychosocial risk factors that, when present, could potentially affect birth outcomes (Florida Department of Health, 2014). The questions included information regarding educational attainment, marital status, ethnicity, previous pregnancy outcomes, substance use, questions addressing mental health, chronic conditions, economic hardship, entry to prenatal care and body mass index (BMI)

information. As with other self-reported tools, it is limited by what the mother wants to share about her life and by what she can recall at the time she is asked. An evaluation of the screening form by the Florida Department of Health indicated the screen performs well identifying women who will experience poor birth outcomes, dispelling some of the concerns about self-reporting (Simmons, 2007). Healthy Start prenatal screen data are available through the HMS and WFS systems at the Florida Department of Health in Pinellas, the lead agency for Healthy Start services in Pinellas County.

Study Variables

Study variables were collected from these three instruments currently in the HMS and WFS data systems. The following is a description of the observed and latent variables used in this study.

Observed Variables

In this study, observed variables refer to variables that are directly measured by the instruments. In structural equation model diagrams, boxes are used to describe observed variables and single headed arrows represent causal relationships (see figure 7). The following is an explanation of the observed variables in the study.

Socio-demographics

The following socio-demographics were obtained from the Healthy Start prenatal screens: marital status (married) as dichotomous married yes/no, maternal education (educ) as completed high school or GED yes/no, maternal ethnicity (White, Black or Latina), trouble

paying bills (trobbill) as a proxy for socioeconomic status (dichotomous yes/no), and maternal age (age) as continuous.

Health risk factors

Information on health risk factors was obtained from the Healthy Start prenatal screen. Health risk factor variables included: late prenatal care (PNC) as dichotomous (1st trimester=No, 2nd and 3rd trimester=yes), tobacco use (smoke) as dichotomous (smoker yes/no), condition or illness requiring ongoing medical care (such as diabetes and hypertension) (ongmedc) as dichotomous, and Body Mass Index (BMI) as continuous.

Birth outcome data

Information about birth outcomes was gathered from the HMS and WFS Healthy Start data systems. Healthy Start staff at the Florida Department of Health in Pinellas document birth outcomes (birth weight and gestation) from vital statistics into the HMS system for all women screened using the Healthy Start screening form. The following outcomes variables were tested in this study:

- *Infant birth weight (Infbw)*: collected as a continuous variable in pounds and ounces.
- *Low birth weight (lbw)*: as a dichotomous variable (yes/no lbw); low birth weight is defined as a baby that was born at less than 5 lbs. 5 oz.
- *Preterm birth (preterm):* as a dichotomized variable (yes/no preterm); defined as an infant delivered under 37-week gestation (as per vital statistics that, at the time, collected it using date of last menstrual period).

- *Small for gestational age* (SGA): measured as a dichotomous variable (yes/no SGA) using birth weight and gestational age. Infants born under the 10th percentile were considered SGA as established by the criteria published by Alexander et al. (1996).

Length of time living in Pinellas (TimePin)

The Pinellas Healthy Start program added a question to the Spanish SSQ6 asking length of time living Pinellas County (in months). This continuous variable was used as a proxy to acculturation for Latina participants. For most of the Healthy Start Latina participants, Pinellas was the only place of residency since their arrival to the United States. The Healthy Start program receives state funding based on yearly legislative budget approval. Asking specific questions that could target individuals as undocumented in the HMS and WFS data systems could be politically conflicting. This measure, although only a proxy, addressed how well rooted the individual may be in the community without necessarily identifying the person as undocumented or non-citizen.

Language (Lang)

The SSQ and PSS10 are completed in either English or Spanish based on the program participant's preference. Language chosen was a dichotomized variable (Spanish yes/no).

Social support score (NScore)

The social support score (NScore) in the SSQ6 was calculated by adding the total number of people mentioned as supports in all items and dividing it by 6 which is the total number of items (Sarason et al., 1983). This score gave information about who provided the needed support for study participants and the extent of their overall support networks.

Family support score (SSQFam)

The SSQ6 allows researchers to calculate an SSQ family score by adding the total number of people mentioned that are family members (significant other/spouses, mother, father, sister, brother, aunt, etc.) (Sarason et al., 1983). The family support score gave vital information about who provided the needed support for study participants and the extent of their family networks. It was also one of the three measures used to describe the latent social support variable in SEM models.

Non-family support score (SSQNfam)

The non-family support score was calculated by adding non-family members mentioned as supports by participants in the SSQ6. This score provided information about the people available to provide support to participants outside of the family network (friends, social workers, therapists, church, etc.). The non-family support score was also one of three measures used to describe the latent social support variable.

Satisfaction score (SSQsatis)

The SSQ6 asked participants to rate their overall satisfaction with the people they mentioned as supports on each given question. Satisfaction ranges from 1 (very dissatisfied) to 6 (very satisfied). Satisfaction scores were computed by adding the score of each question and dividing the sum of the satisfaction scores by 6, which is the number of items. The satisfaction score served as one of three measures used to describe the latent social support variable.

Prenatal stress (PSS10 score)

A PSS10 score was obtained for each participant at program entry to assess non-specific stress during pregnancy. Total scores were obtained by reversing responses of items 6, 7, 8 and 9 (such as 0=4, 1=3, 2=2, 3=1, and 4=0) and then adding the 10 item scores. The ten observable scores were also used to describe the unobserved latent variable of perceived prenatal stress for study participants.

Latent Variables

Latent variables in structural equation models used observed variables that are directly measured in order to infer the unobserved latent factor. They are represented by circles in SEM diagrams (see figure 7).

Social support (SS)

For this study the latent social support variable (SS) was created using the observed variables for total number of family supports (SSQFam), total number of non-family supports (SSQnonf) and the total satisfaction score (SSQsatis).

Perceived prenatal stress (Stress)

A latent prenatal stress variable (stress) was created using each of the ten responses to the questions in the Perceived Stress Scale10 (responses to items PSS1-PSS10). The items measured perceived non-specific stress. The ten observable scores described the unobserved latent variable of perceived stress for study participants.

Analysis

The analysis included descriptive statistics, ANOVA, Principal Component Analysis (PCA), linear and logistic regressions to inform the final structural equation models (SEM). SEM is the statistical technique that was used to test and estimate direct and indirect causal relations between social supports, perceived stress and birth outcomes in the presence of other confounding factors. SEM has the ability to use latent variables (implied variables) which are variables not measured directly but estimated in the model based on other indicators (observed variables). Social supports and perceived stress are abstract concepts based on the respondent's perception of available support, satisfaction with support and their personal interpretation of generalized stress. SEM used these implied and observed correlations to create covariance structures to test the hypothesis of the relationships between the variables as a model, rather than as individual relationships.

Study data was entered from HMS and WFS into a new database using SPSS22 statistical software. Client names, date of birth and other identifiable information were removed at time of data entry into the SPSS database. A client identification number was assigned to each participant. All data was visually inspected for accuracy by the principal investigator. Descriptive statistics were examined for each observed variable including frequencies, mean, and standard deviation when appropriate. In addition, dummy variables were created as needed for categorical variables, and all variables were examined for non-zero variance, multicollinearity and outliers.

There are no established cutoffs of an acceptable percentage of missing data. However, missing data can lead to biased estimates, loss of information, problems with statistical power and increased chance of errors (Dong & Peng Joanne, 2013). A missing data percent between

15-20% is common in studies (Dong & Peng Joanne, 2013; Enders, 2003). Only 0.39% of the data was missing in the current study. The study used a linear extrapolation replacement technique with SPSS software to address issues with missing data. This method replaced missing values by using the last valid value before the missing value and the first valid value after the missing value for interpolation. If there was a missing value in the first or last case of the series, the missing value was not replaced. This technique was found to be an appropriate data replacement technique in the literature and in similar perinatal structural equation model studies (Lobel et al., 2008; McKnight, McKnight, Sidani, & Figueredo, 2007).

All variables had variance within the values (they did not have all the same value). Non-zero variance analysis looked at dispersion of the data. All study variables had non-zero variance.

Multicollinearity identified variables that could potentially measure the same construct. The inclusion of variables that are highly correlated could reduce the impact of the overall model. A correlation matrix was created to indicate any variables correlating higher than 0.70. Any highly correlated variables were excluded (none were identified in this study). Once descriptive statistics and multicollinearity matrices were completed, the data was tested by using ANOVA, PCA and t-tests to identify statistically significant variables. Regression analysis (multivariable and logistic) was also used to describe how each observed variable (family support score, non-family support score, PSS score, years in Pinellas, language, ethnicity, maternal age, marital status, education, problem paying bills, prenatal care, BMI, smoking, ongoing medical care) affected infant birth weight, low birth weight, preterm birth and SGA. The data was then examined in separate SEM models (all ethnic groups and separating by ethnic group) to understand the direct and indirect impact of the latent variables of social supports and

perceived stress on infant birth weight, low birth weight, preterm birth and small for gestational age in the presence of health risk factors.

SEM Models

SEM provided an opportunity to define social supports and perceived stress using multiple indicators from validated surveys, therefore correcting some of the possible measurement bias, reducing error, and yielding more powerful hypothesis tests (Allison, 2013). The SPSS data file was imported to MPlus to conduct a structural equation model (SEM) analysis.

The first step in SEM was to specify the model. Model specification required the creation of a diagram depicting the theoretical relationships between the variables based on the literature. The model included observed and latent variables as well as parameters that were estimated (arrows) (see figure 7). Once it was specified, the next step was to identify the model. A model was considered identified if the number of parameters is less than the number of observations.

Following identification, the SEM models were estimated. This step included the creation of an observed correlation matrix and an implied correlation matrix using MPlus software (theoretical model). In this step, the analysis was meant to find parameters that were as close as possible to the observed correlation matrix in the general population. Maximum Likelihood Estimation (MLE) was used to estimate the parameters of the models. Maximum Likelihood is an iterative method of estimation of parameters. It repeatedly attempts to get estimates of parameters that can result in the best fit of the model to the data.

Once the model was estimated, the model was tested to assess how well the model described the data. A total of sixteen SEM models were initially created and analyzed in this study based on the model specification (figure 7):

- Infant birth weight models: total sample (all ethnicities), White, Black, Latina
- Low birth weight models: total sample, White, Black, Latina
- Preterm birth models: total sample, White, Black, Latina
- SGA models: total sample, White, Black, Latina

The models were tested for goodness of fit using various fit indices, as indices can be sensitive to the type of variable (categorical vs. continuous), sample size and residuals. A Chi square test of model fit with a statistic greater than 0.05 indicated good fit and a Comparative Fit Index (CFI) value over 0.95 indicated a good model fit. In addition, the Root Mean Square Error of Approximation (RMSEA, the most robust measure) was also used to assess model fit with a value of less than 0.05 indicating good fit. The Standardized Root Mean Square Residual (SRMR) with a value under 0.05 can confirm a good fit. For categorical outcomes (low birth weight, preterm birth and SGA), Mplus replaced the SRMR with a Weighted Root Mean Square Residual (WRMR). A WRMR value of less than 0.90 indicates good fit. When the models had poor fit, equivalent models were modified and examined by removing and adding parameters. A simplified model is presented without demographics or health risk factors as a result of model modification since simpler models can at times provide better fit.

Application to Research Questions

This section discusses how the methodological approach and analysis helped answer the specific research questions in this study of social supports, perceived stress and birth outcomes.

Research question 1: What are the sources and gaps in available social supports of Healthy Start Pinellas pregnant Latina mothers at program entry?

The scores obtained from the observed variables of social support score (NScore), family support score (SSQFam) and non-family support score (SSQnonf) helped to describe statistically who provides support to Latina mothers and the extent of support networks. Social support score, family support score and non-family support scores were compared by ethnic groups using ANOVA to better understand ethnic differences across groups.

Research question 2: What are the strengths of those social supports as defined by the quality of support?

The descriptive analysis of the SSQ satisfaction score (SSQsatis) helped to answer how satisfied Latina mothers were with their social supports overall. This provided some understanding of the quality of the support available. ANOVA analysis compared satisfaction scores by ethnic groups to better understand ethnic differences across groups.

Research question 3: What is the direct and indirect impact of social supports and perceived stress on Latina mothers' birth outcomes (infant birth weight, preterm birth and small for gestational age)?

The first step was an analysis of the Prenatal Stress Score (PSS10 score) for all study participants. PSS10 scores were compared by ethnic groups to better understand any ethnic differences across groups. In addition, a Principal Component Analysis was used to identify if the sample showed different dimensions (components) in the interpretation of the PSS10 questions that can better help explain PSS10 scores by ethnic group.

In preparation for the SEM models a series of regressions were performed to identify variables that significantly contributed to each birth outcome (infant birth weight, low birth weight, preterm birth and SGA). This process helped identify variables that were expected to be relevant in the SEM models.

A series of SEM models were constructed to determine the direct and indirect impact of social support and stress on birth outcomes. Infant birth weight, low birth weight, preterm birth and SGA models were created for the total participants, White, Black and Latina. Each model included any direct and mediated (indirect) relationships between social support, stress and the corresponding birth outcome in the presence of socio demographics and health risk factors. The Latina model included language and length of time in Pinellas as a variable to identify any unique patterns for Latina clients. A total of sixteen SEM models were initially created, compared and analyzed in this study. Alternative models were produced to attempt to improve model fit.

Table 3: Summary of research questions, variables and statistical analysis

Research Question	Variables	Statistical Analysis*
Research question 1: What are the sources and gaps in available social supports of Healthy Start Pinellas pregnant Latina mothers at program entry?	*Dependent variables*: Total support score, family support score, non-family support score *Independent variables* : Ethnicity	ANOVA
Research question 2: What are the strengths of those social supports as defined by the quality of support?	*Dependent variable* : Satisfaction score *Independent variable* : Ethnicity	ANOVA
Research question 3: What is the direct and indirect impact of social supports and perceived stress on Latina mothers' birth outcomes (infant birth weight, preterm birth and small for gestational age)?	*Dependent variables* : Infant birth weight, low birth weight, preterm birth, SGA *Independent variables* : Family support score, non-family support score, satisfaction score, PSS score, years in Pinellas, language, ethnicity, maternal age, marital status, education, trouble paying bills, late PNC, BMI, smoking, ongoing medical care	Correlation T-test PCA ANOVA Regression analysis (linear, multiple and logistic)
	Latent variables : Social support, perceived prenatal stress *Observed variables (describing latent variables)* : Family support score, non-family support score, PSS score *Observed variables (confounders)* : Years in Pinellas, language, ethnicity, maternal age, marital status, education, trouble paying bills, late PNC, BMI, smoking, ongoing medical care *Observed variables (birth outcomes)* : Infant birth weight, low birth weight, preterm birth, SGA	Structural Equation Modeling

* Descpritive statistics will be examined for each variable by research question

CHAPTER FOUR

RESULTS

Study results presented in this chapter start with descriptive statistics, and are organized by research question. A summary table of results comparing ethnic groups' results is provided by birth outcome at the end of each statistical test.

Demographics for Total Participants

The Healthy Start program focuses on providing services to pregnant women at risk of poor birth outcomes as identified by the Healthy Start screening form. The study sample reflected this focus. Tables 4 and 5, at the end of the demographics section, summarizes demographics for all study participants by ethnicity.

The total sample was composed of 80.6% medium and high-risk women (18% low, 56% medium and 24.6% high risk). Over 75% of study participants resided in cities identified by Pinellas community organizations as having the largest risk of poor birth outcomes. Almost 26% of participants resided in St. Petersburg (n=106), 25% resided in Clearwater (n=105), 17% in Largo (n=70), and 7% in Pinellas Park (n=30). Consistent with Census data, ethnic minorities in this study clustered in specific low income high-risk areas. The majority of Latinas lived in North County Clearwater area (45%, n=43), while the majority of Black participants lived in South County St. Petersburg area (40%, n=58).

The Healthy Start program has an over representation of minority groups, as poor birth outcomes are associated with racial disparities. This was reflected in the study sample, which

has a large representation of minority groups compared to the county population. The sample was 38.4% white and 58.6% non-white (34.5% Black, 24% Latina and 2.9% other). The mean age of study participants was 27.5 years old. Most study participants were single (82.7%), and 34.1% did not complete a high school education. Other indicators of risk included 38.4% answered they had trouble paying their bills, 72% had Medicaid insurance during pregnancy, 15.3% were uninsured, 35.5% responded they felt depressed and 28% of the total sample had a history of mental health counseling. Most of the women entered prenatal care in the first trimester (65%) and 20.9% smoked during pregnancy (twice the percent seen in pregnant women countywide). The average pre-pregnancy BMI was 27.68, indicating most mothers were overweight prior to pregnancy. Spanish speaking participants represented 18.9% of the total sample. Regarding birth outcomes, 13.1% had a low birth weight baby, 10.7% had a preterm baby, and 14.8% had a baby that was small for gestational age.

Demographics for Latina Participants

The majority of Latinas in the study lived in Clearwater (45%, n=43), with smaller numbers living in Largo (21%, n=20), St. Petersburg (14%, n=13) and Pinellas Park (12%, n=11). For 79% of Latinas, Pinellas was the only place they had lived in the United States. The average number of years living in Pinellas County was 7.41. The percent of Latinas that reported being born outside of the United States mainland was 81.8 (n=81), more than half of them were Mexican (n=58). Most Latinas (85.3%) were medium to high risk based on their Healthy Start risk level (compared to 75% of the White women and 84% of Black women in the sample). Only 13.7% of Latinas were low risk (compared to 24.2% of White and 14.7% of Black participants). Spanish was the first language of 76.7%. The mean age of Latinas was 28.62 years, similar to White but slightly higher than that of Black participants (25.41). As with other

ethnicities, Latinas were mainly single (83.8%). However, unlike other ethnic groups, over a third of Latinas (44.4%) did not have a high school diploma or GED compared to White (27.2%) and Black participants (34.5%). Regarding socioeconomic indicators, 33.3% of Latinas responded they had trouble paying bills (39.2% for White and 35.9% Black). As expected given their foreign-born status, Latinas had the highest percent of no insurance (52.5%) compared to other ethnic groups (White was 3.8% and Black 2.8%). Latinas also had the lowest percentage of pregnancies covered by Medicaid insurance (39.4%) compared to White (79.5%) and Black (88.7%).

Stress and depression are associated to poor birth outcomes in the literature and 38.4% of Latinas felt depressed at the time of the Healthy Start screen. However, only 15.2% of Latinas had a history of mental health counseling compared to White (40.5%) and Black (21.8%). Latinas had the lowest percent of entry to prenatal care in the first trimester (57.6%) compared to White (60.8%) and Black (72.5%). They also had the lowest percent of smoking during pregnancy. Only 4% of Latinas smoked compared to 36.7% of White and 14.8% of Black participants. The percent of Latinas with a condition requiring ongoing medical care was 24.2%. The average Latina pre-pregnancy BMI was 27.04, similar to the BMI of White and Black participants. Regarding birth outcomes, as expected Black women had the highest percent of poor birth outcomes and Latinas were consistently the second highest. The percent of low birth weight was 12.1%, preterm births for Latinas was 11.1%, and 11.1% delivered a small for gestational age baby. Table 4 and 5 summarize descriptive statistics for this study.

Table 4: Frequencies total and by ethnicity

	Latina (N=99) N (%)	White (N=158) N (%)	Black (N=142) N (%)	Total (N=411) N (%)
Marital status				
Single	83 (83.8)	126 (79.7)	126 (88.7)	340 (82.7)
Married	16 (16.2)	32 (19.9)	16 (11.2)	71 (17.3)
Education				
Completed HS or GED	55 (55.6)	115 (72.8)	93 (65.5)	271 (65.9)
Did not complete HS or GED	44 (44.4)	43 (27.2)	49 (34.5)	140 (34.1)
Socioeconomic status				
Trouble paying bills	33 (33.3)	72 (45.6)	51 (35.9)	158 (38.4)
Medicaid (Yes)	39 (39.4)	126 (79.5)	126 (88.7)	296 (72.0)
No insurance	52 (52.5)	6 (3.8)	4 (2.8)	63 (15.3)
Mental health				
Felt depressed (Yes)	38 (38.4)	62 (39.2)	45 (31.7)	146 (35.5)
History mental health counseling (Yes)	15 (15.2)	64 (40.5)	31 (21.8)	115 (28.0)
Entry to prenatal care (trimester)				
1st trimester	57 (57.6)	96 (60.8)	103 (72.5)	267 (65.0)
2nd trimester	39 (39.3)	51 (32.2)	36 (25.3)	127 (30.9)
3rd trimester	3 (3.03)	11 (6.96)	3 (2.1)	17 (4.1)
Substance abuse				
Smoker	4 (4.0)	58 (36.7)	21 (14.8)	86 (20.9)
Ongoing medical care				
Yes	24 (24.2)	55 (34.8)	35 (24.6)	118 (28.7)
No	75 (75.8)	103 (65.2)	107 (75.4)	293 (71.3)
Birth Outcomes				
Preterm birth (yes)	11 (11.1)	15 (9.5)	18 (12.7)	44 (10.7)
Low birth weight (yes)	12 (12.1)	20 (12.7)	22 (15.5)	54 (13.1)
SGA (yes)	11 (11.1)	22 (13.9)	28 (19.7)	61 (14.8)

Table 5: Mean total and by ethnicity

	Latina Mean (SD)	**White** Mean (SD)	**Black** Mean (SD)	**All** Mean (SD)
Maternal age (years)	28.62 (7.02)	28.35 (6.28)	25.41 (5.32)	27.46 (6.32)
BMI	27.04 (6.34)	27.51 (6.68)	28.07 (8.67)	27.68 (7.42)
Gestational weeks at delivery	38.45 (2.91)	38.58 (2.08)	38.31 (2.64)	38.45 (2.47)
Infant birth weight (pounds)	7.16 (1.60)	7.13 (1.37)	6.70 (1.27)	6.99 (1.40)
Years in the U.S.A. (Latina only)	9.11 (5.28)	N/A	N/A	N/A
Years in Pinellas (Latina only)	7.41 (5.31)	N/A	N/A	N/A

Results by Research Question

Research Question 1: What are the Sources and Gaps in Available Social Supports of Healthy Start Pinellas Pregnant Latina Mothers at Program Entry?

