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THE RELATIONSHIP BETWEEN MATERNAL AGE, GENERATIONAL STATUS,  
& CHILDHOOD OBESITY IN THE HISPANIC-AMERICAN POPULATION

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## **ABSTRACT**

The health outcomes of the Hispanic-American population are vital to the overall health of the United States of America. Hispanic-Americans drive population growth in America with high fertility and immigration rates. This research centers on the relationship between maternal age, generational status, and childhood weight outcomes in the Hispanic-American population. Utilizing the National Health and Nutrition Examination Survey (NHANES) compilation data from the years 1999/2000 through 2011/2012, childhood weight outcomes for children aged 2-6 are analyzed in relation to maternal age, generational status, socioeconomic determinants, race, and maternal health practices. In this sample, teenage motherhood does not have a direct effect on childhood weight outcomes. However, teenage motherhood increases risk factors linked to childhood obesity such as the likelihood of a mother smoking during pregnancy and reductions in maternal educational attainment. The association between maternal age and breastfeeding is positively correlated in a bivariate analysis, but not in the multivariate models. Additionally, the association between generational status and breastfeeding rates is negatively correlated in the bivariate analysis, but is not significantly related in the multivariate analyses.

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## CHAPTER 1

### INTRODUCTION:

Over the past three decades, the prevalence of childhood obesity doubled in America (Ogden et al. 2014). Given the importance of childhood health for adult health, productivity, and longevity, the 12.7 million children and adolescents who are obese in American today represent an imminent representation of the health problems and prosperity of the United States (CDC 2015a). Auxiliary governmental policies must be created in order to combat obesity, improve childhood health, and protect the future of the United States.

Childhood obesity is a health issue that ranges far beyond childhood, with long-lasting negative health effects detected in adulthood. Childhood obesity is linked to a higher risk of diabetes, high blood pressure, high cholesterol, and the increased likelihood of being obese as an adult (CDC 2015b). Reductions in childhood obesity rates may result in a healthier adult population in America due to a decreased number of children being predisposed to health conditions such as diabetes and high blood pressure. Across all major race and ethnic groups, Hispanic-Americans have the highest rate of childhood obesity. An estimated 22.4% of Hispanic children and adolescents are classified as obese, compared to only 14.1% of non-Hispanic white children and adolescents (CDC 2015a). Therefore, research specifically addressing Hispanic-American childhood obesity is pertinent for public health officials to create conducive programs that combat the growing obesity epidemic in America.

Approximately 41.3 million immigrants live in the United States, comprising 13.1% of the total American population (Brown and Stepler 2015). Among non-native people, Hispanics represent the largest racial demographic, amounting to 47.0% of the total immigrant population in America (Lopez, Gonzalez-Barrera, and Cuddington 2013). The average total fertility rate for

Hispanic-Americans is 2.4, exceeding the total fertility rate for white Americans, which stands at 1.8 (Passel, Livingston, and Cohn 2012). Due to high fertility and migration rates, over half of America's total population growth between 2000 and 2010 was a result of the Hispanic population. The Hispanic population in America is also relatively young; 23.1% of children ages 17 and younger are Hispanic (Passel, Cohn, and Lopez 2011). Young maternal age and high rates of childhood obesity are exemplified in the Hispanic-American population (HHS 2016; CDC 2015a). In addition to having the highest incidence of childhood obesity, Hispanic-Americans also have the highest rates of teenage pregnancy (CDC 2015a; HHS 2016a). Hispanic-Americans are more than twice as likely to become pregnant as a teenager than non-Hispanic whites (HHS 2016a). Both teenage motherhood and childhood obesity result in negative childhood health and socioeconomic factors, such as low levels of educational attainment and higher risk of developing diabetes, respectively (HHS 2016b; CDC 2015b). Because Hispanic-Americans stimulate America's population growth, the health and wellness of Hispanic-American children is of utmost importance to the overall health outcomes of America (Passel, Cohn, and Lopez 2011).

The relationship between maternal age and childhood obesity in the Hispanic-American population is unclear. My research examines how maternal age affects outcomes of childhood obesity in young Hispanic-American children, and whether maternal age effects operate through risk factors such as low educational attainment and marital status. The argument is: the greater the maternal age, the less likely her child will be obese. This outcome is predicted due to the higher educational attainment and higher rates of breastfeeding of mothers of higher maternal age, which in turn are risk factors for obesity (Livingston and Cohn 2013; CDC 2012a). I further hypothesize that childhood weight outcomes will vary significantly by generational status.



The data utilized for this research is the National Health and Nutrition Examination Survey (NHANES) conducted by the National Center for Health Statistics. The data examined is derived from the NHANES public use continuous data set from the years 1999-2012. Once defined, information regarding the relationship between maternal age, generational status, and childhood obesity in the Hispanic-American population may be utilized to develop public health programs directed at a specific age audience. Potentially, this information may aid in developing an educational program for Hispanic-American mothers encouraging healthy maternal practices such as breastfeeding and proper childhood nutrition to promote childhood health and wellness.

## CHAPTER 2

### THEORY:

#### *Life Course Theory*

The life course theory explains how life transitions, such as occupational and educational pursuits, amount to social trajectories that direct one's imminent life course (Elder 1998). Social transitions are influenced by timing and age norms. Therefore, social trajectories differ by age of individual and affect personal behavior and developmental processes (Elder 1994). When an American teenager becomes pregnant, this is an ill-timed life transition because of non-normative maternal age and the subsequent negative outcomes for both mother and child (Elder 1994; AMCHP 2014). Ill-timed life transitions, such as teenage childbirth, may result in negative life trajectories due to cumulative disadvantages. Cumulative disadvantages occur when one social trajectory in the life course leads to "a concatenation of negative events and influences" (Elder 1998). Examples of cumulative disadvantages of teenage parenthood is detected in both parents and children. For parents, teenage childbirth often results in decreased educational attainment, leading to decreased income. For children, those born to teenage mothers have a higher likelihood of having chronic health issues in addition to higher rates of juvenile delinquency (AMCHP 2014). Teenage pregnancy represents an ill-timed life transition, leading to a possible negative life trajectory and cumulative disadvantages as supported through the life course theory.