The SSQ scores administered at program entry revealed study participants overall had small social support networks. The range of values for the SSQ6 instrument for total support score was from 0 to 9. The range of values for family support score and for non-family support score was from 0 to 54. The mean total social support score for study participants was only 2.3. Latinas had the smallest mean social support scores (1.6) compared to White (2.6) and Black (2.5).

Results also indicate study participants' networks were mainly composed of family members. Latinas' social networks were also composed mainly of family members, however the mean of family members available to provide support was smaller than those of other groups (SSQFam score= 8). Whites had the highest mean score of family and non-family supports. When compared to White and Black, Latinas had the lowest non-family support mean score (SSQnonf= 1.4). The table below provides a summary of support scores by ethnicity.

Table 6: Mean social support scores by race/ethnicity

	Latina	**White**	**Black**	**All**
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Family support score (SSQFam)	8 (4.8)	12.3 (7.7)	12.2 (6.4)	11.2 (6.8)
Non-family support score (SSQnfam)	1.4 (2.4)	3.2 (4.5)	2.9 (4.0)	2.7 (3.4)
Total social support score (Nscore)	1.6 (1.0)	2.6 (4.5)	2.5 (1.3)	2.3 (1.3)

Social support scores, family support scores and non-family support scores were compared by ethnic group using ANOVA to understand any statistical mean differences across groups. The results indicate there was no homogeneity of variance; therefore, the Welch test was used to assess differences. The test indicated there are statistical differences between ethnic

groups in mean total social support score ($F(3, 52.38)= 19.40$, $p<0.001$), family support score ($F(3, 52.06)=14.710$, $p<0.001$) and non-family support scores ($F(3, 53.69)=7.47$, $p<0.001$).

Post hoc results using the Scheffe method indicated Latinas also had significantly lower total support mean score compared to both White and Black ($p=0.000$). However, White and black participants' total support mean scores were not statistically different from each other. Latinas also had significantly lower family support mean scores compared to White and Black study participants ($p=0.000$). White and Black mean scores were not significantly different from each other. For non-family support means, Latinas were significantly lower than White ($p=0.005$), and significantly lower than Black scores ($p=0.043$). The means for White and Black participants were not significantly different from each other.

Sources of social support

As to the sources providing social supports, the results varied by ethnic group. The SSQ6 allowed respondents to nominate up to nine individuals that provided the type of support addressed in each of the six questions. This analysis of primary sources of support accounted for the first person most frequently nominated for each of the six questions. White participants mentioned mothers as their primary sources of supports as they felt they could depend on them and cared for them. They were also the most frequent response for making respondents feel accepted and relaxed. However, the majority of White participants mentioned their boyfriends as their primary source of support to make them feel better when they were down, and they felt they could count on boyfriends to console them. It is unclear if the boyfriend was also the father of the baby as White respondents only mentioned them as boyfriends.

Respondents' mothers were mentioned as the primary source of support for Black participants in all types of social supports elicited by the SSQ6. Latinas responses for primary

source of support were different than White and Black participants. Latinas specified father of the baby (not boyfriend) as the primary social support for each of the six survey questions. The table below summarizes the primary sources of support mentioned for each question in the SSQ6 instrument.

Table 7: SSQ6 primary sources of support by race/ethnicity

Question	Latinas	White	Black	All
Q1. Count on to be dependable	father of baby	mother	mother	mother
Q2. Count on to help feel relax	father of baby	mother	mother	mother
Q3. Accepts you totally	father of baby	mother	mother	mother
Q4. Count on to care about you	father of baby	mother	mother	mother
Q5. Count on to help you feel better	father of baby	boyfriend	mother	mother
Q6. Count on to console you	father of baby	boyfriend	mother	mother

Research Question 2: What are the Strengths of those Social Supports as Defined by the Quality of Support?

SSQ6 satisfaction scores ranged from 1 (not satisfied) to 6 (highly satisfied). All study participants responded as being highly satisfied with their social supports regardless of ethnic group. Table 8 provides a summary of satisfaction scores for the total study sample and a breakdown by ethnic group.

Table 8: Satisfaction with social supports

	Latinas	White	Black	All
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Total satisfaction score	5.3 (0.7)	5.5 (0.8)	5.6 (0.8)	5.5 (0.8)

Results from the ANOVA analysis compared satisfaction mean scores by ethnic groups to understand if there were differences across groups. In this instance, the Levene test was used indicating homogeneity of variance was not violated. The results indicated that at a significance level of $p<0.05$, there was a difference between ethnic groups regarding total satisfaction mean scores ($F=4.748$, $df=3, 407$, $p=0.003$).

Post hoc results using the Scheffe method indicated Latinas' satisfaction mean score was significantly lower than Black participants'(p=0.013). White mothers were not statistically different than Latinas, and White and Black participants were not statistically different from each other. The results from all social supports scores indicated there was something unique about Latinas social support network size, composition and perceived quality of available support compared to White and Black that merited an analysis of these variables by ethnicity in more complex regression and SEM models.

Research Question 3: What is the Direct and Indirect Impact of Social Supports and Perceived Stress on Latina Mothers' Birth Outcomes (infant birth weight, preterm birth and small for gestational age)?

Question 3 step 1: Results of the perceived stress score (PSS10 score) analysis

The PSS10 scores ranged from 0 (no stress) to 40 (high stress). A descriptive analysis of PSS10 scores revealed unexpected low stress scores for this study's medium to high-risk participants. Cohen and Williamson's publication on perceived stress using the PSS10 found the mean PSS10 score in the general White population was 12.8, and for Black was 14.7 (1988). As Table 9 indicates, the study sample was only slightly higher than the mean identified by the instrument's author. However, for Latina study participants the PSS10 mean score was 20.5, considerably higher than the 14.0 mean score found by Cohen and colleagues for the same population. Although the Perceived Stress Scale does not have a clear cut off for stress, studies by University of California researchers identified a PSS10 score of 13 as an average score and a score of 20 and higher as high stress and in need of stress reduction techniques (Epel & Laraia, 2012; Groesz et al., 2012). Based on this average score, the Latina study participants' mean

PSS10 stress score was considered high, placing them at risk of serious health consequences associated with stress (Christensen et al., 2016; S. Cohen et al., 2000; Crusto, de Mendoza, Connell, Sun, & Taylor, 2016; D'Anna-Hernandez et al., 2015; Groesz et al., 2012; Hertzman, 1999; Hilmert et al., 2008).

Table 9: Perceived stress scores (PSS10) by ethnicity

	Latinas	**White**	**Black**	**All**
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Total PSS10 Score	20.5 (8.1)	14.9 (8.7)	15.1 (7.6)	16.3 (8.4)

PSS10 mean scores were then compared by ethnic groups using ANOVA to statistically assess differences across groups. The Levene test indicated homogeneity of variance was not violated. Results at a significance level of $p<0.05$ indicated there were statistical differences between ethnic groups regarding stress scores ($F=11.39$, df=3, 407, $p=0.000$). Post hoc results using Scheffe indicated Latinas had significantly higher PSS mean scores than White and Black participants ($p=0.000$ for each). White and Black participants were not statistically different from each other.

Principal component analysis (PCA). Given the unexpectedly low PSS10 scores for White and Black study participants, a principal component analysis was conducted to determine whether the women showed different dimensions (components) in the interpretation of the PSS10 scores by ethnic group. This provided information on whether each group is interpreting the questions as measuring the intended component (generalized stress) or if more than one component is being interpreted from the PSS10 questions.

The analysis for Whites revealed a single component, which explained most of the variation in the sample (54.46%), with an eigenvalue of 5.67. However, Blacks exhibited two components that combined explained 63.19% of the variation in the responses. Black

component 1 had an eigenvalue of 4.149 and explained 41.5% of the variation. Black component 2 had an eigenvalue of 2.17 and explained 21.69% of the variation. Latinas also exhibited two components explaining together 66.8% of the variability. Component 1 had an eigenvalue of 4.64 and explained 46.36% of the variation. Component 2 had an eigenvalue of 2.04 and explained 20.45% of the variation in responses. For Blacks and Latinas, eight of the PSS10 questions responded to feelings about stress, while questions 4 (handling personal problems) and 7 (ability to control irritations in life) responded to a different construct (component 2) (see Appendix D for detailed PCA results). These findings could indicate that ethnic minorities may be interpreting those questions differently than the White sample, or that they may be experiencing a different level of stress compared to White participants.

Question 3 step 2: Results of regression analysis

Regression analyses (linear regression and logistic) were performed to identify how each observed variable was associated with infant birth weight, low birth weight, preterm birth and SGA. For Latinas, language and years living in Pinellas were added as independent variables in all regression models. The results below are reported for each outcome measure for the total number of participants and by ethnic group. A comparison table summarizing the significant results appears following the regression results. Detailed results for each analysis are included in Appendix F and G.

Infant birth weight (pounds and ounces). A multivariable linear regression used family support score, non-family support score, PSS score, maternal age, marital status, education, problem paying bills, prenatal care, BMI, smoker and ongoing medical care as independent

variables to predict infant birth weight. The significance level used was $p<0.05$. The results were as follows:

*Total sample***.** The model using all independent variables did not explain a significant portion of the variation of infant birth weight F= 1.12, df= 4, 396, p=0.340. Only 3% (R^2=0.033) of the variation of infant birth weight was explained by this model. Adding ethnicity as an independent variable did not improve the results.

Although the model as whole did not predict the variability of birth weight in the total sample, BMI was the only significant predictor in the model (t= 2.4, p=0.017). The results indicate if BMI increased by 1, then birth weight increased by 0.024 pounds.

White. The model using all independent variables did not explain a significant portion of the variation of infant birth weight in White participants (F= 1.326, df= 4,148, p=0.209). Only 10% (R^2=0.097) of the variation of infant birth weight was explained by this model. The model was not a good predictor of the variability in birth weight for White participants. Non-family support was the only significant predictor in the model (t=2.20, p=0.030). Results indicate if non-family support score increased by 1, then birth weight increased by 0.173 pounds.

*Black***.** The model using all independent variables did not explain a significant portion of the variation of infant birth weight F=.676, df=4,128, p=0.772. Only 6% (R^2=.060) of the variation was explained by the model. The model did not predict the variability of birth weight yet ongoing medical care was the only significant predictor in the model for Black infant birth weight (t=-2.16, p=0.033). The results indicated the absence of a condition requiring ongoing medical care can increase birth weight by 0.591 pounds.

*Latina***.** The model for Latinas included the same variables as for White and Black except marital status (married) due to lack of variability, and smoker due to the small number of smokers. The Latina model added language and years living in Pinellas County. The model was not significant F=1.614, df=13, 73, p=0.101. It explained 22% (R^2=0.217) of the variability of infant birth weight. The model did not predict the variability of birth weight in Latino participants. BMI was the only significant predictor of infant birth weight in Latinas (t=3.474, *p*=0.001). For each unit increase in Latina participant's BMI, birth weight increased by 0.09 pounds. Appendix F summarizes the findings of the linear regression analysis for infant birth weight.

Low birth weight (categorical). Logistic regression analyses were conducted using low birth weight as a dichotomous variable and using the same independent variables in the linear regression analysis.

Total sample. The model using all independent variables was not significant (*p*=0.061). The model predicted 9% of the variation of low birth weight. Adding ethnicity as an independent variable did not improve the results. Although the model did not predict low birth weight in the total sample, BMI (*p*=0.005) and having a condition requiring ongoing medical care (*p*=0.017) were significant predictors in the model. For each unit increase in mother's BMI, the odds of having a low birth weight baby increased by 0.925. Having a condition requiring ongoing medical care increased the odds of having a low birth weight baby by 2.135.

White. This model was significant (p=0.042). The model predicted 23.8% of the variation of low birth weight. In this model, education (*p*=0.049) and BMI (*p*=0.041) were significant predictors of low birth weight. Having more than a high school education decreased

the odds of having a low birth weight baby by 0.311. In addition, for each unit increase in mother's BMI, the odds of having a low birth weight baby decreased by 0.925.

Black. The model did not explain a significant portion of low birth weight p=0.271. The model predicted 17% of the variation of low birth weight. In this model, ongoing medical care was a significant predictor of low birth weight (p=0.022). Having a condition requiring ongoing medical care increased the odds of having a low birth weight baby by 3.808.

Latina. The model did not explain a significant portion of low birth weight p=0.341. The model predicted 27% of the variation of low birth weight. The Latina model did not have a significant predictor of low birth weight. Appendix G summarizes the findings for the low birth weight logistic regression analysis

Preterm birth. A logistic regression analysis was conducted using preterm birth as a dichotomous variable. Preterm birth was defined as an infant delivered before 37 weeks gestation. The independent variables were the same as with prior outcomes in this study.

*Total sample***.** The model using all independent variables explained a significant portion of preterm birth p=0.022. The model predicted 11.4% of the variation of preterm birth. The model predicted preterm birth in the total sample; being a smoker (p=0.02) and having a condition requiring ongoing medical care (p=0.004) were significant predictors in the model. Being a smoker increased the odds of being preterm by 0.297. Having a condition requiring ongoing medical care increased the odds of preterm birth by 2.719. Adding ethnicity as an independent variable did not change the results.

*White***.** The model using all independent variables did not explain a significant portion of preterm birth (p=0.236). The model predicted 19.4% of the variation in preterm birth. None of

the independent variables were significant predictors of preterm birth in White study participants.

*Black***.** The model using all independent variables did not explain a significant portion of preterm birth p=0.227. The model predicted 19.2% of the variation of preterm birth. Although the model did not significantly predict preterm birth in Black participants, having a condition requiring ongoing medical care was a significant predictor (p= 0.005) and increased the odds of preterm birth by 5.68.

*Latina***.** This model used the same variables as for White and Black participants excluding marital status and smoking. The model added language and years in Pinellas as independent variables. The model was not significant (p=0.258). It predicted 32% of the variation in preterm birth. None of the independent variables significantly predicted preterm birth for Latina participants. Appendix H summarizes findings of the preterm birth logistic regression analysis.

Small for gestational age (SGA). Logistic regression models were fit to analyze the associations between the independent variables and small for gestational age as a dichotomous variable. Small for gestational age was defined as an infant born below the 10th percentile for gestational age.

Total sample. The model using all independent variables was not significant p=0.216. It predicted 6.5% of the variation in SGA. The model did not predict SGA in the total sample however, maternal age was a significant predictor of SGA (p=0.045). For every year decrease in maternal age the odds of having an SGA infant increased by 0.947. Adding ethnicity as an independent variable did not change the results.

White. The model for White participants using all independent variables was not significant p=0.614. The model predicted 11% of the variation in SGA. None of the independent variables significantly predicted SGA for White participants.

*Black***.** The model for Black participants using all independent variables was not significant *p*=0.096. The model predicted 19.7% of the variation in SGA. The model as whole did not predict SGA in Black participants however, BMI was a significant predictor of SGA (*p*=0.019). For every decrease unit in BMI the odds of having an SGA infant increased by 0.904.

*Latina***.** This model used the same independent variables as in the White and Black models excluding marital status and smoking. Language and years in Pinellas were added as independent variables. The model was not significant (*p*=0.429). The model predicted 28.4% of the variation in SGA. Late prenatal care (PNC) predicted SGA for Latina participants (*p*=.04). Having late prenatal care increased the odds of having an SGA infant by 5.885. Appendix I displays the results for all SGA logistic regression analysis.

Table 10 summarizes only significant results of all regression analysis by outcome variable and ethnic group. Only the preterm birth regression model in the total sample was significant. None of the infant birth weight or SGA models were significant for the total sample or by ethnic group. Social support types, specifically non-family support, was only significantly associated with infant birth weight for Whites. There were no other associations of social support with any other birth outcome for the total sample or by ethnic group. Stress was not associated with any of the birth outcomes in the total sample or any of its subsets.

Table 10: Regression analysis results summary

Outcome Variable	Significant Variable	Significance	Cohen's *d*	Effect
Infant birth weight				
Total sample	BMI	p=0.017	0.124	small
White	non-family support	p=0.030	0.127	small
Black	ongoing medical care	p=0.033	-0.207	small
Latina	BMI	p=0.001	0.246	small
Low birth weight				
Total sample	BMI	p=0.005	0.4182	small
	ongoing medical care	p=0.017	-0.043	small
*White**	education	p=0.049	-0.6439	medium
	BMI	p=0.041	-0.0581	small
Black	ongoing medical care	p=0.022	0.7372	medium
Latina	None	None		
Preterm birth				
*Total sample**	smoker	p=0.02	-0.670	medium
	ongoing medical care	p=0.004	0.552	medium
White	None	None		
Black	ongoing medical care	p=0.005	0.957	large
Latina	None	None		
SGA				
Total sample	maternal age	p=0.045	-0.003	small
White	None	None		
Black	BMI	p=0.019	-0.055	small
Latina	Late prenatal care	p=0.04	0.997	large

* Indicates statistically significant model

Question 3 step 3: Structural equation modeling testing

The study diagram (Fig 7) included two latent variables: 1) a social support (SS) variable (composed of the observed variables family score, non-family score and satisfaction score) and a perceived stress variable (composed of the 10 observed scores in the PSS10 instrument). These latent variables were tested to assess direct and indirect effects (mediated by stress) of social supports and stress on infant birth weight, preterm birth and small for gestational age in the presence of demographic and health risk factors identified in the literature. As with the regression models, the Latina SEM analysis excluded marital status due to lack of variability, and smoker due to a small number of Latina smokers. SEM results include the original study

model and a simplified model that added a direct effect from social support to the birth outcome in the absence of health risk factors. Simpler models are used to try to improve model fit. Tables comparing results from SEM models by birth outcome are provided after a discussion of the model tested. Detailed results for the analyses can be found in Appendices J through M.

Model 1: Direct and Indirect Effects of Social Support and Stress on Birth Outcomes with Demographics and Health Risk Factors

Infant birth weight (pounds and ounces)

Total sample infant birth weight model 1. The SEM model for the total sample did not converge indicating all variables in the model were found to be uncorrelated with each other. None predicted or was associated with infant birth weight in the total sample. This confirms the findings of the infant birth weight linear regression of an overall poor fit for the total sample. Adding an ethnicity variable did not change this result.

White infant birth weight model 1. The chi square test of model fit had a value of 294.82, degrees of freedom 190 and a p-value of 0.000 at the 0.05 level. Chi square p-values under 0.05 indicate a poor model fit. The RMSEA estimate was 0.059 (a good fit is less than 0.05), the CFI was 0.880 (a good fit is over 0.95) and the SRMR was .064 (a good fit is under 0.05). All fit indices denote a poor model fit.

The results showed that although family support and satisfaction were good measures for the latent variable social support, in this model non-family support was not significantly contributing to the latent variable (p=0.463). Removing non-family supports did not improve the fit of the model. All observed variables for the latent variable stress were significant.

Stress had a significant direct negative effect on social supports (p= 0.000) confirming findings in the literature stating that a higher number of quality social supports can reduce stress in pregnant women. However, social supports did not have a significant indirect effect on infant birth weight (p= 0.220). Stress did not have a significant direct effect on infant birth weight (p=.211).

Trouble paying bills had a significant direct effect on social support (p=0.002) indicating a lack social supports can increase trouble paying bills. None of the variables was a significant predictor of infant birth weight. Figure 8 displays model 1 for White infant birth weight. The blue lines indicate significant relationships.

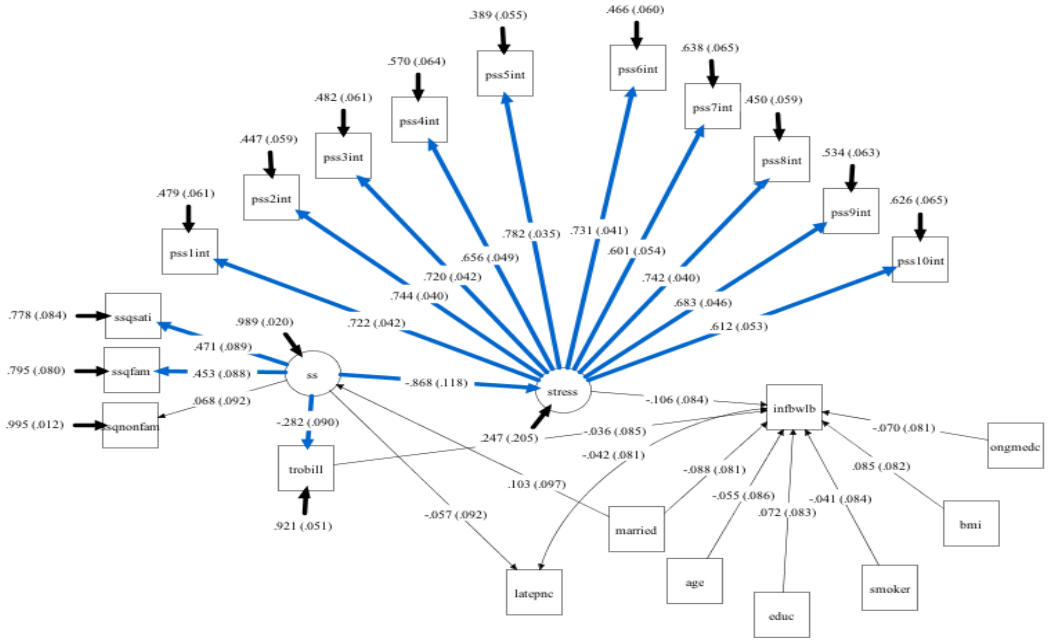

Figure 8: Model 1 White infant birth weight

Note: Blue lines indicate significant relationships at p=<0.05

Black infant birth weight model 1. The value of the chi square test of model fit was 414.5, degrees of freedom 190 and a p-value of 0.000 at the 0.05 level. The RMSEA estimate

was 0.091, the CFI was 0.613 and the SRMR was .093. All fit indices indicated a poor model fit for Black participants.

The results show that unlike White participants, satisfaction with social support was not a good measure for the latent variable social support (p=0.378). Family (p=0.011) and non-family support (p=0.016) were significantly contributing to the latent variable. All observed variables for the latent variable stress were significant except PSS7 (p=0.242) strengthening the findings from the Principal Component Analysis indicating the PSS10 could be measuring different components of stress in Black participants.

Similar to White participants, stress had a significant direct negative effect on social supports (p= 0.003) indicating social supports can reduce stress in pregnant women. Trouble paying bills also had a significant direct effect on social support (p=.048) indicating, as it did for Whites, that a lack of social supports can lead to a higher financial burden. Unlike White participants, for Black women having an illness needing *ongoing medical care* was a significant predictor of infant birth weight (p=.026) confirming the findings from the previous linear regression model. For Black participants, having an ongoing medical care issue decreased infant birth weight by 0.194 pounds. Social support did not have a significant indirect effect on infant birth weight (p= 0.443). Stress did not have a significant direct effect on infant birth weight (p=0.353).

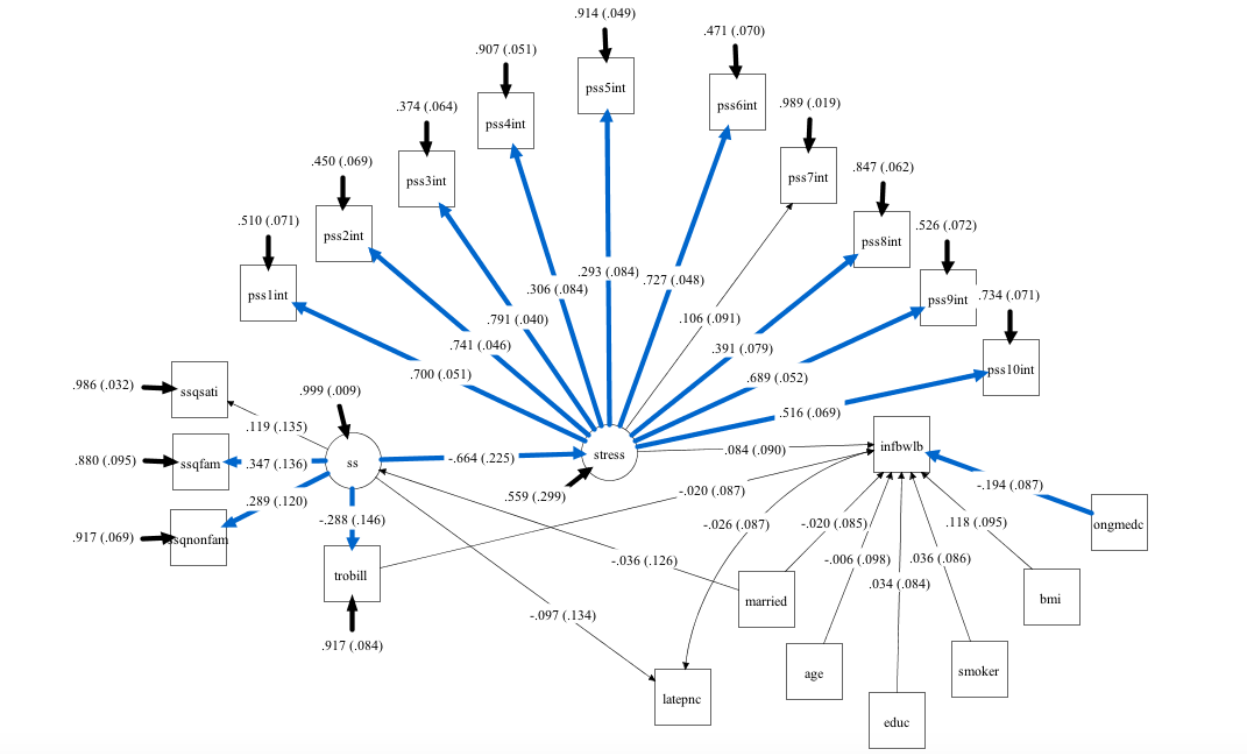

Figure 9: Model 1 Black infant birth weight

Note: Blue lines indicate significant relationships at p=<0.05

Latina infant birth weight model 1. The chi square test of model fit had a value of 399.688, degrees of freedom 191 and a p-value of 0.000 at the 0.05 level. The RMSEA estimate was 0.112, the CFI was 0.646 and the SRMR was 0.131. All fit indices indicated a poor model fit.

The results demonstrate that family support and satisfaction were good measures for the latent variable social support, however as in the White participant model, non-family support was not significantly contributing to the latent variable (p=0.228). Removing non-family supports did not improve the fit of the model. All observed variables for the stress latent variable were significant.

As in previous models, stress continued to have a significant direct negative effect on social supports (p= 0.000). A lack of social supports can increase stress scores by 0.801 in

Latinas. Trouble paying bills also had a significant direct effect on social support (p=0.002). The absence of social supports increased the odds of experiencing trouble-paying bills by 0.379. Social supports did not have a significant indirect effect on infant birth weight (p= 0.134). BMI was the only variable with a significant effect on birth weight for Latinas (p=0.000). For each BMI unit increase in Latina mothers, birth weight increased by 0.336 pounds. Figure 10 is a visual diagram of the relationships between variables for the Latina model 1 infant birth weight model. Appendix J summarizes the findings for all Model 1 infant birth weight models analyzed in this study.

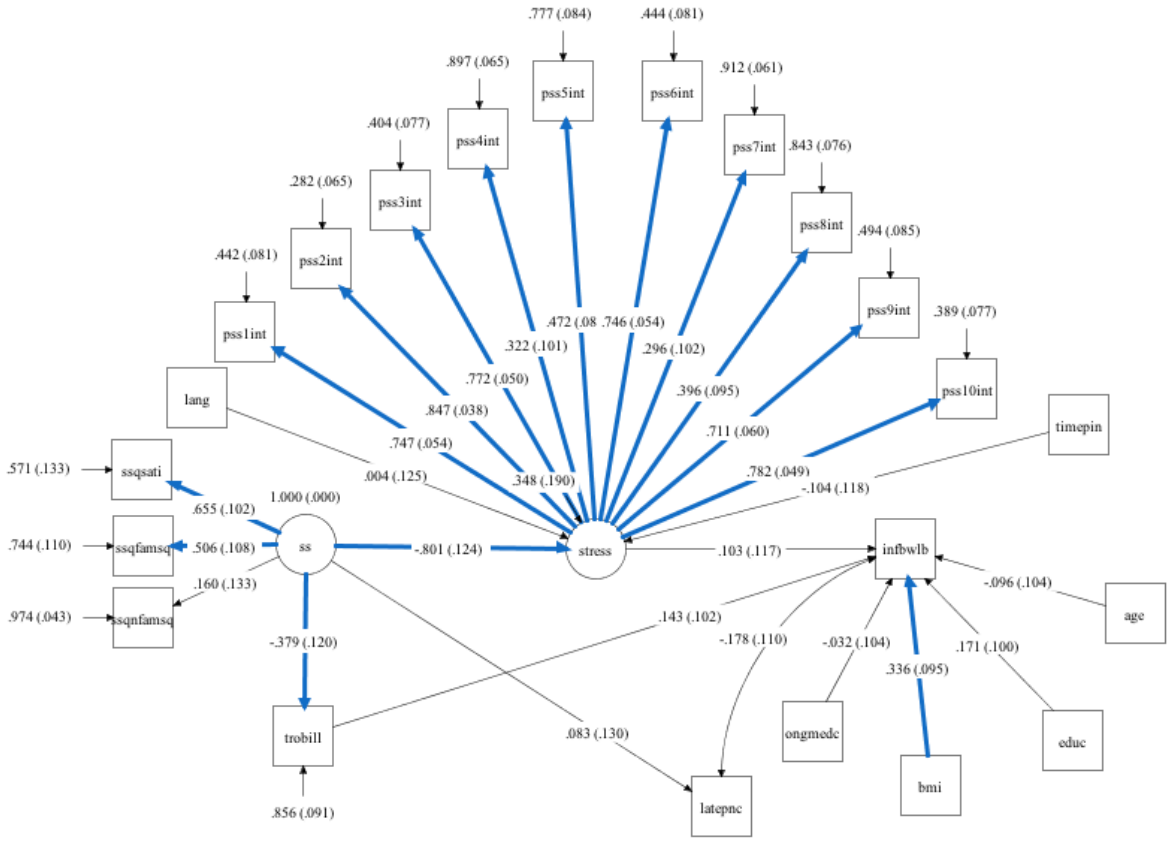

Figure 10: Model 1 Latina infant birth weight

Note: Blue lines indicate significant relationships at p=<0.05

Low birth weight model 1 (categorical)

Total sample low birth weight model 1. The SEM model for low birth weight in the total sample did not converge. Variables were uncorrelated with each other. None of the variables predicted or was associated with low birth weight for the total sample. Adding ethnicity as a variable did not change this result.

White low birth weight model 1. The chi square test is not as accurate in predicting a categorical outcome therefore, it is not used for low birth weight model fit. The RMSEA estimate was 0.041 (a good fit is less than .05), the CFI was 0.923 (a good fit is over .95) and the WRMR (Weighted Root Mean Square Residual used for binary dependent variables) was 0.918 (less than .90 indicates good fit). One of the three indices (the most robust, RMSEA) indicated a good fit and the CFI value was very close to being significant. The variables and parameters in the low birth weight model were appropriate to establish a relationship with low birth weight among White participants.

Similar to the infant birth weight model, in the White low birth weight model satisfaction with supports and family support were good measures for the latent variable support (p=.000). Non-family support did not significantly contribute to the social support latent variable (p=0.359). All observed variables for the latent variable stress were also significant for the total sample.

Also similar to the infant birth weight model, stress continued to have a significant direct negative effect on social support in the low birth weight model (p=0.000). Trouble paying bills had a significant direct effect on social supports (p=0.021). The absence of social supports increased the odds of experiencing trouble-paying bills by 0.245. Social supports mediated by stress did not have a significant indirect effect on low birth weight (p=0.518). BMI had a

significant effect on low birth weight (*p*=.031). For each BMI unit increase in White mothers, the odds of having a low birth weight infant decrease by 0.341.

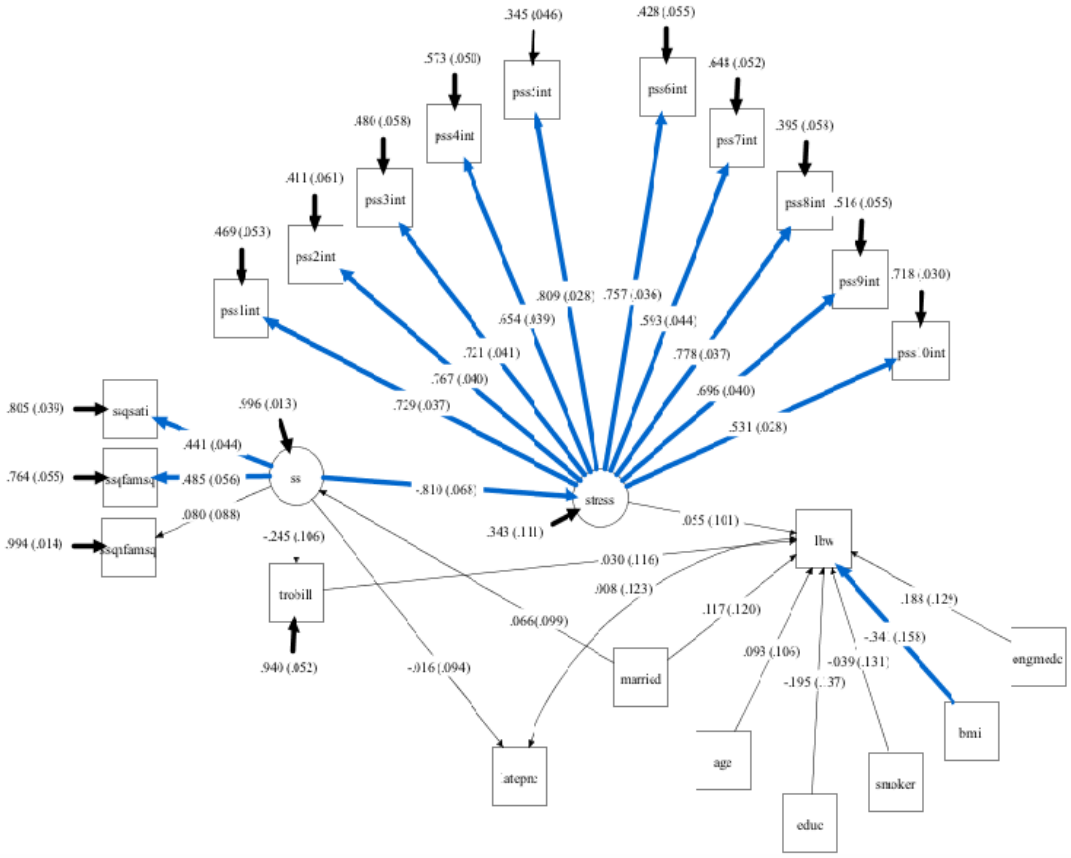

Figure 11: Model 1 White low birth weight

Note: Blue lines indicate significant relationships at p=<0.05

Black low birth weight model 1. The model for low birth weight for Black study participants did not converge. Variables were uncorrelated with each other. None of the variables predicted or was associated with low birth weight.

Latina low birth weight model 1. This SEM model excluded marital status (married) and smoker. The RMSEA estimate was 0.058, the CFI was 0.668 and the WRMR was .979. All indices indicated a poor model fit.

As in the birth weight model, non-family support was not significantly contributing to the social support latent variable (p=0.097). All observed variables for the latent variable stress were significant.

Following a similar trend to the infant birth weight model, stress continued to have a significant direct negative effect on social support (p=0.000). Social supports mediated by stress did not have a significant indirect effect on low birth weight (p=0.333). None of the independent variables had an effect on low birth weight. Figure 12 depicts the SEM diagram for model 1 Latina low birth weight. Appendix K includes a summary of the SEM results for model 1 low birth weight.

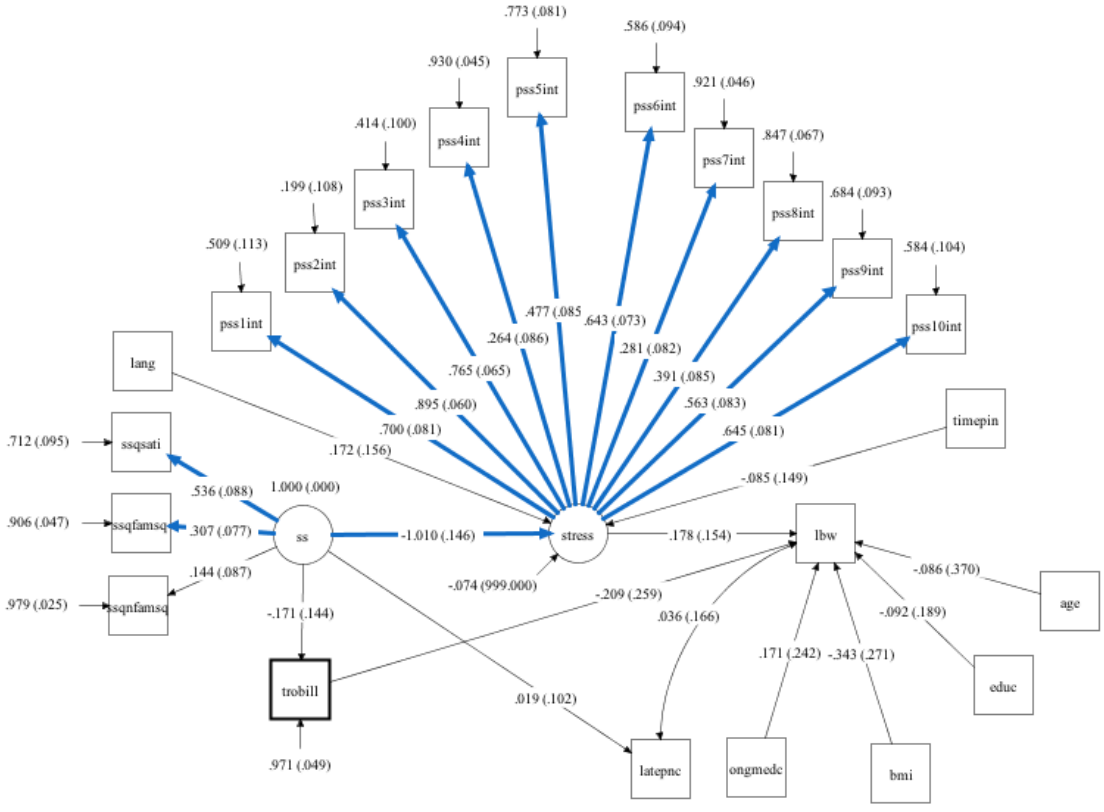

Figure 12: Model 1 Latina low birth weight

Note: Blue lines indicate significant relationships at p=<0.05

Preterm birth model 1

Total sample preterm birth model 1. The SEM model for preterm birth in the total sample did not converge. Variables were uncorrelated with each other.

White preterm birth model 1. The RMSEA estimate was 0.040 (a good fit is less than .05), the CFI was 0.927 (a good fit is over .95) and the WRMR was 0.906 (less than .90 indicates good fit). The RMSEA indicated a good fit and the CFI and WRMR values are very close to being significant. The variables and parameters in the preterm birth model are appropriate to establish a relationship with preterm birth among White participants indicating a good fit for this model.

In this preterm birth model satisfaction with supports and family support continued to be good measures for the latent variable support (p=.000). Non-family support did not significantly contribute to the social support latent variable (p=0.364). All observed variables for the latent variable stress were also significant for the total sample.

Stress continued to have a significant direct negative effect on social support in the preterm birth model (p=0.000). Trouble paying bills had a significant direct effect on social supports (p=0.039). Social supports mediated by stress did not have a significant indirect effect on preterm birth (p=0.459). None of the independent variables had an effect on preterm birth.