#### *The Immigrant Paradox*

The immigrant paradox details how immigrants are likely to experience the same or better health outcomes when compared to native-born citizens. It is a paradox because immigrants often experience barriers to health care and other socioeconomic difficulties, yet still

remain in relatively good health (Urquia, O'Campo, and Heaman 2012). Select socioeconomic difficulties immigrants endure often include poverty and low levels of educational attainment in addition to lack of health insurance (Mendoza 2009). However, despite these disadvantages, children of various races of immigrants experience health outcomes comparable or surpassing those of native white Americans who are third generation or above, defying the predictions that would be expected of them given their low socioeconomic status households (Hamilton et al. 2011; Mendoza 2009).

The immigrant paradox applies to various aspects of health including maternal, childhood, and sexual health (Ahluwalia et al. 2012; Killoren and Deutsch 2013). An example of maternal health and the immigrant paradox is breastfeeding and acculturation. For example, Hispanic-American women are more likely to breastfeed their children than other racial-ethnic groups (CDC 2013a). Within this demographic, however, the least acculturated Hispanic-American women, measured by language use and self-reported Hispanic ethnicity, are the most likely to breastfeed (Ahluwalia et al. 2012). Immigrants are most often the least acculturated in a society with the lowest levels of cultural appropriation (Celenk and Van de Vijver 2011). Therefore, the relationship between level of acculturation and rate of breastfeeding demonstrates one of the positive health benefits of the immigrant paradox.

Another example of the immigrant paradox in childhood health is the relationship between generational status and childhood obesity. Children who are first generation Americans are less likely to be obese compared to those of higher generational status. Research supporting the effect of the immigrant paradox on childhood obesity is found within populations of Latino-American, Asian-American, and black children (McCullough and Marks 2014; Staimez et al. 2013; Singh et al. 2009). Following the immigrant paradox, increased generational status as well

as higher levels of acculturation are associated with increased rates of obesity amongst American children.

Immigrant births amount to a significant proportion of America's natural population growth. Adhering to current population projections, Pew Research Center predicts 82% of the United States' population growth over the next four decades will be caused by immigrants and their offspring who immigrated to America post-2005 (Livingston and Cohn 2010). As generational status increases, however, the immigrant paradox becomes less effective, leading to a deterioration of the protective health practices and benefits low levels of acculturation bring (Guarini et al. 2011). Within the Hispanic-American population, immigrants are less likely than future generations to engage in risky sexual activity (Killoren and Deutsch 2013). With increased generational status comes increased sexual risk behaviors, such as lower levels of condom use or younger age of first sexual intercourse (Guarini et al. 2011). Following the immigrant paradox, individuals with higher generational status partake in riskier sexual behaviors, which may result in higher rates of teenage motherhood. Higher rates of teenage motherhood may lead to a decline in breastfeeding rates, since teenage mothers are the least likely to breastfeed, which negatively affects both the mother and child (CDC 2014; Salone, Vann, and Dee 2013). Therefore, to protect the future health of America, it is crucial to develop social policies to promote positive health outcomes of descendants of immigrants to combat the decline of the protective benefits of the immigrant paradox with each successive generation (Ahluwalia et al. 2012; Killoren and Deutsch 2013).

## CHAPTER 3

### LITERATURE REVIEW:

The main focus of this research centers on the effects of breastfeeding, maternal age, race, generational status, and maternal educational attainment on childhood obesity.

#### *Breastfeeding*

Breastfeeding provides health benefits for both mothers and children. Breastfeeding acts as a natural barrier against childhood obesity (Lefebvre and John 2013). Hispanic-American women are the demographic group most likely to breastfeed their children, followed by non-Hispanic whites (CDC 2013a; CDC 2012b). Growing research supports the idea that breastfeeding has lasting effects as a protective factor against obesity into adulthood (Victora et al. 2016). The positive outcomes of breastfeeding for children are numerous and well-documented. Children who are breastfed experience decreased risk of Sudden Infant Death Syndrome (SIDS), gastrointestinal tract infections, lower respiratory tract infections, asthma, and acute otitis media (Anatolitou 2012; Salone et al. 2013). Mothers who breastfeed have a decreased risk of breast cancer, which is the highest diagnosed cancer among females, as well as ovarian cancer (Salone et al. 2013). Additional maternal health benefits of breastfeeding include decreased postpartum bleeding and increased levels of oxytocin (Anatolitou 2012).

Even though the positive health outcomes of breastfeeding are well documented, breastfeeding rates in America can be improved, with only 79.2% of children ever being breastfed (CDC 2014). To increase breastfeeding rates, a Call to Action centered on breastfeeding was released in 2011. The United States Surgeon General issues a Call to Action to outline a public health crisis and subsequent solutions to solve the health issue (HHS 2015). The relationship between breastfeeding and obesity is established: children who are breastfed are less

likely to be obese (Lefebvre and John 2013). Therefore, in an effort to reduce childhood obesity in America, conducive health initiatives to increase breastfeeding must be implemented.