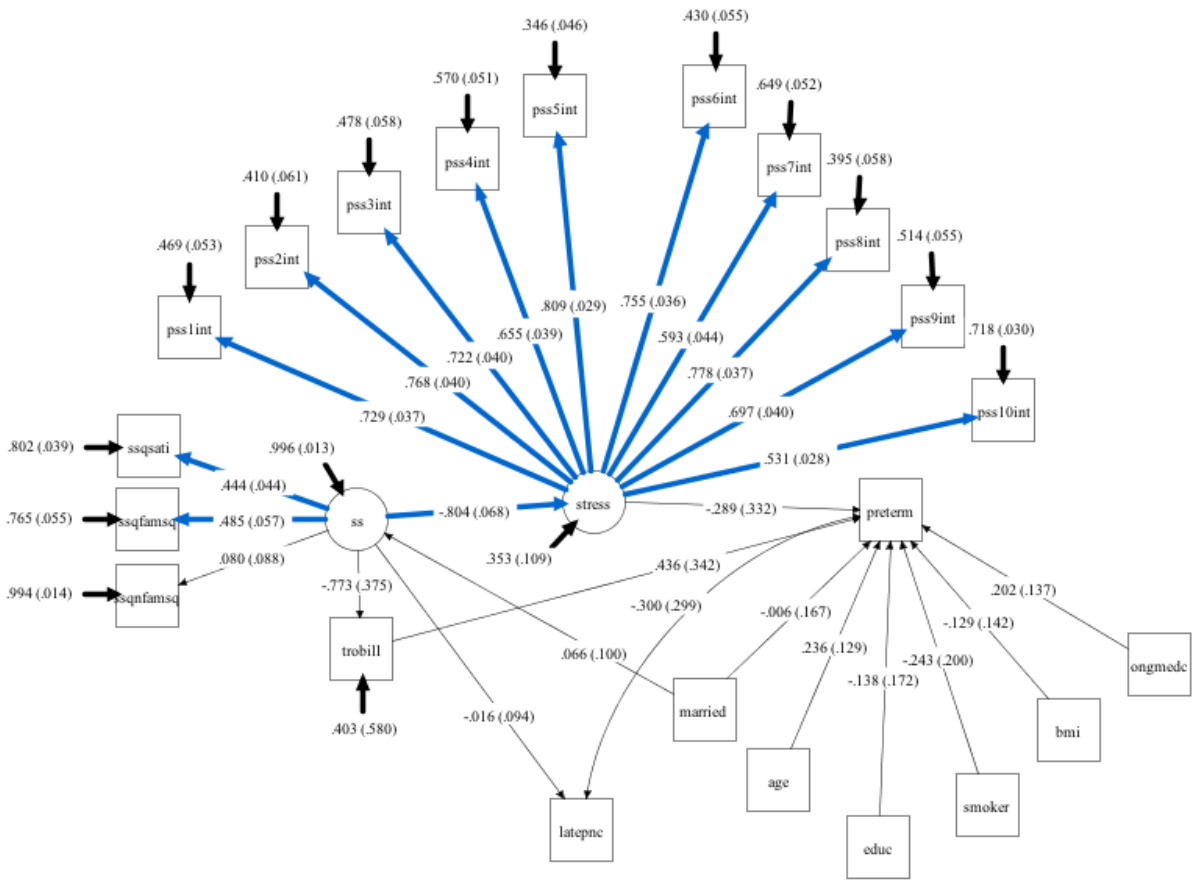

Figure 13: Model 1 White preterm birth

Note: Blue lines indicate significant relationships at p=<0.05

Black preterm birth model 1. The SEM model for preterm birth in Black participants did not converge. All variables in the model were uncorrelated with each other. None of the variables predicted or was associated with preterm birth for Black women.

Latina preterm birth model 1. The RMSEA estimate for the Latina model was 0.060 (a good fit is less than 0.05), the CFI was 0.655 (a good fit is over 0.95) and the WRMR was 1.010 (less than 0.90 indicates good fit). All indices indicate poor fit.

As in the birth weight model, non-family support was not significantly contributing to the social support latent variable (p=0.104). All observed variables for the latent variable stress were significant.

Following a similar trend to the infant birth weight and low birth weight models, stress continued to have a significant direct negative effect on social support (p=.000). Social supports mediated by stress did not have a significant indirect effect on preterm birth (p=0.074). Trouble paying bills had a significant direct effect on social supports (p=0.000). None of the independent variables had an effect on preterm birth. Figure 14 depicts the SEM diagram for model 1 Latina preterm birth. Appendix L includes a summary of the SEM results for model 1 preterm birth.

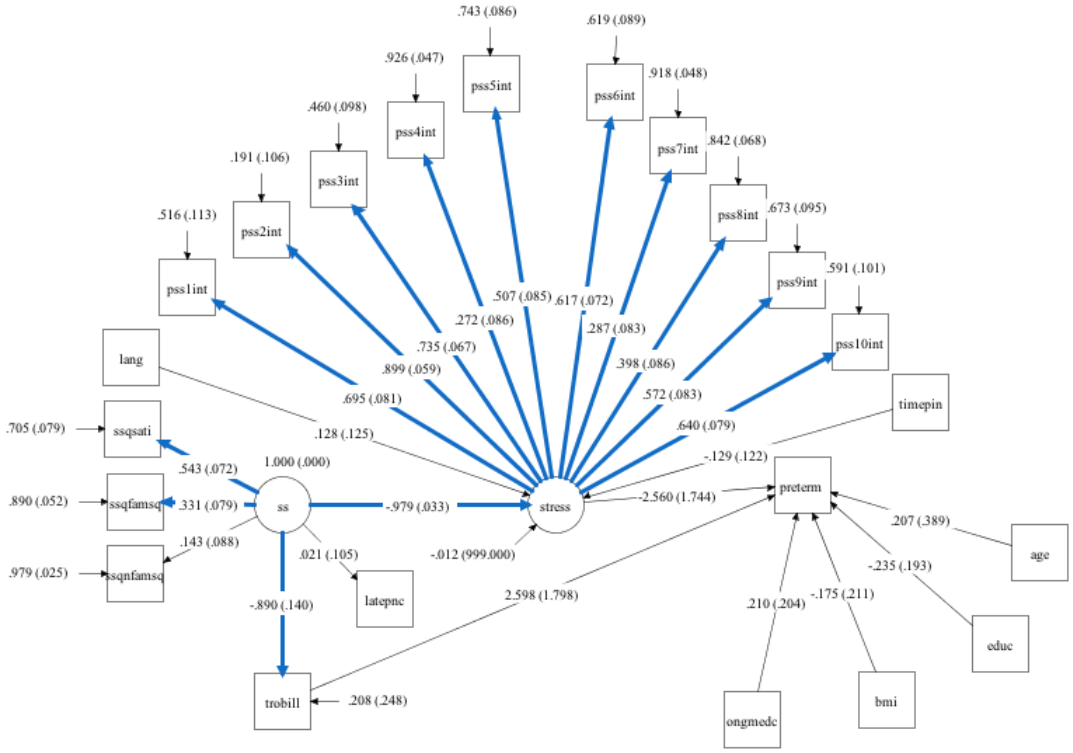

Figure 14: Model 1 Latina preterm birth

Note: Blue lines indicate significant relationships at p=<0.05

Small for gestational age model 1

Total sample SGA model 1. The RMSEA estimate for the total sample was 0.100, the CFI was 0.577 and the WRMR was 2.191. All fit indices indicated a poor model fit for the SGA model in the total sample.

All three observed variables used to create the latent variable social support (SS) were good measures for this latent variable in the preterm birth model. All observed variables for the latent variable stress were also significant for the total sample.

Stress continued to have a significant direct negative effect on social support (p=0.000). Stress for the total sample had a direct effect on SGA (p=0.033). For each unit increase in stress, the odds of having an SGA infant increased by 0.130. Social supports mediated by stress had a significant effect on SGA (p=0.067). Adding ethnicity to the model did not change the results.

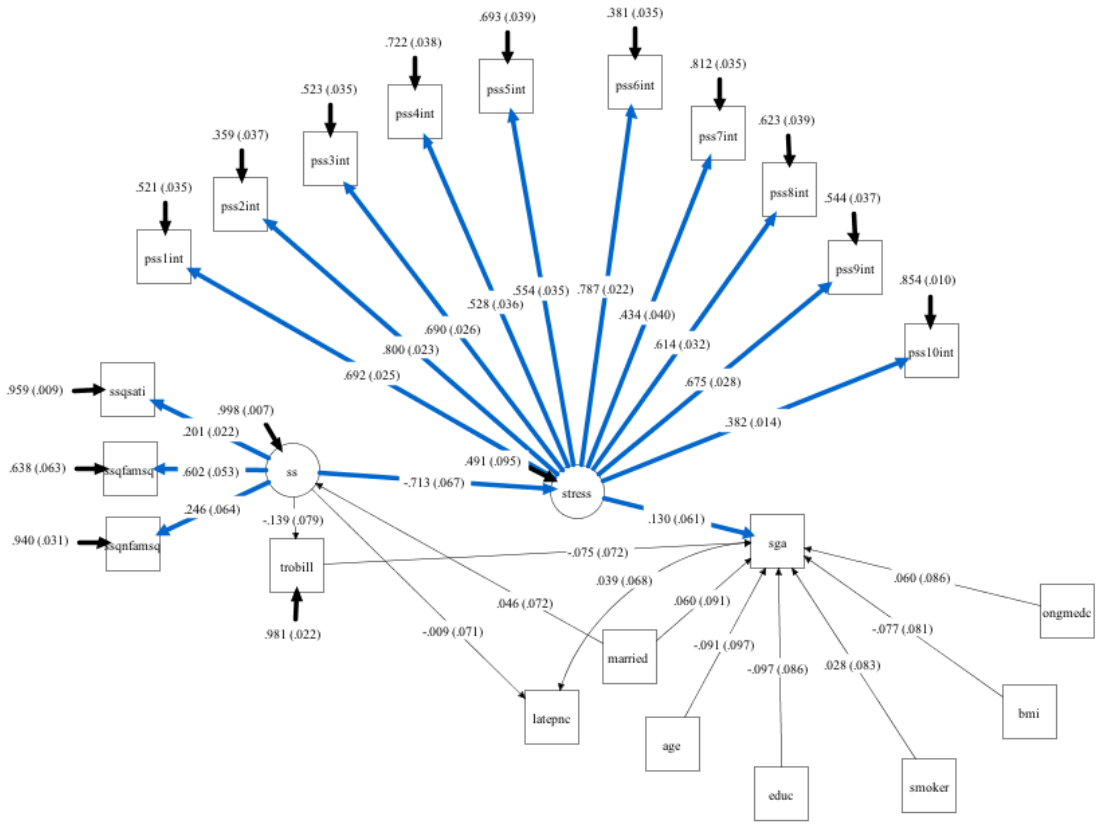

Figure 15: Model 1 SGA total sample

Note: Blue lines indicate significant relationships at p=<0.05

White SGA model 1. The RMSEA estimate was 0.044 (a good fit is less than .05), the CFI was 0.915 (a good fit is over 0.95) and the WRMR was 0.946 (less than .90 indicates good fit). The RMSEA indicates a good model fit. Similar to the preterm birth model, this model indicates the variables and parameters are appropriate to establish a relationship with SGA births among White women.

Similar to previous models, satisfaction with supports and family support were good measures for the latent variable support (p=.000). Non-family support did not significantly contribute to the social support latent variable (p=0.393). All observed variables for the latent variable stress were significant for White study participants.

Also similar to all previous models, stress continued to have a significant direct negative effect on social support in the SGA model (p=0.000). An increase in social supports decreased the stress by 0.803.

As in the infant birth weight, low birth weight and preterm birth models, trouble paying bills had a significant direct effect on social supports (*p*=0.000). However, in this SGA model, trouble paying bills also had a significant direct effect on SGA (*p*=0.026). Having trouble-paying bills increased the odds of an SGA baby by 0.938.

In addition, in the White SGA model stress had a significant direct effect on SGA (*p*=0.026). This supports the literature establishing a link between stress and poor birth outcomes. An increase in stress increases the odds of having an SGA infant by 0.952. As expected given that social supports had a direct negative effect on stress, and stress had a positive effect on SGA, this model was the only model with good model fit that had a significant indirect effect from social supports to SGA (*p*=0.043). This model agreed with the hypothesis that social supports can reduce stress and therefore decrease the odds of SGA.

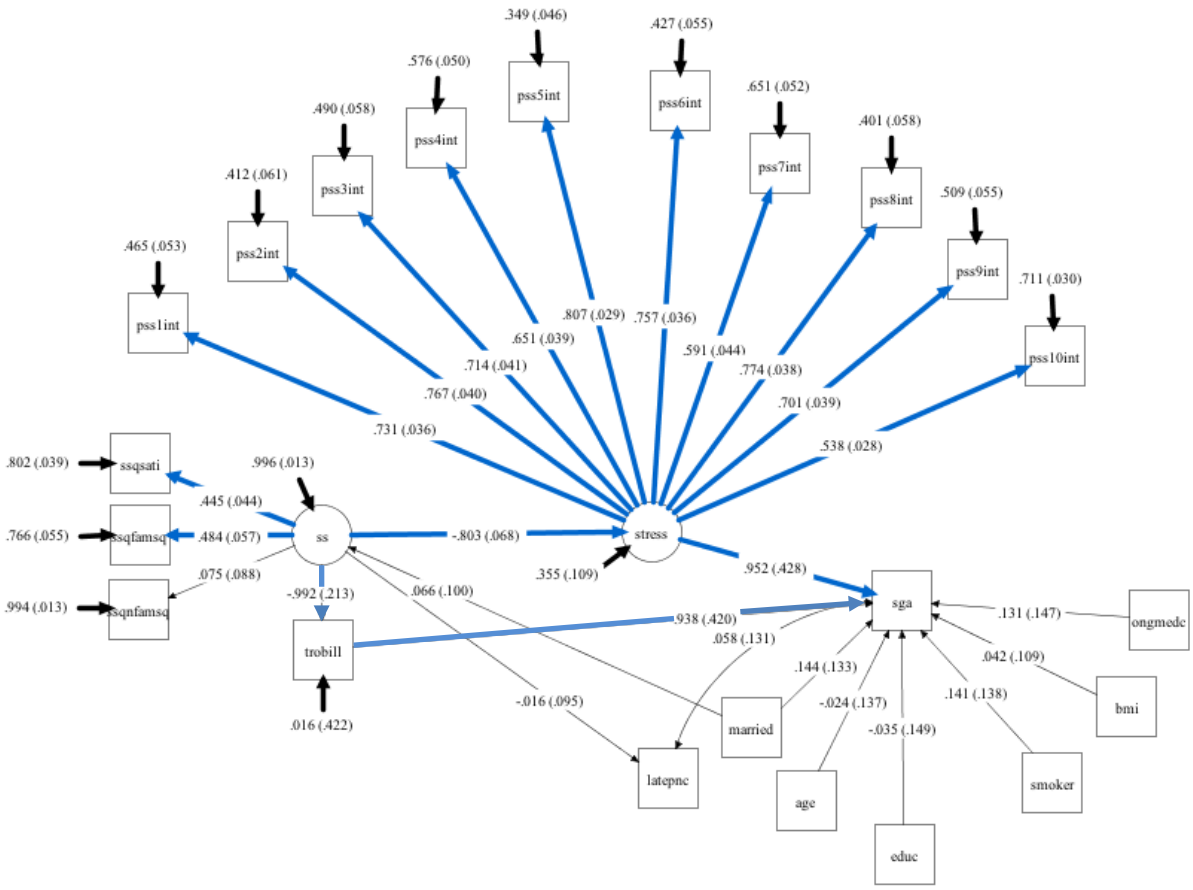

Figure 16: Model 1 White SGA

Note: Blue lines indicate significant relationships at p=<0.05

Black SGA model 1. The SEM model for SGA in Black participants did not converge. Variables were uncorrelated with each other. None of the variables predicted or had an association with SGA for Black women.

Latina SGA model 1. This model excluded the variable married due to a substantial lack of variability that affected the stability of the model. The RMSEA estimate for the Latina model was 0.057, the CFI was 0.675, and the WRMR was 0.974. This was the most promising model for Latinas as the RMSEA was very close to being significant (must be less than 0.05).

Non-family support continued to be non-significant (p=0.108). All observed variables for the latent variable stress were significant. Stress continued to have a significant direct

negative effect on social support (p= 0.000). There were no other significant relationships between the variables. Figure 17 is a depiction of the Latina SGA model. Appendix M includes a summary of model 1 SGA results.

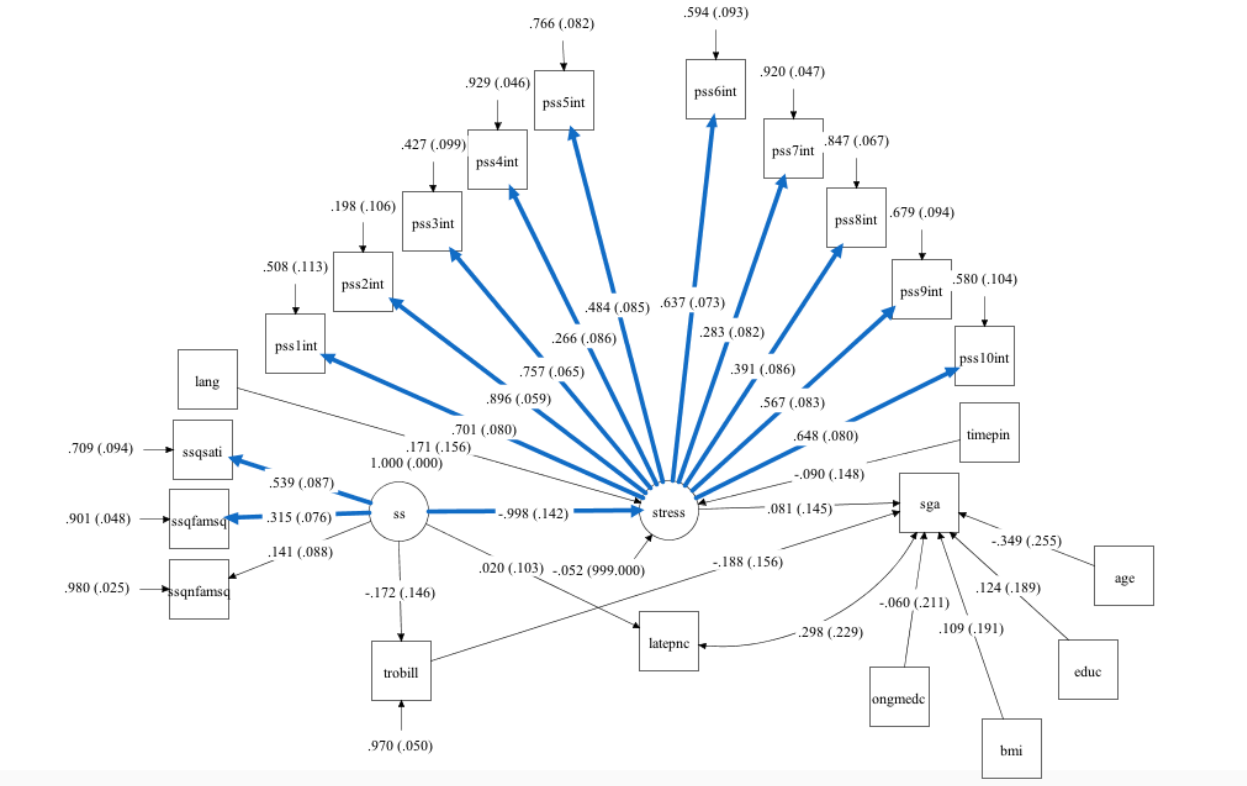

Figure 17: Model 1 Latina SGA

Note: Blue lines indicate significant relationships at p=<0.05

Table 11 provides a summary of model fit and the significant variables related to birth outcomes. Using the more robust index (RMSEA), the only models that fit the data were the White model for low birth weight and the White model for preterm birth. The Latina SGA model was at the borderline of a good fit (RMSEA of 0.05). However, the model seemed to better describe White participants as they were the only ones with significant predictors for birth

outcomes in models that fit the data. The White SGA model was the only one with a significant path from social support to SGA mediated by stress.

Table 11: SEM model 1 summary

Birth Outcome	Model Fit	Significant Variable	Significance
Infant birth weight (pounds)			
Total Sample	No convergence	No convergence	No convergence
White	Poor fit	None	None
Black	Poor fit	ongoing medical care	p=0.021
Latina	Poor fit	BMI	p=0.000
Low birth weight (categorical)			
Total Sample	No convergence	No convergence	No convergence
White	Good fit	BMI	p=0.031
Black	No convergence	No convergence	No convergence
Latina	Poor fit	None	None
Prematurity			
Total Sample	No convergence	No convergence	No convergence
White	Good fit	None	None
Black	No convergence	No convergence	No convergence
Latina	Poor fit	Trouble paying bills	p=0.000
SGA			
Total Sample	Poor fit	Stress (latent)	p=0.033
White	Good fit	Stress (latent)	p=0.026
		Trouble paying bills	p=0.026
		Social Support (indirect)	p=0.043
Black	No convergence	No convergence	No convergence
Latina	Poor fit	None	None

Model 2: Direct and Indirect Effects of Social Support and Stress on Birth Outcomes without Demographic and Health Risk Factors

This simplified model included the latent social support variable, the latent stress variable and the indicated birth outcome in the absence of risk factors. It includes a direct effect from stress to each corresponding birth outcome, and a direct and indirect effect from social support on each birth outcome. Since model 2 did not improve model fit for any of the study populations, only the specified model is provided. A summary table of results by birth outcome is also provided. Appendix N through Q provide detail summaries of model 2 results.

Infant birth weight model 2 (gestational weeks)

The specified model illustrated in Figure 18 is a visualization of the direct and indirect effects of social support and stress on infant birth weight for all groups.

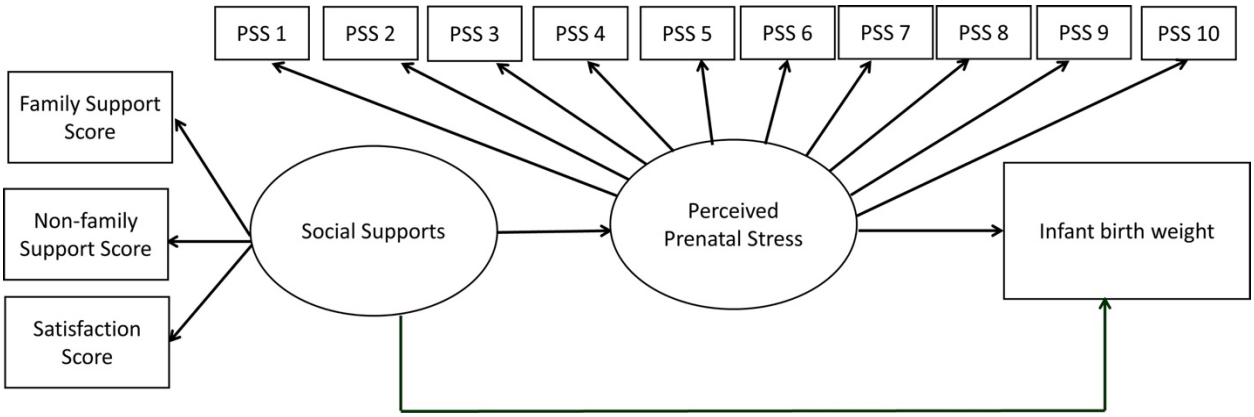

Figure 18: Specified SEM model 2 infant birth weight for the total sample, White, Black and Latina participants

Total sample infant birth weight model 2. Similar to model 1, model 2 for the total sample did not converge. None of the variables were correlated, predicted or were associated with infant birth weight.

White infant birth weight model 2. The chi square test of model fit had a value of 131.116, degrees of freedom 75 and a p-value of 0.0001 at the 0.05 level. The RMSEA estimate was 0.068, the CFI was 0.930 and the SRMR was 0.052. Although the simplified models improved the values of the CFI and SRMR indices, model 2 still had a poor fit across all indices.

As in model 1, non-family support did not have a significant contribution to the latent variable social support (p=0.135). All observed variables for the latent variable stress continued to be significant.

Stress continued to have a significant direct negative effect on social supports (p=0.000). Stress did not a have significant direct effect on infant birth weight. Social support did not have a significant direct or indirect effect on infant birth weight.

Black infant birth weight model 2. This simplified model did not converge.

Latina infant birth weight model 2. The chi square test of model fit had a value of 203.168, degrees of freedom 75 and a p-value of 0.000 at the 0.05 level. The RMSEA estimate was 0.134, the CFI was 0.751 and the SRMR was 0.109. Model 2 did not improve model fit.

Family support and satisfaction continued to be good measures for the latent variable social support and non-family support did not significantly contribute to the latent variable (p=0.110). All observed variables for the latent variable stress were significant.

Stress continued to have a significant direct negative effect on social supports (p=0.000). Social supports did not have a significant direct (p=0.813) or indirect effect (p=0.921) on infant birth weight. Stress did not have a significant direct effect on infant birth weight (p=0.921). Appendix N summarizes the results for model 2 infant birth weight for all study subgroups.

Low birth weight model 2 (categorical)

The specified model illustrated in Figure 19 was used to determine direct and indirect effects of social support and stress on low birth weight for all groups.

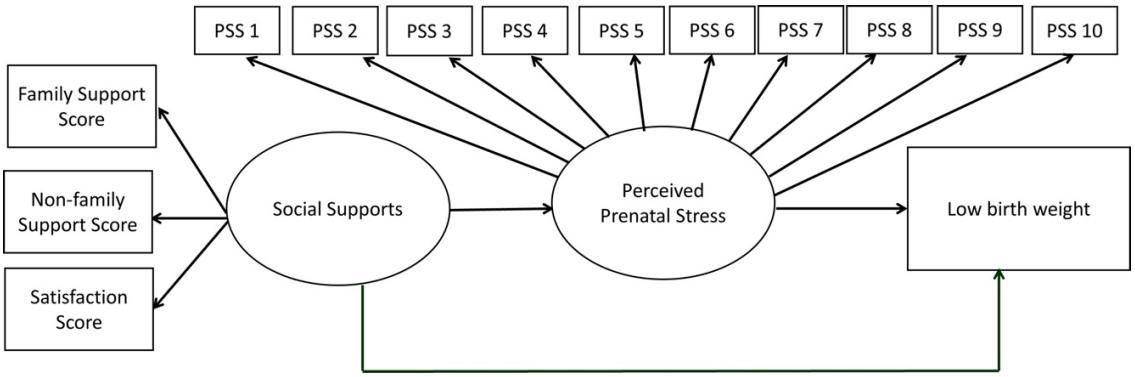

Figure 19: Specified SEM model 2 low birth weight for the total sample, White, Black and Latina participants

Total sample low birth weight model 2. The SEM model for low birth weight in the total sample did not converge. Variables were uncorrelated with each other. None of the variables predicted or was associated with low birth weight for the total sample.

White low birth weight model 2. The RMSEA estimate was 0.141, the CFI was 0.658 and the WRMR was 1.109. All fit indices continue to indicate poor model fit.

Family support and satisfaction continued to be good measures for the latent variable social support and non-family support did not significantly contribute to the latent variable (p=0.404). All observed variables for the latent variable stress were significant.

Stress continued to have a significant direct negative effect on social supports (p=0.000). Social supports did not have a significant direct (p=0.424) or indirect effect (p=0.424) on low birth weight. Stress did not have a significant direct effect on low birth weight (p=0.620).

Black low birth weight model 2. The model for low birth weight for Black study participants did not converge. Variables were uncorrelated with each other.

Latina low birth weight model 2. The RMSEA estimate was 0.112, the CFI was 0.412 and the WRMR was 0.904. Similar to model 1, model 2 had a poor model fit.

Non-family support continued to be a poor measure of the latent variable social support in this low birth weight model (p=0.230). All observed variables for the latent variable stress were also significant for the total sample. Stress continued to have a significant direct negative effect on social support (p=0.000). Social supports did not have a significant direct or indirect effect on preterm birth in model 2. Appendix O summarizes the findings for model 2 low birth weight for all study subgroups.

Preterm birth model 2

The specified model illustrated in Figure 20 was used to determine direct and indirect effects of social support and stress on preterm birth for all groups.

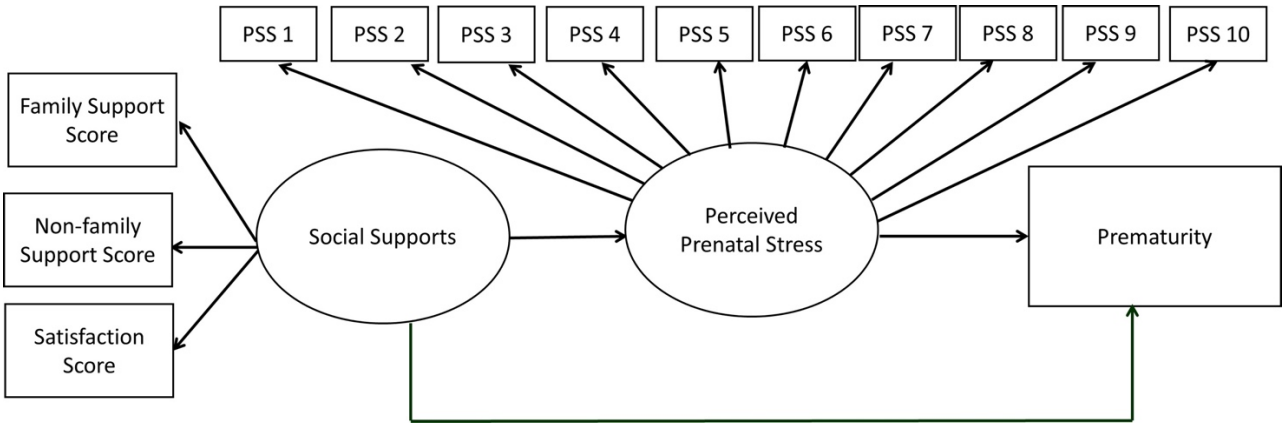

Figure 20: Specified SEM model 2 preterm birth for the total sample, White, Black and Latina participants

Total Sample preterm birth model 2. The RMSEA estimate was 0.194, the CFI was 0.182 and the WRMR was 2.628. The indices in module 2 were worse than those is model 1. All fit indices indicated a poor model fit.

All observed variables used to create the latent variable social support were significant. All observed variables for the latent variable stress were also significant. Stress continued to have a significant direct negative effect on social support (p=0.000). There were no other significant direct or indirect effects on preterm birth in this model.

White preterm birth model 2. The RMSEA estimate was 0.136, the CFI was 0.679 and the WRMR was 1.091. While preterm birth model 1 had a good fit, simplifying the model led to a poor model fit. This indicates the need to include demographic and health risk factor in the preterm birth model for White participants.

Non-family support continued to be a poor measure of the latent variable social support (SS) in this second preterm birth model (p=0.427). All observed variables for the latent variable stress were also significant for the total sample. Stress continued to have a significant direct negative effect on social support (p=0.000). Social supports did not have a significant direct or indirect effect on preterm birth in model 2.

Black preterm birth model 2. The RMSEA estimate was 0.145, the CFI was 0.707 and the WRMR was 2.080. All fit indices indicated a poor model fit. Unlike model 1, this model converged but had dependency issues among the latent variables that did not allow relationships to be estimated.

Latina preterm birth model 2. The RMSEA estimate was 0.112, the CFI was 0.420 and the WRMR was 0.903. The preterm birth model 1 had a good fit yet simplifying it in model 2 led to a poor model fit as it did with White participants.

In this model all social support observed variables were good measures for the latent social support variable, including non-family support (p=0.023). All observed variables for the latent variable stress were also significant for the total sample. Stress continued to have a significant direct negative effect on social support (p=0.000). Social supports did not have a significant direct or indirect effect on preterm birth in model 2. Appendix P summarizes the results for preterm birth model 2 in all study subgroups.

Small for gestational age model 2

The specified model illustrated in Figure 21 was used to determine direct and indirect effects of social support and stress on SGA for all groups.

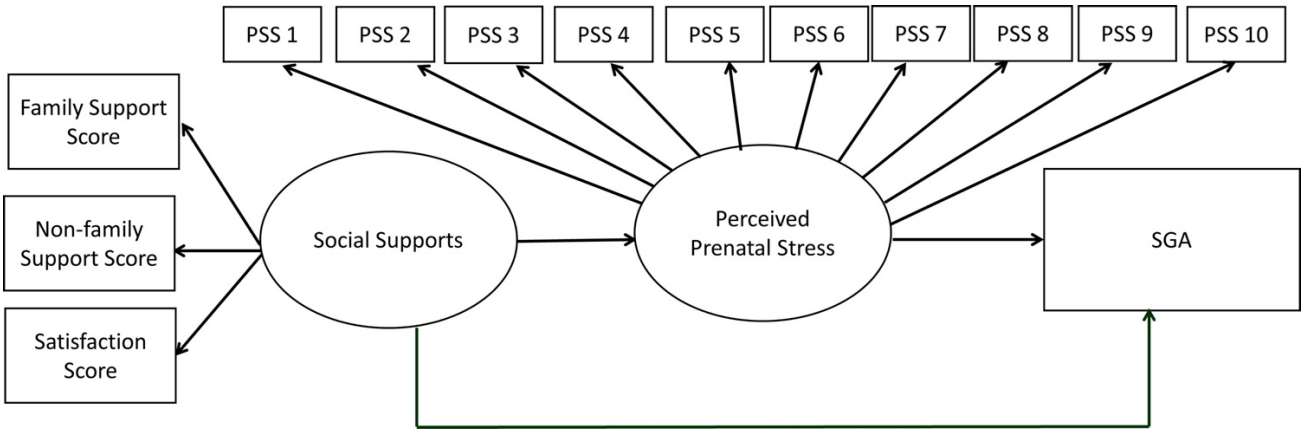

Figure 21: Specified SEM model 2 SGA for the total sample, White, Black and Latina participants

Total sample SGA model 2. The RMSEA estimate was 0.207, the CFI was 0.083 and the WRMR was 2.645. Simplifying the model did not improve the fit, the indices were worse in model 2 than in model 1. All indices indicated a poor model fit.

White SGA model 2. Model 1 for SGA in White participants had a good fit, however simplifying the model made for a poor fitting model. The RMSEA estimate was 0.143, the CFI was 0.654 and the WRMR was 1.156. All fit indices indicated a poor model fit.

In addition to non-family support being a poor measure for the latent variable and social support having a direct effect on stress, the simplified model (model 2) had a significant direct effect of social support on SGA (p=0.010). Model 2 also had a significant direct effect of stress on SGA (p=0.013). Despite the significant relationships between the variables, the model fit indices indicate including demographics and health risk factors provided a better model fit to understand the relationship between the variables in the White participant SGA model.

Black SGA model 2. The RMSEA estimate was 0.142, the CFI was 0.723 and the WRMR was 2.071. All fit indices indicated a poor model fit. Unlike model 1, this model

converged but had dependency issues among the latent variables that did not allow for reliable estimates.

Latina SGA model 2. The RMSEA estimate was 0.113, the CFI was 0.397 and the WRMR was 0.909. All fit indices indicated poor model fit.

In this model, all social support observed variables were good measures for the latent social support variable. The relationship between stress and social support continued to be significant (p=0.000). There were no direct or indirect (mediated by stress) effects between social support and SGA. Appendix Q summarizes the results for all study groups as related to model 2 SGA.

Table 12 summarizes the SEM model 2 findings. Model 2 did not improve the fit of model 1 for any group in any of the birth outcomes indicating the importance of including demographics and health risk factors in models predicting associations with infant birth weight, low birth weight, preterm birth and SGA.

Table 12: SEM model 2 summary

Outcome Variable	Model Fit	Predicting Variable	Significance
Infant birth weight			
Total Sample	No convergence	No convergence	No convergence
White	Poor fit	None	None
Black	No convergence	No convergence	No convergence
Latina	Poor fit	None	None
Low birth weight			
Total Sample	No convergence	None	None
White	Poor fit	None	None
Black	No convergence	No convergence	No convergence
Latina	Poor fit	None	None
Prematurity			
*Total Sample**	Poor fit	None	None
White	Poor fit	None	None
Black	Unable to determine	Unable to determine	Unable to determine
Latina	Poor fit	Poor fit	Poor fit
SGA			
Total Sample	Poor fit	None	None
White	Poor fit	Support (latent) direct	p=0.010
Black	Unable to determine	Unable to determine	Unable to determine
Latina	Poor fit	None	None

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Public health theory emphasizes the importance of social supports as a protective factor to improve health and minimize health risks. This study explored social supports for Healthy Start Latina participants at risk of delivering a low birth weight, preterm and small for gestational age infant. The study examined the sources of social supports and the direct and indirect associations between social supports, perceived stress and these birth outcomes in the presence of health risk and demographics. Findings were compared by ethnicity (White, Black, Latina) to identify unique characteristics for each group. Social supports had a direct association with stress across all ethnic groups, confirming public health literature indicating that social supports can influence stress (Cohen et al., 2000; Glanz et al., 2008; Mann et al., 2010). However, in this study social supports did not have a direct or indirect significant association with Latina study participants' birth outcomes.

Latina Social Supports

Social supports are linked in the literature to improved health (Feldman et al., 2000; Glanz et al., 2008). Lack of social supports have been linked to social isolation and decreased psychosocial well-being (Rohde, D'Ambrosio, Tang, & Rao, 2016). This study analyzed social network size (mean total social support score) and composition for Healthy Start study participants to determine characteristics of their social supports by ethnicity. Overall, Healthy Start study participants exhibited low mean total support scores in the SSQ6 survey instrument

(less than 3 in a range from 0-9). Small social network size could be a product of the high-risk, low socioeconomic sample included in this study that have a small number of supports available to them (Smyth, Siriwardhana, Hotopf, & Hatch, 2015). Latinas had the lowest mean score (1.6) of all ethnic groups, almost half that of White and Black participants. The majority of Latinas in this study were foreign born and this finding is consistent with the literature that indicates small network size and social isolation is prevalent among Latina immigrants (Hurtado-de-Mendoza, Gonzales, Serrano, & Kaltman, 2014; Paris, 2008; Parra-Medina & Messias, 2011; Rhodes et al., 2015; Smyth et al., 2015; Sussner, Lindsay, Greaney, & Peterson, 2008).

Differences in social supports by ethnic groups are also documented in public health literature (Jutagir et al., 2016; Smyth et al., 2015). The ANOVA analyses in this study confirmed some of these differences as social support mean scores were statistically different for Latinas compared to White and Black participants. The analysis of primary sources of social support provided an example of these differences. Latinas relied on the father of the baby as the main source of support for all types of support sought. Black participants mentioned mother as their primary source for all types of support. White participants mentioned mother for most types of support, except for the times when they wanted someone to make them feel better about themselves, and when they needed someone to console them. In those two instances, White participants mentioned boyfriends instead of mothers. Further studies are needed to examine these differences in sources and types of support by ethnic group in order to determine if this is a unique composition to this sample, or a characteristic among high risk pregnant women participating in the Healthy Start program.

Stress and Latinas

Mean stress scores in the Perceived Stress Scale (PSS10) varied for study participants. As a high risk group, the expectation was to identify high levels of stress (McDonald, Kingston, Bayrampour, Dolan, & Tough, 2014). However, White and Black participants had mean PSS10 score similar to those found in the general population. The Latina PSS10 mean stress score was higher than expected in the general Latina population. ANOVA results indicated the high Latina stress mean score in the study group was significantly different than that of White and Black study participants. The findings are consistent with the literature indicating ethnic differences regarding stress levels and perceptions of stress (Mukherjee, Trepka, Pierre-Victor, Bahelah, & Avent, 2016; Shavitt et al., 2016). The lack of significant differences between Black and White study participants indicated further studies were needed to study ethnic differences in perceptions of stress.

The principal component analysis (PCA) of the PSS10 conducted in this study intended to provide an insight into these ethnic differences that were partially revealed in the ANOVA analysis. PCA results indicated the presence of one component in the White population and two components in the Black and Latino population. The results could be indicative of: 1) different interpretations of what is considered stressful by ethnic group, 2) the need of repeated measures with the PSS10 during pregnancy for a more accurate assessment of stress levels, and 3) the possible need for an alternative stress measurement tool for this high risk population. Research with high risk populations suggests that for people continuously exposed to stress, the perception of stressful circumstances might vary causing measurement problems (Kingston, Heaman, Fell, Dzakpasu, & Chalmers, 2012). The PSS10 may not be presenting situations that are considered stressful enough for high-risk women exposed to numerous stressors across their life span. A life

event scale such as the Holmes and Rahe Social Readjustment Rating Scale (SRRS) (1967) can be an alternative measure for high risk women with life span exposure to chronic stress. Biological markers, such as cortisol levels, have also been used to measure stress among Mexican Americans (D'Anna-Hernandez et al., 2012). This measure can assess stress hormones, rather than perceived stress among high risk populations. The use of repeated measures with the PSS10 and cortisol levels can be beneficial to reduce bias created by individual daily stressors caused by life circumstances.

Latina Social Supports, Stress and Birth Outcomes Using Regression and SEM Models

This study used both regression analysis and structural equation modeling to identify direct and indirect associations between social supports, perceived stress and birth outcomes in the presence of health risk and demographics. Only a few variables were statistically significant in predicting birth outcomes in regression and SEM models. These variables were not consistent across ethnic groups. Latinas did not have direct or indirect association of social supports and any of the study birth outcomes. White participants were the only group displaying a direct significant association between social support (non-family support) and a birth outcome (infant birth weight). White participants were the only group with an indirect significant association in SEM analysis between the latent social support variable and a birth outcome (small for gestational age) mediated by stress. The absence of additional significant risk factors in the regression and SEM models could be the result of lack of variability and sample size in the study population. More than 80 percent of study participants were single, more than a third of the sample had less than a high school education, over 70 percent received Medicaid (an indicator of low socioeconomic status). Almost a third had a history of a mental health issue and an ongoing medical care problem. This lack of variability could be masking other issues in the population

not revealed in the analysis, providing a plausible explanation for the limited number of risk factors identified in this study.

Infant birth weight, low birth weight and preterm births

The regression analysis identified maternal BMI as a significant factor predicting infant birth weight in the total sample and among Latinas. BMI was only significant for Whites when using the categorical outcome low birth weight. The association remained significant in the respective SEM models for Latinas and White. This is consistent with the public health literature that identifies maternal BMI as one of the known risk factors for low birth weight (Chang, Brown, & Nitzke, 2016; Diemert et al., 2016; Han, Mulla, Beyene, Liao, & McDonald, 2011; Hurtado-de-Mendoza et al., 2014; Martino et al., 2016; Patchen, Rebok, & Astone, 2016; Stotland et al., 2005; Sussner et al., 2008; Valero de Bernabé et al., 2004; Xiang et al., 2015). For Black participants, ongoing medical care had a direct significant relationship with infant birth weight in both regression and SEM analysis. This supports the literature indicating a relationship between chronic conditions and birth outcomes among African American women (Graham, Zhang, & Schwalberg, 2007; Griffith, Johnson, Zhang, Neighbors, & Jackson, 2011; Prather, Fuller, Marshall, & Jeffries, 2016; Tucker et al., 2015). Preterm birth had significant predictors for the total sample (smoker, ongoing medical care) and for Black (ongoing medical care) in the regression model, but these indicators did not persist in the SEM model.