### ***Maternal Age at Birth***

Maternal age at birth affects breastfeeding rates, childhood health outcomes, and educational attainment for both mothers and children (HHS 2016b; CDC 2012b). Increased maternal age is correlated with higher rates of breastfeeding. Among teenage mothers, approximately 67.7% initiate breastfeeding compared with 84.3% of mothers aged thirty-five or older (CDC 2012a). Teenage mothers are less likely to seek prenatal care in the first trimester of pregnancy compared to mothers of older maternal age (The National Campaign 2016a). The negative childhood health outcomes associated with teenage motherhood include a higher risk of premature birth and low birth weight. These two factors alone increase risks of infant death, cerebral palsy, blindness, and chronic respiratory problems (The National Campaign 2016b). In regards to educational outcomes, children born to teenage mothers as well as teenage mothers themselves are less likely to achieve high levels of educational attainment. In addition, children born to teenage mothers are more likely to live in poverty and single-parent households. The teenage motherhood is also cyclic: girls born to teenage mothers are more likely to become teenage mothers themselves, continuing the cycle of increased risks of poor educational attainment and decreased childhood health outcomes (HHS 2016b).

### ***Race and Ethnicity***

Hispanic-Americans sustain complicated health patterns, both positive and negative. Hispanic-American women represent the racial demographic most likely to breastfeed their children (CDC 2013a). In addition, the immigrant paradox defies health predictions for people of low-economic status, protecting recently immigrated Hispanic-Americans from negative health

outcomes and creating health outcomes similar or surpassing third-generation non-Hispanic white Americans (Hamilton et al. 2011; Mendoza 2009). However, Hispanic-American children experience the highest rates of childhood obesity, with 22.4% of Hispanic-American children being classified as obese compared to only 14.1% of non-Hispanic white children (CDC 2015a). Hispanic-American females are also the demographic most likely to become teenage mothers; out of 1,000 Hispanic-American female adolescents, 38 will become teenage mothers. For non-Hispanic white adolescents, 17.3 out of 1,000 females will become teenage mothers, a number half the rate of Hispanic-Americans (HHS 2016a). Therefore, Hispanic-Americans often experience beneficial health outcomes due to the protective benefits of the immigrant paradox in addition to high breastfeeding rates, but experience negative health outcomes due to high rates of childhood obesity and teenage motherhood (Hamilton et al. 2011; Mendoza 2009; CDC 2013a; CDC 2015a; HHS 2016a).

### ***Educational Attainment***

Health outcomes are often explained by socioeconomic status. Maternal education is an indicator of socioeconomic status and childhood weight outcomes. Children of mothers with low levels of educational attainment are more likely to be obese compared to children of mothers with high levels of educational attainment (Keane et al. 2012). However, only 38% of mothers who give birth to a child when they are younger than 18 years old graduate from high school (The National Campaign 2016a). Furthermore, the relationship between maternal educational attainment and breastfeeding rates is positively correlated: an increase in maternal education results in higher rates of breastfeeding. Mothers who fail to complete high school are less likely to initiate breastfeeding than college educated mothers (69.1% versus 91.2%, respectively) (CDC 2012b). Educational attainment is also linked to economic opportunities. In 2015, people without

a high school diploma had a 8.0% unemployment rate compared to the collective 4.3% unemployment rate in America in 2015, as well as the lowest amount of weekly earnings at \$493 per week (Bureau of Labor Statistics 2016).



## CHAPTER 4

### HYPOTHESES:

Through previous research, the relationship between maternal age and health practices has been clearly established. However, additional research is necessary to accurately measure the relationship between maternal age, generational status, and childhood obesity in the Hispanic-American population. Focusing on the health of the largest immigrant population, this research specifically examines childhood weight outcomes of Hispanic-Americans (Lopez et al. 2013).

The specific research questions this study examines are:

- I. *Children born to teenage mothers will experience higher rates of childhood obesity.* This hypothesis examines the correlation of teenage motherhood with childhood weight outcomes in addition to the effect of maternal age on health practices such as breastfeeding and smoking during pregnancy. Being a teenage mother will create cumulative disadvantages, which will increase the risk of negative health practices and result in childhood obesity.
- II. *Foreign born children will experience lower rates of childhood obesity.* Stemming from the immigrant paradox, immigrant children will experience protective health benefits, such as increased maternal breastfeeding rates, which will result in healthy weight outcomes.
- III. *Children born to immigrant mothers will experience lower rates of childhood obesity.* Also utilizing generational status, the nativity of the mother will determine childhood weight outcomes. This is another example of the protective effects of the immigrant paradox.

## CHAPTER 5

### DATA AND METHODS:

This research utilizes The National Health and Nutrition Examination Survey (NHANES) compilation data from the years 1999/2000 through 2011/2012. The NHANES is administered by the National Center for Health Statistics, which is part of the Centers for Disease Control and Prevention (CDC). The NHANES is an annual, nationally representative survey measuring America's population health. Both physical examinations and health interviews are used to assess each participant's health status. Questions regarding demographic and socioeconomic information are also detailed. Approximately 5,000 individuals are interviewed by the NHANES each year. Minority groups such as Hispanics, African-Americans, and individuals 60 and older are over-sampled to increase the reliability of the data. NHANES data is available online through the CDC for public use (CDC 2013b).

The sample analyzed for this research includes children of Hispanic descent, aged 2 to 6 years old. The age range is such because only parents or guardians of children under six years of age were asked questions regarding whether the child was ever breastfed (NHANES 2010). Cases were eliminated if there was any missing data regarding maternal breastfeeding habits, maternal age at birth, and maternal smoking habits while pregnant. In addition, cases with missing data for child's weight and household reference person's educational attainment and marital status were also removed. In total, 2,334 cases remained in the analytic sample (N=2,334).