Small for gestational age

The regression model showed significant associations with maternal age for total sample, BMI for Black and late prenatal care for Latinas. Late prenatal care has been documented in the literature as prevalent among Latinas, especially immigrants (Partridge, Balayla, Holcroft, &

Abenhaim, 2012; Rhodes et al., 2015; Sangi-Haghpeykar, Lam, & Raine, 2014) Mistrust of health services, lack of affordable health care options, transportation issues and language are documented barriers leading to delayed prenatal care for immigrant Latinas (Rhodes et al., 2015). Small for gestational age (SGA) is a promising SEM model for further analysis, as the White model had good fit and the Latina model was very close to a good fit. In a larger more diverse sample size for each ethnic group, this model could provide additional significant relationships to help explain the relationship between social supports, stress, risk factors and demographics among Healthy Start participants.

Study Strengths

This study provided knowledge on Latinas' social network structure, composition and stress levels in a high risk Pinellas Healthy Start population for whom there was no prior knowledge. Comparisons with other ethnic groups showed differences that can help develop future research inquiries to understand social determinants of health for similar populations. The study's risk factor was not being Latina or undocumented, but the demographic and health risk factors addressed in the Healthy Start screening form. These factors are not usually addressed by the Latino paradox, as immigration and socioeconomic status are the main concerns in the paradox (Guendelman et al., 1999).

The use of the principal components analysis also provided further insights into differences regarding how stress measurement instruments can be vary for Latinas compared to other ethnic groups. The two components resulting from the analysis indicate stress can be interpreted or experienced different by different ethnic groups. This information is relevant to Florida Healthy Start and federal programs funded by MIECHV (Maternal Infant and Early Childhood Visiting Programs) as the Perceived Stress Scale is the preferred instrument used to

measure stress in program participants. The use of SEM models was also valuable as it confirmed evidence in the literature for a relationship between social supports and stress, confirming some of the findings from the regression models, and providing a start point for future research into the study of small for gestational age for White and Latino participants.

Limitations

Some of the limitations of this study included issues with population characteristics, sample size for ethnic groups, issues with the social support and perceived stress instruments, confounders not measured in the study, and issues related to instrument administration.

The population served by the Healthy Start program presented a series of challenges due to their characteristics to qualify for the program. In order to qualify, a pregnant woman had to score into the program based on risk factors that could potentially lead to poor birth outcomes. Having a group that is determined to be high risk presented challenges since they had other psychosocial issues in place that were not present in other populations such as small social support networks, and an abundance of negative medical, environmental and interpersonal influences. The American Psychological Association warned that people can internalize stress and become accustomed to it (Miller et al., 1993). This could have influenced the PSS10 scores. Since this population is high risk, the study instruments could be too conservative presenting situations that were not severe enough to be determined as stressful by participants. In addition, study participants displayed small variability in risk factors (marital status, education, low socio economic status indicators and health risk factors) that can influence study results. In this study sample, many confounding variables did not have an effect. It is possible that these variables may have an impact on a different population. In addition, sample size for each ethnic group

could also affect study results as they may not be enough participants in each ethnic group to allow for additional risk factors to show significance.

In addition to population characteristics, the instruments also presented study limitations. The SSQ6 had high values for reliability and validity however, it measured perceived social supports as opposed to actual support received. This can be a limitation since expectations of support might not meet the reality of obtained support. The SSQ6 assumed that a higher number of supports is positively correlated to good outcomes however, it did not account for negative supports. The SSQ6 also lacked measures regarding the characteristics of the people providing support and the timeliness of the support. A person may provide support grudgingly, may provide needed support when it is no longer needed, or the support may not meet the actual recipient's need. In addition, this study only assessed support at program entry. Additional support provided earlier or later in pregnancy was not assessed. Participants could also have other risk factors not measured in the Healthy Start screening form that can be potential confounders.

Regarding stress, the PSS10 had good psychometric properties and was used in multiple populations. However, the PSS10 measures stress only within the last month of a respondent's life and its predictability falls in a short period of time (4 to 8 weeks). Program participants could have experienced stressors after program entry that were not assessed in this study. Other issues that were raised included that the PSS10 measure overlaps with psychological symptoms scales (Cohen, 1986; Lazarus & Folkman, 1986), and the PSS10 implication of stress as a single one-dimensional and global variable ignoring personal goals and beliefs (Lazarus & Folkman, 1986).

Instrument administration issues included completing the questionnaires at program entry. Self-reporting depended on how quickly women wanted to complete their paperwork and what they could recall. Respondent burden in this program population may be related to disclosure of revealing social supports in uncomfortable situations such as domestic violence and negative family dynamics that can influence responses, particularly to the SSQ6. Trust, burden and disclosure could be more significant if program participants are undocumented and may be afraid of disclosing whom they live with and the types of supports provided. Other administration issues included the care coordinators' willingness to ask mothers to complete the questionnaires and their willingness to revise the questionnaires to ensure they are properly completed. The questionnaires were in place since 2013 and the Healthy Start program quality improvement process monitored and corrected these issues related to improper form completion and incorrect scoring. When missing data was identified, questionnaires were returned to care coordinators for adequate completion. Care coordinators then contacted clients for any missing information, therefore although this is a limitation it is not expected to have impacted the findings of this study.

Implications for Public Health Research and Practice

This study of social supports, stress and birth outcomes confirmed some of the public health research indicating the complexity of measuring social support and stress impact on birth outcomes (Hetherington et al., 2015). Race/ethnicity played a pivotal part on this study's findings. Stress experience and perceptions can vary by race/ethnicity and could be influencing stress measurement. Public health research and practice can explore the use of repeated stress measures that target perception as well as biological markers of high risk Latinas to better

understand how they perceive and experience stress. Repeated measures can help eliminate some of the effects of daily stressors that can be influencing responses to stress instruments.

In this study sample, social supports did not have an indirect effect through stress on Latina birth outcomes, however social supports had a significant direct effect on stress across all ethnic groups including Latinas. Additional measures related to stress can be used to better understand the relationship between social supports and birth outcomes. The literature identifies the effect of social supports, stress and psychological well-being on health (Shavitt et al., 2016). Public health research can use variables and measures that define Latino psychological well-being to further explore indirect relationships between social supports and birth outcomes. Small for gestational age can be a starting point for this research as it was identified in this study as a model with good fit for White study participants and was close to being significant for Latina study participants.

Studying high risk populations presents considerable challenges to public health research and practice. Study findings indicated many confounding variables did not have an effect on the study sample. Although this was true for this study, it is possible these same variables could have an impact in a different population. Future research can examine differences in how variables such as stress and social support are defined in high risk groups, particularly ethnically diverse, marginalized and urban populations. While validated tools exist, the unique health concerns of at risk marginalized minorities justify additional scrutiny prior to their widespread use and dissemination. For the Healthy Start program, these findings indicate the need to test their current PSS10 tool in Healthy Start populations outside of Pinellas County in order to investigate if similar patterns occur in state wide programs. Healthy Start can also benefit from further exploring differences by level of risk in addition to ethnicity regarding social networks

and social supports. Finally, the findings from this study suggest the need for programs that target preconceptional health risk factors identified in the literature to influence birth outcomes, such as BMI and ongoing medical conditions, prior to conception. A preconceptional component to Healthy Start programs could help decrease some of the risks associated to poor birth outcomes.

The findings of this study reiterate the need for additional testing and validation of existing tools in populations with multiple demographic and health risk factors. As public health continues to explore the effects of social determinants of health on birth outcomes, it is important to understand the mechanisms by which strong social bonds affect health and the additional factors that could be influencing birth outcomes beyond those specified in this study models. This study addressed the intricacies of marginalized populations, whose health is adversely impacted by stress and a lack of social support. Critical steps can be taken to adapt proper tools, interventions, and policies that can create lasting and meaningful change among isolated minorities.

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APPENDIX A: SOCIAL SUPPORT QUESTIONNAIRE

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(To be administered at program entry)

Date administered:_____

Instructions:

The following questions ask about people in your life who provide you with help or support. Each question has two parts. For the first part, list all the people you know, excluding yourself, whom you can count on for help or support in the manner described. Give the person's initials and their relationship to you (see example). Do not list more than one person next to each of the numbers beneath the question.

For the second part, circle how satisfied you are with the overall support you have.

If you have no support for a question, check the words "No one," but still rate your level of satisfaction. Do not list more than nine persons per question.

Please answer all questions as best you can. All your answers will be kept confidential.

Example:

Who do you know whom you can trust with information that could get you in trouble?

No one	1) T.N. (brother)	4) T.N. (father)	7)
	2) L.M. (friend)	5) L.M. (employer)	8)
	3) R.S. (friend)	6)	9)

How Satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

1. Whom can you really count on to be dependable when you need help?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How Satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

2. Whom can you really count on to help you feel more relaxed when you are under pressure or tense?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How Satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

3. Who accepts you totally, including both your worst and your best points?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How Satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

4. Whom can you really count on to care about you, regardless of what is happening to you?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How Satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

5. Whom can you really count on to help you feel better when you are feeling generally down-in-the-dumps?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How Satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

6. Whom can you count on to console you when you are very upset?

No one	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

How Satisfied?

6 – very satisfied	5 – fairly satisfied	4 – a little satisfied	3 – a little dissatisfied	2 – fairly dissatisfied	1 – very dissatisfied

To score SSQ6:

1. Add total number of people for all 6 items. (Max. is 54).
Divide by 6 for per item score. This gives you SSQ Number Score, or SSQN.

SSQ Number Score_____

2. Total satisfaction scores for all 6 items. (Max is 36).
Divide by 6 for per item score. This gives you SSQ Satisfaction score or SSQS
.

SSQ Satisfaction Score_____

Acuña, L., Bruner, C.A. (1999). Estructura Factorial del Cuestionario de Apoyo Social de Sarason, Levine, Basham y Sarason en México. *Revista Mexicana de Psicología, volumen 16(2)* 267-277.

Tiempo que lleva la mamá residiendo en los Estados Unidos:____años, _____meses.

Cuestionario de Apoyo Social 6 (SSQ6)

Fecha en que se administra la encuesta:_____

Instrucciones:

Las siguientes preguntas son acerca de personas que le brindan ayuda o apoyo. Cada pregunta tiene dos partes. En la primera parte, liste las personas con las que cuenta o confía, excluyéndose a usted mismo, para ayudarle o apoyarle en la forma como describe cada pregunta. Escriba las iniciales de cada persona y el tipo de relación que tiene con usted (vea el ejemplo). No liste más de 9 personas por pregunta, ni más de una persona junto a cada número.

En la segunda parte, ponga un círculo o una cruz, que indique el nivel de satisfacción que usted tiene con el apoyo de todas las personas en general que mencionó en cada situación.

Si usted no cuenta con apoyo para algunas de las preguntas, marque la palabra "nadie", pero aún así evalúe su nivel de satisfacción. TODAS SUS RESPUESTAS SERÁN CONFIDENCIALES.

Ejemplo:

¿En quién confía para contarle información que pudiera meterlo a usted en problemas?

Nadie	1) T.N. (hermano)	4) T.N. (papá)	7)
	2) L.M. (amigo)	5) L.M. (empleado)	8)
	3) R.S. (amigo)	6)	9)

¿Qué tan satisfecho está con el apoyo de todas las personas que nombró?

6 – muy satisfecho	5 – bastante satisfecho	4 – un poco satisfecho	3 – un poco insatisfecho	2 – bastante insatisfecho	1 – muy insatisfecho

1. ¿Con quién puede realmente contar cuando necesita ayuda?

Nadie	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

¿Qué tan satisfecho está con el apoyo de todas las personas que nombró?

6 – muy satisfecho	5 – bastante satisfecho	4 – un poco satisfecho	3 – un poco insatisfecho	2 – bastante insatisfecho	1 – muy insatisfecho

2. ¿Con quién puede realmente contar para hacerlo sentir más relajado cuando está bajo presión o está tenso?

Nadie	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

¿Qué tan satisfecho está con el apoyo de todas las personas que nombró?

6 – muy satisfecho	5 – bastante satisfecho	4 – un poco satisfecho	3 – un poco insatisfecho	2 – bastante insatisfecho	1 – muy insatisfecho

3. ¿Quién lo acepta totalmente, incluyendo sus mejores y sus peores aspectos?

Nadie	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

¿Qué tan satisfecho está con el apoyo de todas las personas que nombró?

6 – muy satisfecho	5 – bastante satisfecho	4 – un poco satisfecho	3 – un poco insatisfecho	2 – bastante insatisfecho	1 – muy insatisfecho

4. ¿Con quién puede realmente contar para cuidarlo o apoyarlo, independientemente de lo que le esté sucediendo?

Nadie	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

¿Qué tan satisfecho está con el apoyo de todas las personas que nombró?

6 – muy satisfecho	5 – bastante satisfecho	4 – un poco satisfecho	3 – un poco insatisfecho	2 – bastante insatisfecho	1 – muy insatisfecho

5. ¿Con quién cuenta para ayudarlo a sentirse major cuando se siente muy deprimido?

Nadie	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

¿Qué tan satisfecho está con el apoyo de todas las personas que nombró?

6 – muy satisfecho	5 – bastante satisfecho	4 – un poco satisfecho	3 – un poco insatisfecho	2 – bastante insatisfecho	1 – muy insatisfecho

6. ¿Con quién puede contar para consolarlo cuando se siente muy alterado o preocupado?

Nadie	1)	4)	7)
	2)	5)	8)
	3)	6)	9)

¿Qué tan satisfecho está con el apoyo de todas las personas que nombró?

6 – muy satisfecho	5 – bastante satisfecho	4 – un poco satisfecho	3 – un poco insatisfecho	2 – bastante insatisfecho	1 – muy insatisfecho

Para computar los resultados del SSQ6:
1. Sume todas las personas mencionadas en la primera parte de las 6 preguntas. (Máximo es 54) Divida el total entre 6. Esto le dará la puntuación del SSQ Number Score.

SSQ Number Score_____

2. Sume los números seleccionados para cada pregunta de satisfacción (Máximo es 36). Divida el total entre 6. Esto le dará el SSQ Satisfaction Score

SSQ Satisfaction Score_____

APPENDIX B: PERCEIVED STRESS SCALE (PSS10)

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way.

Name _____ Date _____

Age _____ Gender (*Circle*): **M F** Other _____

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

1.	In the last month, how often have you been upset because of something that happened unexpectedly?	**0**	**1**	**2**	**3**	**4**
2.	In the last month, how often have you felt that you were unable to control the important things in your life?	**0**	**1**	**2**	**3**	**4**
3.	In the last month, how often have you felt nervous and "stressed"?	**0**	**1**	**2**	**3**	**4**
*4.	In the last month, how often have you felt confident about your ability to handle personal problems?	**0**	**1**	**2**	**3**	**4**
*5.	In the last month, how often have you felt that things were going your way?	**0**	**1**	**2**	**3**	**4**
6.	In the last month, how often have you found that you could not cope with all the things you had to do?	**0**	**1**	**2**	**3**	**4**
*7.	In the last month, how often have you been able to control irritations in your life?	**0**	**1**	**2**	**3**	**4**
*8.	In the last month, how often have you felt that you were on top of things?	**0**	**1**	**2**	**3**	**4**
9.	In the last month, how often have you been angered because of things that were outside of your control?	**0**	**1**	**2**	**3**	**4**
10.	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	**0**	**1**	**2**	**3**	**4**

******** TOTAL PSS SCORE_____

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References

The PSS Scale is reprinted with permission of the American Sociological Association, from Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24,* 386-396.

Cohen, S. and Williamson, G. Perceived Stress in a Probability Sample of the United States. Spacapan, S. and Oskamp, S. (Eds.) *The Social Psychology of Health.* Newbury Park, CA: Sage, 1988.

PSS Scoring: Reverse responses to questions *4,*5,*7 and *8 (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0) and then sum across all scale items.

Referrals guide:
Category 1 score 1 to 9= monitor caregiver, continued support
Category 2 score 10 to 19= monitor caregiver, offer referral and supports
Category 3 score 20 to 29= refer for diagnostic assessment
Category 4 score 30 to 40= refer for diagnostic assessment

Perceived Stress Scale (PSS10)-SPANISH

Las preguntas en esta escala hacen referencia a sus sentimientos y pensamientos durante el **último mes**. En cada caso, por favor indique con una "X" como usted se ha sentido o ha pensado en cada situación.

Nombre _____ Fecha _____

Edad _____ Sexo (*Circle*): **M F** Otro _____

		0=Nunca	**1=Casi Nunca**	**2= De vez en cuando**	**3=A Menudo**	**4=Muy a Menudo**
1.	En el útimo mes, ¿con qué frecuencia, ha estado afectado por algo que ha ocurrido inesperadamente?	**0**	**1**	**2**	**3**	**4**
2.	En el último mes, ¿con qué frecuencia se ha sentido incapaz de controlar las cosas importantes en su vida?	**0**	**1**	**2**	**3**	**4**
3.	En el último mes, ¿con qué frecuencia se ha sentido nervioso o estresado?	**0**	**1**	**2**	**3**	**4**
*4.	En el último mes, ¿con qué frecuencia ha estado seguro sobre su capacidad para manejar sus problemas personales?	**0**	**1**	**2**	**3**	**4**
*5.	En el último mes, ¿con qué frecuencia ha sentido que las cosas le van bien?	**0**	**1**	**2**	**3**	**4**
6.	En el último mes, ¿con qué frecuencia has sentido que no podía afrontar todos las cosas que tenia que hacer?	**0**	**1**	**2**	**3**	**4**
*7.	En el último mes, ¿con qué frecuencia ha podido controlar las dificultades de su vida?	**0**	**1**	**2**	**3**	**4**
*8.	En el último mes, con qué frecuencia se ha sentido al control de todo?	**0**	**1**	**2**	**3**	**4**
9.	En el último mes, con qué frecuencia ha estado enfadado porque las cosas que le han ocurrido estaban fuera de su control?	**0**	**1**	**2**	**3**	**4**
10.	En el último mes, ¿con qué frecuencia ha sentido que las dificultades se acumulan tanto que no puede superarlas?	**0**	**1**	**2**	**3**	**4**

SCORE_____

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Referencias

The PSS Scale is reprinted with permission of the American Sociological Association, from Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24,* 386-396.

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PSS Scoring: Reverse responses to questions *4,*5,*7 and *8 (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0) and then sum across all scale items.

Guía para referidos:
Categoría 1 puntuación del 1 al 9= monitorear a la cliente, continuar apoyo
Categoría 2 puntuación del 10 al 19= monitorear a la cliente, ofrecer referidos y apoyos
Categoría 3 puntuación del 20 al 29= referir para diagnóstico
Categoría 4 puntuación del 30 al 40= referir para diagnóstico

APPENDIX C: HEALTHY START PRENATAL SCREEN

Help your baby have a healthy start in life!

Please answer the following questions to find out if anything in your life could affect your health or your baby's health. Your answers are confidential. You may qualify for free services from the Healthy Start Program or the Healthy Families Program, no matter what your income level is! (Please complete in ink.)*

Today's Date: _____

	YES	NO
1. Have you graduated from high school or received a GED?	☐	☐ 1
2. Are you married now?	☐	☐ 1
3. Are there any children at home younger than 5 years old?	☐	☐
4. Are there any children at home with medical or special needs?	☐	☐
5. Is this a good time for you to be pregnant?	☐	☐
6. In the last month, have you felt down, depressed or hopeless?	☐ 1	☐
7. In the last month, have you felt alone when facing problems?	☐	☐
8. Have you ever received mental health services or counseling?	☐	☐
9. In the last year, has someone you know tried to hurt you or threaten you?	☐	☐
10. Do you have trouble paying your bills?	☐	☐

11. What race are you? Check one or more.
☐ White ☐ 2 Black ☐ Other _____

12. In the last month, how many alcoholic drinks did you have per week?
_____ drinks 1 ☐ did not drink

13. In the last month, how many cigarettes did you smoke a day? *(a pack has 20 cigarettes)*
_____ cigarettes 1 ☐ did not smoke

14. Thinking back to just before you got pregnant, did you want to be.....?
☐ pregnant now ☐ pregnant later ☐ 3 not pregnant

15. Is this your first pregnancy?
☐ 2 Yes ☐ No If no, give date your last pregnancy ended: Date: (month/year)_____

16. Please mark any of the following that have happened.
☐ 1 Had a baby that was not born alive
☐ 2 Had a baby born 3 weeks or more before due date
☐ 3 Had a baby that weighed less than 5 pounds, 8 ounces
☐ None of the above

PATIENT INFORMATION

Name: First / Last / M.I.	Social Security Number:	Date of Birth (mo/day/yr):	17. Age:	☐ 1 <18
Street address (apartment complex name/number):	County:	City:	State:	Zip Code:
Prenatal Care covered by: ☐ Medicaid ☐ Private Insurance _____ ☐ No Insurance ☐ Other _____	Best time to contact me:	Phone #1 _____ Phone #2 _____		

I authorize the exchange of my health information between the Healthy Start Program, Healthy Start Providers, Healthy Start Coalitions, Healthy Families Florida, WIC, Florida Department of Health, and my health care providers for the purposes of providing services, paying for services, improving quality of services or program eligibility. This authorization remains in effect until revoked in writing by me.

Patient Signature: _____ **Date:** _____

Please initial: _____ Yes _____ No I also authorize specific health information to be exchanged as described above, which includes any of my mental health, TB, alcohol/drug abuse, STD, or HIV/AIDS information.

** If you do not want to participate in the screening process, please complete the patient information section only and sign below:*

Signature: _____ *Date:* _____

PROVIDER ONLY

LMP (mo/day/yr):	EDD (mo/day/yr):	18. Pre-Pregnancy: Wt: _____lbs. Height: ____ft. ____in. BMI: _____	☐ 1 < 19.8 ☐ 2 > 35.0
Provider's Name:	Provider's ID:	19. Pregnancy Interval Less Than 18 Months? ☐ N/A ☐ No	☐ 1 Yes
		20. Trimester at 1st Prenatal Visit? _____	☐ 1 2nd
Provider's Phone Number:	Provider's County:	21. Does patient have an illness that requires ongoing medical care? Specify illness: _____ ☐ No	☐ 2 Yes
Healthy Start Screening Score: _____	**Check One:** ☐ **Referred to Healthy Start. If score <6, specify:** _____ ☐ **Not Referred to Healthy Start.**		
Provider's/Interviewer's Signature and Title _____ **Date (mo/day/yr)** _____			

DH 3134, 04/08, stock number 5744-100-3134-7 Distribution of copies: WHITE & YELLOW—County Health Department in county where screening occurred PINK—Retained in patient's record GREEN—Patient's Copy

APPENDIX D: PRINCIPAL COMPONENT ANALYSIS

Table 13: Factor loadings for Total sample

Factor Loadings (All)		
Item	Comonent 1	Component 2
PSS 1	**.715**	
PSS 2	**.770**	
PSS 3	**.725**	
PSS 4	**.598**	.567
PSS 5	**.697**	.410
PSS 6	**.722**	
PSS 7	.533	.627
PSS 8	**.684**	.466
PSS 9	**.706**	
PSS 10	**.790**	

Note: Factor Loadings < .40 are supressed

Table 14: Factor loadings for White sample

Factor Loadings (White)	
Item	Component 1
PSS 1	**.758**
PSS 2	**.769**
PSS 3	**.762**
PSS 4	**.698**
PSS 5	**.799**
PSS 6	**.755**
PSS 7	**.650**
PSS 8	**.774**
PSS 9	**.730**
PSS 10	**.806**

Note: Factor Loadings < .40 are supressed

Table 15: Factor loadings for Black sample

Factor Loadings (Black)		
Item	Component 1	Component 2
PSS 1	**.731**	
PSS 2	**.752**	
PSS 3	**.786**	
PSS 4	.433	**.633**
PSS 5	.478	**.636**
PSS 6	**.718**	
PSS 7		**.795**
PSS 8	.552	**.597**
PSS 9	**.719**	
PSS 10	**.791**	

Note: Factor Loadings < .40 are supressed

Table 16: Factor loadings for Latina sample

Factor Loadings (Latina)		
Item	Component 1	Component 2
PSS 1	**.778**	
PSS 2	**.860**	
PSS 3	**.789**	
PSS 4	.437	**.709**
PSS 5	**.635**	.476
PSS 6	**.678**	
PSS 7	.445	**.699**
PSS 8	.538	**.564**
PSS 9	**.722**	
PSS 10	**.777**	

Note: Factor Loadings < .40 are supressed

APPENDIX E: MISSING VALUES

Table 17: Missing values by variable

Variable	Total Missing (N=411)
Age	1
Marital status	0
Education	0
Trouble paying bills	1
Prenatal care (trimester)	0
BMI	1
Smoker	0
Ongoing medical care	0
SSQ satisfaction score	19
PSS score	8
Gestational weeks	0
Birth weight	0
Language (Latinas only)	0
Years living in Pinellas (Latinas only)	8

APPENDIX F: INFANT BIRTH WEIGHT REGRESSION RESULTS

Table 18: Linear regression analysis for infant birth weight

	Total Model				White Model				Black Model				Latina Model			
	B	*SE B*	*β*	*p-value*	*B*	*SE B*	*β*	*p-value*	*B*	*SE B*	*β*	*p-value*	*B*	*SE B*	*β*	*p-value*
(Constant)	5.836	0.758		0.000	5.705	1.246		0.000	6.349	1.072		0.000	6.889	2.429		0.006
Age	-0.001	0.012	-0.003	0.954	-0.018	0.019	-0.082	0.361	-0.001	0.025	-0.002	0.983	-0.03	0.029	-0.132	0.303
Married	-0.093	0.191	-0.025	0.629	-0.304	0.283	-0.089	0.285	-0.066	0.365	-0.017	0.856				
Education	0.195	0.150	0.066	0.195	0.231	0.259	0.076	0.374	0.066	0.242	0.025	0.785	0.548	0.332	0.18	0.103
Trouble paying bills	0.075	0.151	0.026	0.621	-0.080	0.235	-0.029	0.735	-0.037	0.245	-0.014	0.882	0.271	0.382	0.083	0.48
PNC	-0.133	0.147	-0.046	0.366	-0.111	0.227	-0.040	0.625	-0.063	0.256	-0.022	0.805	-0.458	0.343	-0.15	0.186
BMI	0.024	0.010	0.125	0.017	0.022	0.017	0.109	0.201	0.018	0.015	0.119	0.240	0.09	0.026	0.385	0.001
Smoker	0.019	0.177	0.006	0.913	-0.160	0.243	-0.057	0.510	0.154	0.325	0.043	0.637				
Ongoing medical care	-0.228	0.156	-0.074	0.146	-0.158	0.236	-0.055	0.505	-0.591	0.273	-0.200	0.033	-0.172	0.4	-0.049	0.668
Family support	0.004	0.075	0.003	0.961	0.143	0.105	0.121	0.178	0.048	0.127	0.036	0.705	-0.361	0.235	-0.211	0.129
Non-family support	0.077	0.059	0.067	0.191	0.191	0.087	0.179	0.030	0.003	0.091	0.003	0.974	0.011	0.184	0.007	0.95
SSQ Satisfaction Score	0.065	0.100	0.036	0.516	0.173	0.150	0.104	0.252	-0.048	0.151	-0.030	0.751	-0.007	0.293	-0.003	0.98
PSS Score	0.008	0.010	0.047	0.418	0.004	0.015	0.027	0.779	0.010	0.016	0.060	0.524	0.001	0.027	0.006	0.966
Language													-0.251	0.593	-0.071	0.673
Years living in Pinellas													-0.003	0.002	-0.165	0.252
	Total Model $R^2 = .033$				White Model $R^2 = .097$				Black Model $R^2 = .060$				Latina Model $R^2 = .217$			

APPENDIX G: LOW BIRTH WEIGHT LOGISTIC REGRESSION RESULTS

Table 19: Logistic regression analysis for low birth weight

	Total Model					White Model					Black Model					Latina Model				
	β	*S.E.* β	*p-value*	OR	95% CI	β	*S.E.* β	*p-value*	OR	95% CI	β	*S.E.* β	*p-value*	OR	95% CI	β	*S.E.* β	*p-value*	OR	95% CI
Constant	1.374	1.522	0.367	3.952		2.208	2.972	0.458	9.097		-0.182	2.283	0.936	0.834		-0.075	5.285	0.99	0.928	
Age	0.009	0.026	0.726	1.009	0.959 - 1.062	0.046	0.045	0.301	1.047	0.959 - 1.143	0.009	0.057	0.879	1.009	0.902 - 1.128	-0.029	0.076	0.71	0.972	0.837 - 1.128
Married	0.125	0.423	0.768	1.133	0.495 - 2.594	0.497	0.653	0.447	1.643	0.457 - 5.905	0.194	0.816	0.812	1.214	0.245 - 6.013					
Education	-0.342	0.315	0.279	0.711	0.383 - 1.319	-1.167	0.593	0.049	0.311	0.097 - 0.996	0.713	0.593	0.229	2.041	0.639 - 6.521	-0.629	0.803	0.43	0.533	0.11 - 2.574
Trouble paying bills	0.142	0.327	0.664	1.153	0.607 - 2.187	0.108	0.581	0.853	1.114	0.357 - 3.478	0.672	0.529	0.205	1.957	0.693 - 5.524	-1.56	1.249	0.21	0.21	0.018 - 2.43
PNC	-0.111	0.326	0.734	0.895	0.473 - 1.695	0.015	0.568	0.979	1.015	0.333 - 3.09	-0.859	0.654	0.189	0.423	0.118 - 1.525	0.166	0.825	0.84	1.181	0.234 - 5.949
BMI	-0.078	0.028	0.005	0.925	0.877 - 0.976	-0.106	0.052	0.041	0.900	0.813 - 0.996	-0.083	0.043	0.055	0.921	0.847 - 1.002	-0.082	0.074	0.27	0.922	0.797 - 1.065
Smoker	-0.178	0.392	0.650	0.837	0.388 - 1.805	-0.102	0.593	0.864	0.903	0.282 - 2.888	-0.282	0.787	0.720	0.755	0.162 - 3.526					
Ongoing medical care	0.758	0.318	0.017	2.135	1.145 - 3.98	0.861	0.549	0.117	2.365	0.807 - 6.933	1.337	0.584	0.022	3.808	1.212 - 11.961	0.586	0.972	0.55	1.797	0.268 - 12.067
Family support	0.013	0.024	0.578	1.013	0.967 - 1.062	0.003	0.041	0.936	1.003	0.926 - 1.087	-0.023	0.043	0.584	0.977	0.898 - 1.062	0.037	0.095	0.7	1.037	0.86 - 1.251
Non-family support	-0.034	0.046	0.457	0.967	0.884 - 1.057	-0.228	0.117	0.052	0.796	0.633 - 1.002	0.009	0.064	0.883	1.010	0.89 - 1.145	0.207	0.183	0.26	1.231	0.859 - 1.763
SSQ Satisfaction score	-0.273	0.189	0.148	0.761	0.525 - 1.102	-0.418	0.290	0.148	0.658	0.373 - 1.161	-0.018	0.324	0.955	0.982	0.521 - 1.852	-0.545	0.624	0.38	0.58	0.171 - 1.97
PSS Score	-0.013	0.020	0.540	0.988	0.949 - 1.028	-0.017	0.035	0.624	0.983	0.917 - 1.053	-0.022	0.036	0.543	0.978	0.911 - 1.05	0.078	0.079	0.33	1.081	0.925 - 1.263
Language																0.59	1.362	0.67	1.803	0.125 - 26.044
Living in Pinellas																0.012	0.006	0.06	1.012	0.999 - 1.024
	Total Model Psuedo R^2 is between 0.48 (Cox & Snell) and 0.090 (Nagelkerke)					White Model Psuedo R^2 is between 0.126 (Cox & Snell) and 0.238 (Nagelkerke)					Black Model Psuedo R^2 is between 0.098 (Cox & Snell) and 0.169 (Nagelkerke)					Latina Model Psuedo R^2 is between 0.143 (Cox & Snell) and 0.268 (Nagelkerke)				

APPENDIX H: PRETERM BIRTH LOGISTIC REGRESSION RESULTS

Table 20: Logistic regression analysis for preterm birth

	Total Sample					White Model					Black Model					Latina Model				
	β	*S.E.* β	*p-value*	OR	95% CI	β	*S.E.* β	*p-value*	OR	95% CI	β	*S.E.* β	*p-value*	OR	95% CI	β	*S.E.* β	*p-value*	OR	95% CI
Constant	-0.702	1.622	0.665	0.496		0.266	3.271	0.935	1.304		-2.205	2.481	0.374	0.110		-2.913	5.813	0.616	0.054	
Age	0.045	0.028	0.113	1.046	0.99 - 1.105	0.096	0.052	0.067	1.101	0.993 - 1.22	0.037	0.055	0.501	1.038	0.931 - 1.157	0.065	0.093	0.486	1.067	0.89 - 1.279
Married	-0.064	0.452	0.888	0.938	0.387 - 2.276	-0.147	0.773	0.849	0.863	0.19 - 3.925	-0.155	0.860	0.857	0.857	0.159 - 4.62					
Education	-0.627	0.352	0.075	0.534	0.268 - 1.065	-1.011	0.708	0.153	0.364	0.091 - 1.458	0.143	0.629	0.820	1.154	0.336 - 3.961	-1.108	0.933	0.235	0.33	0.053 - 2.056
Trouble paying bills	0.330	0.363	0.363	1.390	0.683 - 2.83	0.722	0.655	0.270	2.059	0.57 - 7.434	0.148	0.622	0.812	1.160	0.343 - 3.925	0.757	1.062	0.476	2.131	0.266 - 17.072
PNC	-0.462	0.378	0.221	0.630	0.301 - 1.321	-1.191	0.709	0.093	0.304	0.076 - 1.219	-0.725	0.715	0.311	0.484	0.119 - 1.967	0.049	0.965	0.96	1.05	0.158 - 6.965
BMI	-0.004	0.024	0.857	0.996	0.95 - 1.043	-0.050	0.055	0.359	0.951	0.855 - 1.059	0.007	0.036	0.853	1.007	0.939 - 1.08	-0.058	0.067	0.39	0.944	0.827 - 1.077
Smoker	-1.214	0.523	0.020	0.297	0.107 - 0.827	-0.896	0.700	0.201	0.408	0.103 - 1.611	-1.800	1.174	0.125	0.165	0.017 - 1.65					
Ongoing medical care	1.000	0.343	0.004	2.720	1.389 - 5.323	0.832	0.624	0.183	2.297	0.676 - 7.808	1.736	0.623	0.005	5.677	1.675 - 19.235	1.779	1.202	0.139	5.921	0.562 - 62.414
PSS Score	-0.041	0.023	0.080	0.960	0.97 - 1.069	-0.032	0.042	0.445	0.968	0.948 - 1.11	-0.034	0.040	0.406	0.967	0.882 - 1.061	0.084	0.099	0.397	1.087	0.896 - 1.32
Family support	0.018	0.025	0.471	1.018	0.921 - 1.093	0.026	0.040	0.522	1.026	0.792 - 1.104	-0.033	0.047	0.481	0.967	0.896 - 1.169	0.094	0.195	0.629	1.099	0.749 - 1.611
Non-family support	0.004	0.044	0.935	1.004	0.482 - 1.074	-0.067	0.085	0.429	0.935	0.314 - 1.112	0.023	0.068	0.734	1.023	0.463 - 1.924	-0.353	0.68	0.604	0.703	0.185 - 2.665
SSQ Satisfaction score	-0.329	0.205	0.107	0.719	0.917 - 1.005	-0.526	0.323	0.103	0.591	0.891 - 1.052	-0.058	0.363	0.873	0.944	0.893 - 1.047	-0.055	0.081	0.494	0.946	0.808 - 1.108
Language																0.537	1.748	0.759	1.71	0.056 - 52.589
Living in Pinellas																0.012	0.008	0.129	1.012	0.996 - 1.028
	Total Model Psuedo R^2 is between 0.056 (Cox & Snell) and 0.114 (Nagelkerke)					White Model Psuedo R^2 is between 0.090 (Cox & Snell) and 0.194 (Nagelkerke)					Black Model Psuedo R^2 is between 0.103 (Cox & Snell) and 0.192 (Nagelkerke)					Latina Model Psuedo R^2 is between 0.155 (Cox & Snell) and 0.320 (Nagelkerke)				

APPENDIX I: SGA REGRESSION RESULTS

Table 21: Logistical regression analysis for SGA

	Total Model					White Model					Black Model					Latina Model				
	β	*S.E.* β	OR	*p-value*	95% CI	β	*S.E.* β	OR	*p-value*	95% CI	β	*S.E.* β	OR	*p-value*	95% CI	β	*S.E.* β	OR	*p-value*	95% CI
Constant	-0.498	1.618	0.608	0.758		-3.785	2.678	0.023	0.158		-0.841	2.611	0.431	0.747		-5.936	6.016	0.003	0.324	
Age	-0.054	0.027	0.947	0.045	0.898 - 0.999	-0.016	0.043	0.984	0.710	0.904 - 1.071	-0.014	0.056	0.987	0.810	0.883 - 1.102	-0.094	0.08	0.91	0.238	0.778 - 1.064
Married	0.262	0.399	1.299	0.512	0.594 - 2.841	-0.214	0.533	0.808	0.688	0.439 - 4.809	-0.442	0.483	0.642	0.360	0.848 - 14.028					
Education	-0.275	0.296	0.759	0.353	0.425 - 1.357	0.373	0.611	1.453	0.541	0.284 - 2.293	1.238	0.716	3.449	0.084	0.249 - 1.657	0.057	0.843	1.059	0.946	0.203 - 5.528
Trouble paying bills	-0.244	0.317	0.783	0.442	0.421 - 1.459	-0.250	0.535	0.779	0.640	0.273 - 2.221	-0.047	0.517	0.954	0.928	0.346 - 2.629	-1.658	1.041	0.19	0.111	0.025 - 1.465
PNC	0.498	0.294	1.646	0.090	0.925 - 2.928	0.243	0.495	1.275	0.623	0.484 - 3.363	0.335	0.524	1.397	0.523	0.501 - 3.901	1.772	0.861	5.885	0.04	1.088 - 31.821
BMI	-0.024	0.022	0.977	0.283	0.935 - 1.02	0.037	0.038	1.038	0.332	0.963 - 1.119	-0.101	0.043	0.904	0.019	0.831 - 0.984	0.04	0.054	1.04	0.459	0.937 - 1.156
Smoker	0.420	0.345	1.522	0.223	0.774 - 2.992	0.756	0.517	2.130	0.144	0.773 - 5.871	-0.074	0.701	0.929	0.916	0.235 - 3.665					
Ongoing medical care	0.477	0.308	1.611	0.121	0.881 - 2.944	0.705	0.501	2.024	0.159	0.758 - 5.404	0.517	0.545	1.677	0.343	0.576 - 4.878	0.12	1.027	1.127	0.907	0.151 - 8.437
Family support	-0.026	0.024	0.975	0.296	0.929 - 1.023	0.043	0.033	1.044	0.189	0.924 - 1.075	-0.053	0.035	0.949	0.130	0.896 - 1.051	-0.068	0.102	0.934	0.506	0.765 - 1.141
Non- family support	0.012	0.038	1.012	0.755	0.939 - 1.09	-0.007	0.315	0.993	0.983	0.83 - 1.069	0.389	0.406	1.475	0.338	0.879 - 1.12	0.244	0.175	1.277	0.162	0.907 - 1.798
SSQ satisfaction score	0.121	0.225	1.129	0.590	0.726 - 1.756	-0.060	0.065	0.942	0.355	0.535 - 1.843	-0.008	0.062	0.993	0.903	0.666 - 3.267	0.525	0.783	1.69	0.503	0.365 - 7.835
PSS Score	-0.003	0.020	0.997	0.884	0.959 - 1.037	-0.003	0.039	0.997	0.934	0.979 - 1.113	-0.030	0.041	0.971	0.461	0.886 - 1.016	0.089	0.069	1.093	0.198	0.955 - 1.252
Language																0.259	1.436	1.296	0.857	0.078 - 21.61
Years living in Pinellas																0.001	0.006	1.001	0.854	0.99 - 1.012
	Total Model Psuedo R^2 is between 0.037 (Cox & Snell) and 0.065 (Nagelkerke)					White Model Psuedo R^2 is between 0.06 (Cox & Snell) and 0.11 (Nagelkerke)					Black Model Psuedo R^2 is between 0.124 (Cox & Snell) and 0.197 (Nagelkerke)					Latina Model Psuedo R^2 is between 0.161 (Cox & Snell) and 0.284 (Nagelkerke)				

APPENDIX J: SEM MODEL 1 INFANT BIRTH WEIGHT RESULTS

Table 22: SEM Model 1 for infant birth weight

	Total Model	White Model			Black Model			Latina Model		
	Did not converge	Total Estimate	Est./S.E.	P-Value	Total Estimate	Sample SE	P-Value	Total Estimate	Sample SE	P-Value
Parameter Estimates										
SS BY SSQSATI		0.471	5.297	0.000	0.119	0.135	0.378	0.655	0.102	0.000
SS BY SSQFAM		0.453	5.166	0.000	0.347	0.136	0.011	0.506	0.108	0.000
SS BY SSQNONFAM		0.068	0.734	0.463	0.289	0.120	0.016	0.160	0.133	0.228
STRESS BY PSS1INT		0.722	17.076	0.000	0.700	0.051	0.000	0.747	0.054	0.000
STRESS BY PSS2INT		0.744	18.775	0.000	0.741	0.046	0.000	0.847	0.038	0.000
STRESS BY PSS3INT		0.72	17.011	0.000	0.791	0.040	0.000	0.772	0.050	0.000
STRESS BY PSS4INT		0.656	13.337	0.000	0.306	0.084	0.000	0.322	0.101	0.001
STRESS BY PSS5INT		0.782	22.168	0.000	0.293	0.084	0.000	0.472	0.089	0.000
STRESS BY PSS6INT		0.731	17.774	0.000	0.727	0.048	0.000	0.746	0.054	0.000
STRESS BY PSS7INT		0.601	11.053	0.000	0.106	0.091	0.242	0.296	0.102	0.004
STRESS BY PSS8INT		0.742	18.514	0.000	0.391	0.079	0.000	0.396	0.095	0.000
STRESS BY PSS9INT		0.683	14.696	0.000	0.689	0.052	0.000	0.711	0.060	0.000
STRESS BY PSS10INT		0.612	11.452	0.000	0.516	0.069	0.000	0.782	0.049	0.000
STRESS ON SS		-0.868	-7.356	0.000	-0.664	0.225	0.003	-0.801	0.124	0.000
STRESS ON LANG								0.004	0.125	0.976
STRESS ON TIMEPIN								0.004	0.125	0.976
SS ON MARRIED		0.103	1.057	0.290	-0.036	0.126	0.773			
TROBILL ON SS		-0.282	-3.121	0.002	-0.288	0.146	0.048	-0.379	0.120	0.002
LATEPNC ON SS		-0.057	-0.621	0.534	-0.097	0.134	0.467	0.083	0.130	0.522
INFBWLB ON STRESS		-0.106	-1.251	0.211	0.084	0.090	0.353	0.103	0.117	0.380
INFBWLB ON AGE		-0.055	-0.645	0.519	-0.006	0.098	0.952	-0.096	0.104	0.353
INFBWLB ON MARRIED		-0.088	-1.09	0.276	-0.020	0.085	0.812			
INFBWLB ON EDUC		0.072	0.866	0.387	0.034	0.084	0.689	0.171	0.100	0.086
INFBWLB ON TROBILL		-0.036	-0.42	0.675	-0.020	0.087	0.820	0.143	0.102	0.161
INFBWLB ON SMOKER		-0.041	-0.486	0.627	0.036	0.086	0.679			
INFBWLB ON BMI		0.085	1.03	0.303	0.118	0.095	0.213	0.336	0.095	0.000
INFBWLB ON ONGMEDC		-0.07	-0.867	0.386	-0.194	0.087	0.026	-0.032	0.104	0.759
LATEPNC WITH INFBWLB		-0.042	-0.524	0.600	-0.026	0.087	0.769	-0.178	0.110	0.106
Effects										
from SS TO INFBWLB										
Total		0.102	1.395	0.163	-0.050	0.064	0.443	-0.137	0.091	0.135