### VARIABLES:

The main analysis of this research focused on child's body mass index (BMI), whether or not (s)he was breastfed, maternal age at birth, race, generational status, and household reference

person's educational attainment and marital status. A household reference person refers to the individual 18 years or older who owns or rents the housing unit where the survey respondent lives. The educational status and marital status of the household reference person are indicators of socioeconomic status for the household (NHANES 2011).

**Obese:** The focal dependent variable of this research was a child's weight classification as obese or non-obese. BMI determined whether or not the child was categorized as obese. Adhering to CDC guidelines, a child was classified as "Obese" if his/her BMI was greater than or equal to the 95<sup>th</sup> percentile for weight status. A child was classified as "Non-obese" if his/her BMI fell below the 95<sup>th</sup> percentile (CDC 2015c).

**Breastfed:** A child was classified as "Breastfed" if the answer to the question, "Was [child] ever breastfed or fed breastmilk?" was "Yes". A child was classified as "Not Breastfed" if the response was "No" (NHANES 2010).

**Maternal Age at Birth:** The variable maternal age at birth was classified in four different categories: teen mother, mother aged 20-24, mother aged 25-29, and mother aged 30 and above. Data for this variable was derived from question, "How old was [child's] mother when [s/he] was born?" (NHANES 2013).

**Race/ethnicity:** The child's race/ethnicity was categorized as Mexican American, other Hispanic, Non-Hispanic white, non-Hispanic Black, and other, which included multi-racial children. Cases were only included if children were Mexican-American or other Hispanic (NHANES 2010).

**Generational Status:** Generational status was not clearly specified on the NHANES questionnaire, but rather determined with information from two variables: the household reference person's generational status and the child's place of birth. Children who were foreign-

born were classified as first generation. Second generation children were U.S.-born children who lived in a household with a foreign-born householder. The remaining children were classified as third-or-higher generation. Although subject to error, the combination of these two variables was the closest indicator to generational status deducted from the NHANES, since no question specifically asked information regarding generational status, only place of respondent's birth (NHANES 2010).

**Household Reference Person's Educational Attainment:** The educational attainment of a household reference person was determined by the answer to the question: "What is the highest grade or level of school [household reference person has] received?" (NHANES 2010). Responses were categorized as: less than high school, some high school, high school (including GED completion), some college, and college. A continuous variable was created to measure educational attainment of the household reference person to be utilized in structural equation modeling, which classified educational attainment by number of years in school. If an individual completed less than a high school education, his/her educational attainment equaled 8. For those who completed some high school, educational attainment was denoted as 11. By completing high school or earning a GED, educational attainment equaled 12. Those who completed some college were categorized as 14 for educational attainment. Household reference persons who completed college were denoted as 16. For analysis, the household reference person's educational attainment was utilized as a proxy for maternal educational attainment, which is a predictor of socioeconomic status (Keane et al. 2012).

**Household Reference Person's Marital Status:** The marital status of the household reference person was distinguished by four categories: married, no longer married, never

married, and living with partner. The category ‘no longer married’ included those who were widowed, divorced, or separated.

**Controls:** Variables utilized as controls included gender of child, low birth weight, normal birth weight, high birth weight, age of child, and maternal smoking habits while pregnant. Children who weighed less than 2,500 grams at birth are categorized as low birth weight (CDC 2016a). Children who weighed more than 4,000 grams at birth are categorized as high birth weight. Normal birth weight described children who weighed between 2,500 and 4,000 grams at birth (CDC 2009). Maternal smoking habits were distinguished by the question: “Did [child’s] biological mother smoke at any time while she was pregnant with [him/her]?” with the answers of “Yes” and “No” being utilized to determine maternal smoking habits during pregnancy (NHANES 2011).

#### STATISTICAL ANALYSES:

Stata software was utilized to examine the factors affecting childhood obesity. Descriptive statistics were determined to depict an accurate portrait of the sample being examined (Table A). Health indicators, such as childhood obesity, breastfeeding rates, and generational status are the main focus of this research, but socioeconomic measures such as educational attainment and marital status are also included. Cross-tabulations were run for the following relationships: maternal age at birth and childhood obesity, maternal age at birth and breastfeeding rates, breastfeeding and childhood obesity, generational status and breastfeeding rates, and generational status and childhood obesity with chi-square statistics utilized to determine statistical significance of the relationships. Logistic regression analyses were conducted to measure the strength of the relationship between childhood weight outcomes and generational status. Factors such as breastfeeding rates, maternal age, race, household reference

person's educational attainment and marital status in addition to the control variables of gender, child's age, birth weight, and maternal smoking habits while pregnant were also included in the logistic regressions. Structural equation modeling was estimated to measure the effects of being a teenage mother on risk factors, which in turn affect childhood weight outcomes. The medical examiners weight was utilized in the logistic regression analyses as well as in the structural equation modeling.

## CHAPTER 6

### RESULTS:

#### **Descriptive Information**

In this sample, 15.78% of Hispanic-American children were classified as obese. A total of 74.38% of respondents were breastfed. The majority of respondents were second generation Americans (57.30%). Those belonging to the first generation represented only 5.36% of the population with the third generation amounting to 37.34%. The most common maternal age at birth was the twenty to twenty-four age grouping, representing 51.22% of the sample. However, there was a large disparity between the extremes in maternal age: twice the percentage of mothers were over thirty at the time of birth compared to teenagers, representing 30.45% and 14.08% of the population, respectively. Lack of maternal educational attainment was apparent in this sample, indicated by the educational attainment of the household reference person. The most common level of education completed was less than a high school degree, which amounted to slightly less than half of the population (48.81%). The majority of respondent's parents were married, 69.31% of the population, whereas extremely few respondents' parents were never married, representing 9.70% of the population. The household reference person's marital status was utilized as a proxy for respondent's parental marital status.

#### **Maternal Age, Health Practices & Childhood Obesity**

Cross-tabulations were conducted to measure the relationship between maternal age and its subsequent effects on childhood obesity and breastfeeding rates. Childhood obesity rates were fairly similar across all maternal age cohorts. The highest incidence of childhood obesity occurred within the thirty and above maternal age group with 17.34% of child respondents being classified as obese. Children of teenage mothers had the next highest obesity rates; 16.07% of

children born to teenage mothers were classified as obese. Approximately 15.68% of children born to mothers who were twenty-five to twenty-nine were obese and 13.21% children born to mothers who were twenty to twenty-four. Regarding the relationship between maternal age at birth and breastfeeding rates, breastfeeding rates were greater for mothers of higher maternal age. Only 66.07% of teenage mothers breastfed compared to 76.83% of mothers over the age of thirty. Mothers who were twenty-five to twenty-nine at the time of respondent's birth had the highest breastfeeding rates with 78.08% of this group breastfeeding. For the maternal age group of twenty to twenty-four, 72.59% breastfed. However, the relationship between breastfeeding and obesity was weak and not significant in this sample. Approximately the same amount of obese respondents were breastfed compared to those who were not obese, 15.45% compared to 15.53%, respectively.

A structural equation model was implemented to measure the effects of being a teenage mother on factors affecting childhood obesity. Being a teenage mother did not have a direct effect on childhood weight outcomes. However, being a teenage mother increased risk factors that are related to childhood obesity. Being a teenage mother increased the chances of never marrying by 13% in addition to increasing the likelihood of smoking during pregnancy by 4%. Teenage motherhood was also negatively associated with breastfeeding; teen moms were 9.8% less likely to breastfeed compared to other maternal age groups. In addition, teenage motherhood negatively affected educational attainment with teenage mothers achieving .614 less years of education compared to mothers of higher maternal age.

### **Generational Status, Health Practices & Childhood Obesity**

To identify the effect of generational status on childhood weight outcomes and maternal health practices, cross-tabulations were created to measure the relationship between generational



status and childhood obesity as well as breastfeeding rates. Generational status and breastfeeding rates were negatively correlated; the higher the generational status, the less likely the respondent was breastfed. Children who had a foreign born parent were the most likely to be breastfed; 85.95% of first generation children were breastfed compared to 79.03% of second generation children. Only 64.91% of third generation children were breastfed. The relationship between generational status and childhood obesity was weaker than the relationship between generational status and breastfeeding rates. All generational levels experienced similar levels of childhood obesity; 16.53% of the first generation was obese compared to 15.82% of the second generation and 14.73% of the third generation.

Two logistic regressions were created to model childhood weight outcomes. The first regression focused on maternal age, race, generational status, breastfeeding rates, and controls such as gender and age of child, and their subsequent effects on childhood obesity. The only factor having a direct effect on childhood weight outcomes was a child being two years of age, a control variable. Being two years old decreased the likelihood of being obese by 84.6%. The second logistic regression included all of the variables previously listed plus educational attainment and marital status of household reference person and added controls including maternal smoking habits while pregnant and variances of birth weight. Once again, the only factor having a direct effect on childhood weight outcomes in this model was a child being two years of age, reducing obesity by 84.5%.

### **Hypotheses & Results**

In regards to Hypothesis I, “Children born to teenage mothers will experience higher rates of childhood obesity”, maternal age did not directly affect childhood weight outcomes. However, there was a statistically significant relationship between maternal age and

breastfeeding rates: mothers of higher maternal age are more likely to breastfeed compared to teenage mothers. Teenage motherhood did affect factors that may lead to childhood obesity by increasing the likelihood of a mother smoking while pregnant as well as a parent never being married. Teenage motherhood also was associated with reductions in breastfeeding rates and maternal educational attainment. Therefore, the hypothesis of teenage mother having a direct on effect on childhood weight outcomes failed to be supported, but teenage mother did have an effect on risk factors related to childhood weight outcomes.

Hypotheses II and III both centered on the nativity of the child respondent. Hypotheses II focused on the generational status of the respondent, “Foreign born children will experience lower rates of childhood obesity”, whereas Hypothesis III focused on the generational status of the respondent’s parent, “Children born to immigrant mothers will experience lower rates of childhood obesity”. Generational status failed to provide any protective benefit in relation to childhood weight outcomes in multivariate analyses. However, the relationship between generational status and breastfeeding rates was statistically significant and negatively correlated. Breastfeeding rates decreased with each subsequent generation, ranging from 85.85% of the first generation to 64.91% of the third generation. The relationship between generational status and childhood obesity was not statistically significant; childhood obesity rates were similar for each generation. In total, low generational status increased the likelihood of maternal breastfeeding but failed to provide a direct effect on childhood weight outcomes.

## CHAPTER 7

### CONCLUSION:

Teenage pregnancy and childhood obesity are not isolated issues. Both teenage pregnancy and childhood obesity are national issues that negatively affect both women and children of all races and ethnicities (The National Campaign 2016b; HHS 2016b). Although no direct correlation was found between maternal age, generational status, and childhood weight outcomes for Hispanic-Americans in this sample, teenage motherhood did increase risk factors associated with childhood obesity established in previous literature. In bivariate analyses, low generational status and high maternal age were associated with higher breastfeeding rates. One possible reason no relationship was found between teenage motherhood, generational status, and childhood obesity is the narrow age group of the sample: children between 2 and 6 years old. This age range is such due to a limitation in the data; the NHANES does not collect data on breastfeeding for children older than 6. However, other research has found clear relationships between generational status and obesity among children who are school aged (i.e., age 5 and older) (Liu et al. 2012). Further research should be conducted that compares children's weight by generational status across all age groups, from birth to adolescence.