APPENDIX K: SEM MODEL 1 LOW BIRTH WEIGHT RESULTS

Table 23: SEM Model 1 for low birth weight

Total Model	White Model			Black Model	Latina Model		
Did not converge	Total Estimate	Sample *SE*	*P-Value*	*Did not converge*	Total Estimate	Sample *SE*	*P-Value*
Parameter Estimates							
SS BY SSQSATI	0.441	0.044	0.000		0.536	0.088	0.000
SS BY SSQFAMSQ	0.485	0.056	0.000		0.307	0.077	0.000
SS BY SSQNFAMSQ	0.08	0.088	0.359		0.144	0.087	0.097
STRESS BY PSS1INT	0.729	0.037	0.000		0.700	0.081	0.000
STRESS BY PSS2INT	0.767	0.04	0.000		0.895	0.060	0.000
STRESS BY PSS3INT	0.721	0.041	0.000		0.765	0.065	0.000
STRESS BY PSS4INT	0.654	0.039	0.000		0.264	0.086	0.002
STRESS BY PSS5INT	0.809	0.028	0.000		0.477	0.085	0.000
STRESS BY PSS6INT	0.757	0.036	0.000		0.643	0.073	0.000
STRESS BY PSS7INT	0.593	0.044	0.000		0.281	0.082	0.001
STRESS BY PSS8INT	0.778	0.037	0.000		0.391	0.085	0.000
STRESS BY PSS9INT	0.696	0.04	0.000		0.563	0.083	0.000
STRESS BY PSS10INT	0.531	0.028	0.000		0.645	0.081	0.000
STRESS ON SS	-0.81	0.068	0.000		-1.010	0.146	0.000
SS ON MARRIED	0.066	0.099	0.510				
TROBILL ON SS	-0.245	0.106	0.021		-0.171	0.144	0.236
LATEPNC ON SS	-0.016	0.094	0.866		0.019	0.102	0.848
LBW ON STRESS	0.055	0.101	0.591		0.178	0.154	0.247
LBW ON AGE	0.093	0.106	0.382		-0.086	0.370	0.815
LBW ON MARRIAGE	0.117	0.12	0.330				
LBW ON EDUC	-0.195	0.137	0.152		-0.092	0.189	0.627
LBW ON TROBILL	0.03	0.116	0.795		-0.209	0.259	0.420
LBW ON SMOKER	-0.039	0.131	0.767				
LBW ON BMI	-0.341	0.158	0.031		-0.343	0.271	0.206
LBW ON ONGMEDC	0.188	0.129	0.145		0.171	0.242	0.479
LATEPNC WITH LBW	0.008	0.123	0.945		0.036	0.166	0.827
Effects							
from SS TO LBW							
Total	-0.052	0.08	0.518		-0.144	0.149	0.333

APPENDIX L: SEM MODEL 1 PRETERM BIRTH RESULTS

Table 24: SEM Model 1 for preterm births

	Total Model	White Model			Black Model	Latina Model		
	Did not converge	Total Estimate	Sample *SE*	*p-value*	*Did not converge*	Total Estimate	Sample *SE*	*p-value*
Parameter Estimates								
SS BY SSQSATI		0.444	0.044	0.000		0.543	0.072	0.000
SS BY SSQFAMSQ		0.485	0.057	0.000		0.331	0.079	0.000
SS BY SSQNFAMSQ		0.080	0.088	0.364		0.143	0.088	0.104
STRESS BY PSS1INT		0.729	0.037	0.000		0.695	0.081	0.000
STRESS BY PSS2INT		0.768	0.040	0.000		0.899	0.059	0.000
STRESS BY PSS3INT		0.722	0.040	0.000		0.735	0.067	0.000
STRESS BY PSS4INT		0.655	0.039	0.000		0.272	0.086	0.002
STRESS BY PSS5INT		0.809	0.029	0.000		0.507	0.085	0.000
STRESS BY PSS6INT		0.755	0.036	0.000		0.617	0.072	0.000
STRESS BY PSS7INT		0.593	0.044	0.000		0.287	0.083	0.001
STRESS BY PSS8INT		0.778	0.037	0.000		0.398	0.086	0.000
STRESS BY PSS9INT		0.697	0.040	0.000		0.572	0.083	0.000
STRESS BY PSS10INT		0.531	0.028	0.000		0.640	0.079	0.000
STRESS ON SS		-0.804	0.068	0.000		-0.979	0.033	0.000
STRESS ON LANG						0.128	0.125	0.308
STRESS ON TIMEPIN						-0.129	0.122	0.290
SS ON MARRIED		0.066	0.100	0.508				
TROBILL ON SS		-0.773	0.375	0.039		-0.890	0.140	0.000
LATEPNC ON SS		-0.016	0.094	0.865		0.021	0.105	0.841
PRETERM ON STRESS		-0.289	0.332	0.385		-2.560	1.744	0.142
PRETERM ON AGE		0.236	0.129	0.066		0.207	0.389	0.594
PRETERM ON MARRIED		-0.006	0.167	0.969				
PRETERM ON EDUC		-0.138	0.172	0.424		0.235	0.193	0.224
PRETERM ON TROBILL		0.436	0.342	0.202		2.598	1.798	0.148
PRETERM ON SMOKER		-0.243	0.200	0.225				
PRETERM ON BMI		-0.129	0.142	0.362		-0.175	0.211	0.406
PRETERM ON ONGMEDC		0.202	0.137	0.142		0.210	0.204	0.303
LATEPNC WITH PRETERM		-0.300	0.299	0.315		0.031	0.063	0.624
Effects								
from SS TO PRETERM								
Total		-0.052	0.08	0.459		0.194	0.109	0.074

APPENDIX M: SEM MODEL 1 SGA RESULTS

Table 25: SEM Model 1 for SGA

	Total Model			White Model			Black Model	Latina Model		
	Total Estimate	Sample *SE*	*P-Value*	Total Estimate	Sample *SE*	*P-Value*	*Did not converge*	Total Estimate	Sample *SE*	*P-Value*
Parameter Estimates										
SS BY SSQSATI	0.201	0.022	0.000	0.445	0.044	0.000		0.539	0.087	0.000
SS BY SSQFAMSQ	0.602	0.053	0.000	0.484	0.057	0.000		0.315	0.076	0.000
SS BY SSQNFAMSQ	0.246	0.064	0.000	0.075	0.088	0.393		0.141	0.088	0.108
STRESS BY PSS1INT	0.692	0.025	0.000	0.731	0.036	0.000		0.701	0.080	0.000
STRESS BY PSS2INT	0.800	0.023	0.000	0.767	0.040	0.000		0.896	0.059	0.000
STRESS BY PSS3INT	0.690	0.026	0.000	0.714	0.041	0.000		0.757	0.065	0.000
STRESS BY PSS4INT	0.528	0.036	0.000	0.651	0.039	0.000		0.266	0.086	0.002
STRESS BY PSS5INT	0.554	0.035	0.000	0.807	0.029	0.000		0.484	0.085	0.000
STRESS BY PSS6INT	0.787	0.022	0.000	0.757	0.036	0.000		0.637	0.073	0.000
STRESS BY PSS7INT	0.434	0.040	0.000	0.591	0.044	0.000		0.283	0.082	0.001
STRESS BY PSS8INT	0.614	0.032	0.000	0.774	0.038	0.000		0.391	0.086	0.000
STRESS BY PSS9INT	0.675	0.028	0.000	0.701	0.039	0.000		0.567	0.083	0.000
STRESS BY PSS10INT	0.382	0.014	0.000	0.538	0.028	0.000		0.648	0.080	0.000
STRESS ON SS	-0.713	0.067	0.000	-0.803	0.068	0.000		-0.998	0.142	0.000
STRESS ON LANG								0.171	0.156	0.274
STRESS ON TIMEPIN								-0.090	0.148	0.545
SS ON MARRIED	0.046	0.072	0.520	0.066	0.100	0.507				
TROBILL ON SS	-0.139	0.079	0.079	-0.992	0.213	0.000		-0.172	0.146	0.237
LATEPNC ON SS	-0.009	0.071	0.899	-0.016	0.095	0.864		0.020	0.103	0.847
SGA ON STRESS	0.130	0.061	0.033	0.952	0.428	0.026		0.081	0.145	0.576
SGA ON AGE	-0.091	0.097	0.351	-0.024	0.137	0.862		-0.349	0.255	0.172
SGA ON MARRIAGE	0.060	0.091	0.508	0.144	0.133	0.277				
SGA ON EDUC	-0.097	0.086	0.259	-0.035	0.149	0.813		0.124	0.189	0.511
SGA ON TROBILL	-0.075	0.072	0.297	0.938	0.420	0.026		-0.188	0.156	0.227
SGA ON SMOKER	0.028	0.083	0.737	0.141	0.138	0.307				
SGA ON BMI	-0.077	0.081	0.342	0.042	0.109	0.703		0.109	0.191	0.566
SGA ON ONGMEDC	0.060	0.086	0.483	0.131	0.147	0.371		-0.060	0.211	0.775
LATEPNC WITH SGA	0.039	0.068	0.566	0.058	0.131	0.657		0.298	0.229	0.193
Effects										
from SS TO SGA										
Total	-0.082	0.045	0.067	0.166	0.082	0.043		-0.048	-0.327	0.743

APPENDIX N: SEM MODEL 2 INFANT BIRTH WEIGHT RESULTS

Table 26: SEM Model 2 for infant birth weight

Total Model	White Model			Black Model	Latina Model		
Did not converge	Total Estimate	Sample *SE*	*P-Value*	*Did not converge*	Total Estimate	Sample *SE*	*P-Value*
Parameter Estimates							
SS BY SSQSATI	0.420	0.133	0.002		0.627	0.124	0.000
SS BY SSQFAMSQ	0.389	0.124	0.002		0.433	0.119	0.000
SS BY SSQNFAMSQ	0.130	0.087	0.135		0.189	0.118	0.110
STRESS BY PSS1INT	0.719	0.043	0.000		0.756	0.050	0.000
STRESS BY PSS2INT	0.741	0.040	0.000		0.871	0.033	0.000
STRESS BY PSS3INT	0.718	0.043	0.000		0.784	0.046	0.000
STRESS BY PSS4INT	0.657	0.049	0.000		0.307	0.099	0.002
STRESS BY PSS5INT	0.776	0.036	0.000		0.515	0.081	0.000
STRESS BY PSS6INT	0.729	0.042	0.000		0.667	0.063	0.000
STRESS BY PSS7INT	0.599	0.055	0.000		0.325	0.098	0.001
STRESS BY PSS8INT	0.742	0.040	0.000		0.426	0.090	0.000
STRESS BY PSS9INT	0.678	0.047	0.000		0.713	0.056	0.000
STRESS BY PSS10INT	0.610	0.054	0.000		0.759	0.050	0.000
STRESS ON SS	-0.972	0.243	0.000		-0.913	0.156	0.000
INFBWLB ON STRESS	4.426	41.722	0.916		-0.076	0.757	0.921
INFBWLB ON SS	4.674	41.744	0.911		-0.189	0.798	0.813
Effects							
from SS TO INFBWLB							
Total	0.370	0.177	0.036		-0.120	0.150	0.423
Total Indirect	-4.304	41.642	0.918		0.069	0.696	0.921
Direct	4.674	41.744	0.911		-0.189	0.798	0.813

APPENDIX O: SEM MODEL 2 LOW BIRTH WEIGHT RESULTS

Table 27: SEM Model 2 for low birth weight

Total Model	White Model			Black Model	Latina Model		
Did not converge	Total Estimate	Sample *SE*	*P-Value*	*Did not converge*	Total Estimate	Sample *SE*	*P-Value*
Parameter Estimates							
SS BY SSQSATI	0.419	0.038	0.000		0.627	0.124	0.000
SS BY SSQFAMSQ	0.517	0.053	0.000		0.433	0.119	0.000
SS BY SSQNFAMSQ	0.086	0.104	0.404		0.189	0.118	0.110
STRESS BY PSS1INT	0.741	0.034	0.000		0.756	0.050	0.000
STRESS BY PSS2INT	0.785	0.039	0.000		0.871	0.033	0.000
STRESS BY PSS3INT	0.701	0.040	0.000		0.784	0.046	0.000
STRESS BY PSS4INT	0.656	0.039	0.000		0.307	0.099	0.002
STRESS BY PSS5INT	0.812	0.029	0.000		0.515	0.081	0.000
STRESS BY PSS6INT	0.772	0.035	0.000		0.667	0.063	0.000
STRESS BY PSS7INT	0.598	0.042	0.000		0.325	0.098	0.001
STRESS BY PSS8INT	0.787	0.034	0.000		0.426	0.090	0.000
STRESS BY PSS9INT	0.692	0.039	0.000		0.713	0.056	0.000
STRESS BY PSS10INT	0.544	0.018	0.000		0.759	0.050	0.000
STRESS ON SS	-0.735	0.069	0.000		-0.913	0.156	0.000
LBW ON STRESS	-0.148	0.298	0.620		-0.076	0.757	0.921
LBW ON SS	-0.300	0.375	0.424		-0.189	0.798	0.813
Effects							
from SS TO LBW							
Total	-0.300	0.375	0.424		-0.044	0.205	0.831
Total Indirect	0.000	0.000	1.000		0.000	0.000	1.000
Direct	-0.300	0.375	0.424		-0.044	0.205	0.831

APPENDIX P: SEM MODEL 2 PRETERM BIRTH RESULTS

Table 28: SEM Model 2 for preterm births

	Total Model			White Model			Black Model	Latina Model		
	Total Estimate	Sample *SE*	*P-Value*	Total Estimate	Sample *SE*	*P-Value*	*Did not converge*	Total Estimate	Sample *SE*	*P-Value*
Parameter Estimates										
SS BY SSQSATI	0.232	0.022	0.000	0.421	0.038	0.000		0.612	0.082	0.000
SS BY SSQFAMSQ	0.577	0.047	0.000	0.517	0.053	0.000		0.418	0.078	0.000
SS BY SSQNFAMSQ	0.232	0.064	0.000	0.082	0.103	0.427		0.196	0.086	0.023
STRESS BY PSS1INT	0.674	0.027	0.000	0.742	0.034	0.000		0.660	0.072	0.000
STRESS BY PSS2INT	0.803	0.024	0.000	0.785	0.038	0.000		0.924	0.045	0.000
STRESS BY PSS3INT	0.658	0.027	0.000	0.702	0.040	0.000		0.701	0.064	0.000
STRESS BY PSS4INT	0.534	0.037	0.000	0.656	0.039	0.000		0.318	0.088	0.000
STRESS BY PSS5INT	0.578	0.036	0.000	0.812	0.029	0.000		0.553	0.073	0.000
STRESS BY PSS6INT	0.781	0.023	0.000	0.771	0.035	0.000		0.565	0.071	0.000
STRESS BY PSS7INT	0.432	0.040	0.000	0.597	0.042	0.000		0.347	0.081	0.000
STRESS BY PSS8INT	0.621	0.033	0.000	0.787	0.034	0.000		0.482	0.075	0.000
STRESS BY PSS9INT	0.666	0.028	0.000	0.693	0.039	0.000		0.625	0.072	0.000
STRESS BY PSS10INT	0.391	0.013	0.000	0.543	0.018	0.000		0.691	0.070	0.000
PRETERM ON STRESS	-0.172	0.242	0.477	-0.375	0.351	0.285		-1.007	0.086	0.000
PRETERM ON SS	-0.102	0.304	0.738	-0.511	0.444	0.250		0.181	0.152	0.235
STRESS ON SS	-0.752	0.067	0.000	-0.734	0.069	0.000		0.181	0.152	0.235
Effects										
from SS TO PRETERM										
Total	-0.102	0.304	0.738	-0.511	0.444	0.250		0.181	0.152	0.235
Total Indirect										
Direct	-0.102	0.304	0.738	-0.511	0.444	0.250		-0.044	0.205	0.831

APPENDIX Q: SEM MODEL 2 SGA RESULTS

Table 29: SEM Model 2 for SGA

	Total Model			White Model			Black Model	Latina Model		
	Total Estimate	Sample *SE*	*P-Value*	Total Estimate	Sample *SE*	*P-Value*	*Did not converge*	Total Estimate	Sample *SE*	*P-Value*
Parameter Estimates										
SS BY SSQSATI	0.228	0.022	0.000	0.425	0.038	0.000		0.612	0.082	0.000
SS BY SSQFAMSQ	0.586	0.048	0.000	0.514	0.052	0.000		0.418	0.078	0.000
SS BY SSQNFAMSQ	0.233	0.064	0.000	0.074	0.103	0.474		0.196	0.086	0.023
STRESS BY PSS1INT	0.674	0.027	0.000	0.743	0.034	0.000		0.660	0.072	0.000
STRESS BY PSS2INT	0.797	0.024	0.000	0.785	0.039	0.000		0.924	0.045	0.000
STRESS BY PSS3INT	0.652	0.027	0.000	0.696	0.040	0.000		0.701	0.064	0.000
STRESS BY PSS4INT	0.536	0.037	0.000	0.654	0.039	0.000		0.318	0.088	0.000
STRESS BY PSS5INT	0.579	0.036	0.000	0.810	0.029	0.000		0.553	0.073	0.000
STRESS BY PSS6INT	0.778	0.023	0.000	0.772	0.035	0.000		0.565	0.071	0.000
STRESS BY PSS7INT	0.437	0.040	0.000	0.596	0.042	0.000		0.347	0.081	0.000
STRESS BY PSS8INT	0.622	0.033	0.000	0.784	0.034	0.000		0.482	0.075	0.000
STRESS BY PSS9INT	0.663	0.028	0.000	0.695	0.039	0.000		0.625	0.072	0.000
STRESS BY PSS10INT	0.395	0.013	0.000	0.547	0.018	0.000		0.691	0.070	0.000
SGA ON STRESS	0.162	0.145	0.264	0.800	0.321	0.013		-1.007	0.086	0.000
SGA ON SS	0.053	0.153	0.732	0.830	0.323	0.010		0.181	0.152	0.235
STRESS ON SS	-0.750	0.068	0.000	-0.729	0.069	0.000		0.028	0.192	0.882
Effects										
SS TO SGA										
Total	0.053	0.153	0.732	0.830	0.323	0.010		-0.029	0.193	0.882
Total Indirect										
Direct	0.053	0.153	0.732	0.830	0.323	0.010		-0.029	0.193	0.882

APPENDIX R: FAIR USE WORKSHEETS

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Reviewed by USF General Counsel 08/11/2015

Overall, the amount and substantiality of material used in relation to the whole ■supports fair use or ☐does not support fair use.

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Overall, the effect on the market for the original ■supports fair use or ☐does not support fair use.

CONCLUSION

The combined purpose and character of the use, nature of the copyrighted material, amount and substantiality of material used in relation to the whole and the effect on the market for the original

■likely supports fair use or ☐likely does not support fair use.

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This worksheet has been adapted from:

Cornell University's Checklist for Conducting A Fair use Analysis Before Using Copyrighted Materials: https://copyright.cornell.edu/policies/docs/Fair_Use_Checklist.pdf

Crews, Kenneth D. (2008) Fair use Checklist. Columbia University Libraries Copyright Advisory Office. http://copyright.columbia.edu/copyright/files/2009/10/fairusechecklist.pdf

Smith, Kevin; Macklin, Lisa A.; Gilliland, Anne. A Framework for Analyzing any Copyright Problem. Retrieved from: https://d396qusza40orc.cloudfront.net/cfel/Reading%20Docs/A%20Framework%20for%20Analyzing%20any%20Copyright%20Problem.pdf

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