Ultimately in this sample, teenage motherhood increased risk factors associated with childhood obesity, such as decreased maternal educational attainment and breastfeeding rates as well as an increased risk of maternal smoking while pregnant. For this reason, it is critical to the health and prosperity of the United States to implement teenage pregnancy prevention programs more centered towards Hispanic-Americans in order to protect the nation's youth and future by combatting their high rates of teenage motherhood.

Within the past decade, the effectiveness of teenage pregnancy prevention programs varied greatly (Silk and Romero 2014; Secura et al. 2014). In a collaborative effort, the CDC, the Office of Population Affairs, and the federal Office of Adolescent Health funded five national and nine state organizations dedicated to preventing teenage pregnancy in the United States during 2010 through 2015. As a direct result of these organizations, five factors were identified as critical steps to create successful teenage pregnancy prevention programs: community mobilization and sustainability, evidence-based programs, increasing youth access to contraceptive and reproductive health care services, stakeholder education, and working with diverse communities (CDC 2016b).

To combat teenage pregnancy and childhood obesity in the Hispanic-American population, I believe community mobilization and sustainability stands as the pivotal factor in reducing both teenage pregnancy and childhood obesity rates. Hispanic-Americans maintain a collectivistic culture with a greater level of personal interdependence than non-Hispanic white Americans (Stone et al. 2006). Therefore, community mobilization regarding sexual health initiatives would decrease teenage pregnancy rates. Community mobilization focused on child nutrition, such as the benefits of breastfeeding, would lead to possible reductions in childhood obesity in the Hispanic-American population. Community mobilization is key because of Hispanic-Americans high levels of interdependence and great sense of collectivism. I believe it is crucial to educate Hispanic-American parents and community mentors, including teachers, religious figures, and politicians, throughout the United States about the benefits of safe sexual health practices and breastfeeding. Additional organizations solely focused on teenage pregnancy prevention initiatives for the Hispanic-American community must also be established. Ideally, these organizations would be bilingual, culturally sensitive, and address needs specific to the

Hispanic-American community, placing an emphasis on educational attainment, contraceptive prevalence, reproductive health, and delay of first childbirth. These organizations focused on preventing teenage motherhood can also engage the parents of Hispanic-American teenagers in efforts to discuss safe sexual practices with their children, an issue that is not commonly discussed in the home. Community mobilization for sexual health initiatives would help offset the norm of early fertility and conservative attitudes regarding sexuality in the Hispanic-American culture (Russell et al. 2004). Through community mentors and organizations, beneficial health practices will dissipate into Hispanic-American communities, resulting in a decrease in teenage pregnancy rates as well as the risk-factors associated with teenage motherhood and childhood obesity.

**Table A: Sample Descriptive Statistics**

<b>Category</b>	<b>Column N%</b>	<b>Unweighted Count</b>
Obese	15.78%	361
Breastfed	74.38%	1,735
<b>Demographic Information</b>		
Female	49.73%	1,173
Male	50.27%	1,161
Mexican-American	68.68%	1,814
Other Hispanic	31.32%	520
First generation	5.36%	121
Second generation	57.30%	1,378
Third generation	37.34%	835
<b>Age of Child</b>		
Two Years Old	18.80%	581
Three Years Old	20.66%	437
Four Years Old	21.66%	463
Five Years Old	19.92%	419
Six Years Old	18.96%	434
<b>Birth Characteristics</b>		
Low birth weight	6.83%	163
High birth weight	9.59%	228
Normal birth weight	83.59%	1,943
Mother smoked while pregnant	5.79%	129

**Maternal Age at Birth**

Less than twenty	14.08%	336
Twenty to twenty-four	51.22%	1,156
Twenty-five to twenty-nine	26.10%	625
Thirty and above	30.45%	669

**Educational Attainment  
of Household****Reference Person**

Less than high school	24.39%	637
Some high school	24.42%	577
High school	21.59%	496
Some college	18.25%	421
College	11.34%	203

**Marital Status of  
Household Reference  
Person**

Married	69.31%	1,635
No longer married	11.39%	264
Never married	9.70%	215
Living with Partner	9.59%	220

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N=2,334

Source: NHANES Data from 1999/2000 through 2011/2012

Sample: Mexican-American and other Hispanic children aged 2-6

**Hypothesis I, Table A: Maternal Age at Birth and Childhood Obesity**

<b>Age of Mother</b>	<b>% Obese</b>	<b>Unweighted Count</b>
Less than twenty	16.07%	54
Twenty to twenty-four	13.21%	93
Twenty-five to twenty-nine	15.68%	98
Thirty and above	17.34%	116
<b>Total</b>		361

N=2,334

Source: NHANES Data from 1999/2000 through 2011/2012

Sample: Mexican-American and other Hispanic children aged 2-6

Pr = 0.199

**Hypothesis I, Table B: Maternal Age at Birth and Breastfeeding Rates**

<b>Age of Mother</b>	<b>% Breastfed</b>	<b>Unweighted Count</b>
Less than twenty	66.07%	222
Twenty to twenty-four	72.59%	511
Twenty-five to twenty-nine	78.08%	488
Thirty and above	76.83%	514
<b>Total</b>		1,735

N=2,334

Source: NHANES Data from 1999/2000 through 2011/2012

Sample: Mexican-American and other Hispanic children aged 2-6

Pr =0.000\*\*\*

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



**Hypothesis I, Table C: Breastfeeding and Childhood Obesity**

<b>Breastfed</b>	<b>% Obese</b>	<b>Unweighted Count</b>
Yes	15.45%	268
No	15.53%	93
<b>Total</b>		361

N=2,334

Source: NHANES Data from 1999/2000 through 2011/2012

Sample: Mexican-American and other Hispanic children aged 2-6

Pr = 0.963

Indirect effect of teenage motherhood on obesity through:	B	Teenage mother's effect on:
	B	B
Never Married	-0.006	.130***
Low Birth Weight	0.039	-0.001
High Birth Weight	0.045	-0.028
Breastfed	-0.005	-0.098**
Education (Continuous)	-0.006	-.614***
Mom Smoked During Pregnancy	0.009	0.040*
Teenage Mother	-0.005	-----
Female	-0.023	-----
Child, Aged 2	-0.094	-----
Child, Aged 3	-0.016	-----
Child, Aged 4	0.026	-----
Child, Aged 5	-0.042	-----
Second Generation	0.047	-----
Third Generation	0.043	-----
Mexican-American	-0.024	-----
<b>Total Indirect Effects:</b>	0.002	
<b>Direct Effects:</b>	-0.005	
<b>Total Effect of Teenage Motherhood on Childhood Obesity:</b>	-0.003	

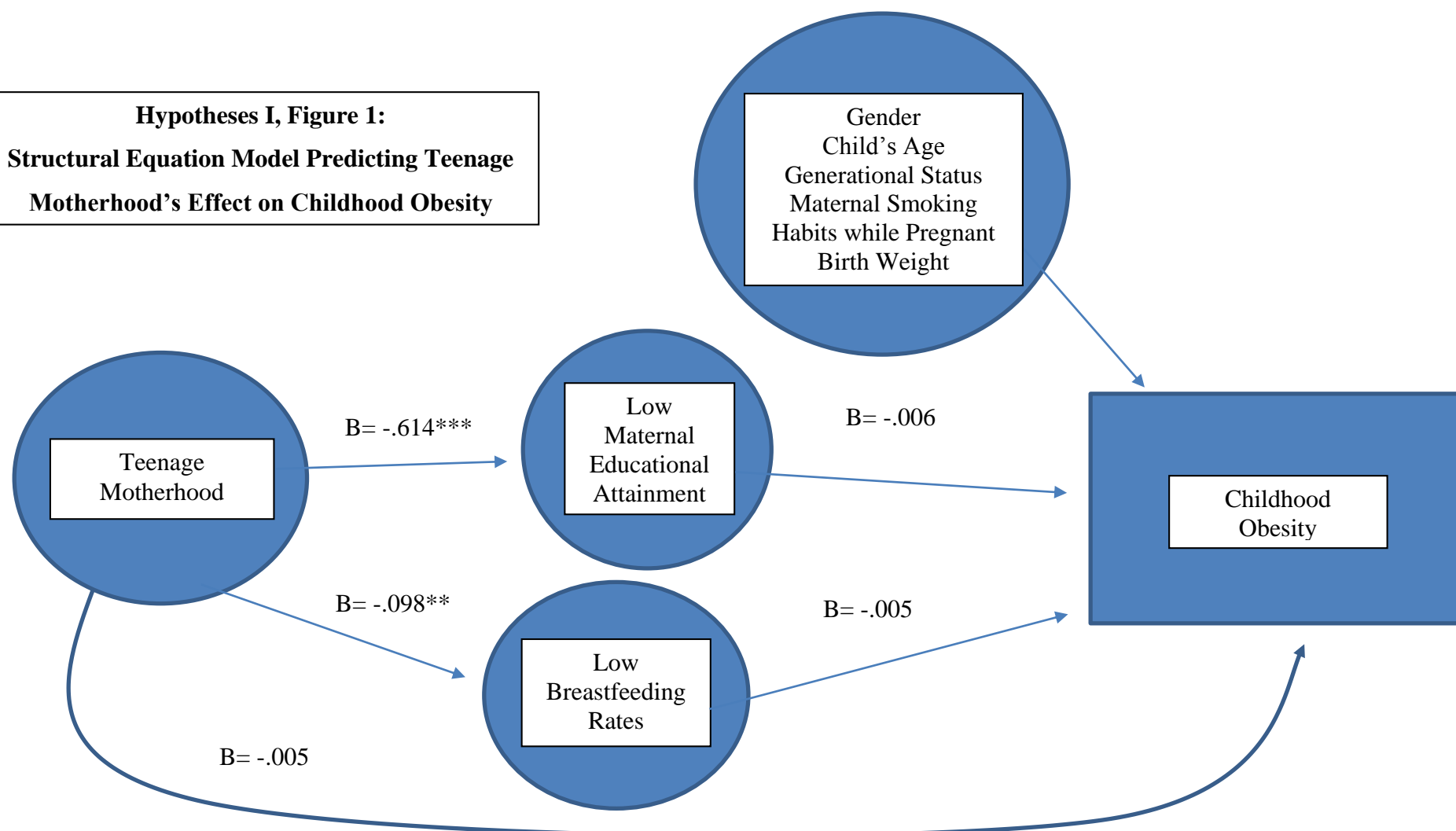
N=2,334

Source: NHANES Data from 1999/2000 through 2011/2012

Sample: Mexican-American and other Hispanic children aged 2-6

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

**Hypotheses I, Figure 1:  
Structural Equation Model Predicting Teenage  
Motherhood's Effect on Childhood Obesity**



N=2,334

Source: NHANES Data from 1999/2000 through 2011/2012

Sample: Mexican-American and other Hispanic children aged 2-6

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

**Hypotheses II & III, Table A: Generational Status and Breastfeeding Rates**

<b>Generational Status</b>	<b>% Breastfed</b>	<b>Unweighted Count</b>
First generation	85.95%	104
Second generation	79.03%	1,089
Third generation	64.91%	542
<b>Total</b>		<b>1,735</b>

N=2,334

Source: NHANES Data from 1999/2000 through 2011/2012

Sample: Mexican-American and other Hispanic children aged 2-6

Pr =0.000\*\*\*

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

**Hypotheses II & III, Table B: Generational Status and Childhood Obesity**

<b>Generational Status</b>	<b>% Obese</b>	<b>Unweighted Count</b>
First generation	16.53%	20
Second generation	15.82%	218
Third generation	14.73%	123
<b>Total</b>		<b>361</b>

N=2,334

Source: NHANES Data from 1999/2000 through 2011/2012

Sample: Mexican-American and other Hispanic children aged 2-6

Pr =0.747

	B	Odds Ratio
<b>Maternal Age at Birth</b>		
Teenage Mother	-.019	.981
Non-teenage Mother (Ref.)	-----	-----
<b>Race</b>		
Mexican-American	-.125	.882
Other Hispanic (Ref.)	-----	-----
<b>Generational Status</b>		
First Generation	-.244	.783
Second Generation	.141	1.151
Third Generation	-----	-----
<b>Breastfed</b>		
Yes	-.076	.927
No (Ref.)	-----	-----
<b>Gender</b>		
Female	-.175	.840
Male	-----	-----
<b>Age of Child</b>		
Two Years Old	-.846***	.429***
Three Years Old	-.098	.907
Four Years Old	.182	1.200
Five Years Old	-.319	.727
Six Years Old (Ref.)	-----	-----

N=2,334

Source: NHANES Data from 1999/2000 through 2011/2012

Sample: Mexican-American and other Hispanic children aged 2-6

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

**Hypothesis II & II, Table D: Logistic Regression Model Predicting Childhood Obesity**

	<b>B</b>	<b>Odds Ratio</b>
<b>Maternal Age at Birth</b>		
Teenage Mother	-.046	.955
Non-teenage Mother (Ref.)	-----	-----
<b>Race</b>		
Mexican-American	-.188	.828
Other Hispanic (Ref.)	-----	-----
<b>Generational Status</b>		
First Generation	-.297	.743
Second Generation	.043	1.044
Third Generation (Ref.)	-----	-----
<b>Breastfed</b>		
Yes	-.041	.960
No (Ref.)	-----	-----
<b>Educational Attainment of Household Reference Person</b>		
Less than High School	.586	1.800
Some High School	.461	1.586
High School/GED	.290	1.336
Some College	.540	1.716
College (Ref.)	-----	-----
<b>Marital Status of Household Reference Person</b>		
Never married	-.050	.951
No longer married	.140	1.151
Living with partner	-.062	.940
Married (Ref.)	-----	-----
<b>Gender</b>		
Female	-.169	.844
Male	-----	-----

**Maternal Smoking Habits****While Pregnant**

Mother Smoked	.029	1.029
Mother Did Not Smoke (Ref.)	-----	-----

**Birth Weight**

Low birth weight	.269	1.308
High birth weight	.309	1.362
Normal birth weight (Ref.)	-----	-----

**Age of Child**

Two Years Old	-.845***	.430***
Three Years Old	-.124	.883
Four Years Old	.168	1.183
Five Years Old	-.338	.713
Six Years Old (Ref.)	-----	-----

N=2,334

Source: NHANES Data from 1999/2000 through 2011/2012

Sample: Mexican-American and other Hispanic children aged 2-6

\*p &lt; .05 \*\*p &lt; .01 \*\*\*p &lt; .001

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## ACADEMIC VITA

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### EDUCATION:

The Pennsylvania State University, Schreyer Honors College August 2012-May 2016  
Bachelor of Science in Sociology  
Minor in International Studies

### THESIS:

“The Relationship between Maternal Age, Generational Status, & Childhood Obesity in the Hispanic-American Population”  
Thesis Supervisor: Dr. Jennifer Van Hook

### HONORS AND AWARDS:

Sociology Student Marshal 2016 Paterno Fellows Program  
Dean’s List Phi Beta Kappa  
Markel Memorial Scholarship Fund Alpha Kappa Delta

### GRANTS:

Liberal Arts Enrichment Fund: Fall 2015  
Erickson Discovery Grant: Summer 2015

### INTERNATIONAL EXPERIENCE:

Univerzita Karlova v Praze  
*Semester abroad, Spring of 2015*  
-Study abroad program located in Prague, Czech Republic  
-Courses specialized in Czech culture, history, and transatlantic relations  
-Volunteered in an orphanage teaching English to two teenage girls; 1 hour, biweekly

### TEACHING EXPERIENCE

The Pennsylvania State University  
*Undergraduate Teaching Assistant* Fall 2014-Present  
-Courses include: Honors Sociological Theory, Honors Social Change, Introduction to Developmental Psychology  
-Acted as a liaison between students and professors while being a course manager  
-Taught in-class special interest topics such as breastfeeding, cross-cultural parenting, and The Simplicity Movement  
-Led review sessions prior to exams by creating PowerPoint review presentations

### RESEACH EXPERIENCE:

The Association of Religion Data Archives (ARDA) January 2016-Present  
*Undergraduate Research Assistant*  
-Analyzed published literature regarding the intersection of religion, psychology, and health in search of large primary datasets and scales evaluating measures of the previously mentioned topics

-Recorded contact and background information of the principal researcher as well as descriptive information regarding the primary dataset

**STUDENT AFFILIATIONS & ACTIVITIES:**

Hearts for the Homeless

January 2015-Present

*Shift Supervisor*

-Weekly volunteer, 2-3 hours per week

-Oversaw the standard operations of the homeless shelter including cleaning, completion of intake forms, donation management, and clothing distribution for the homeless clients

Best Buddies

August 2012-Present

*General Member*

-Acted as an advocate for individuals with disabilities through the Best Buddies organization by creating a friendship and upholding contact with assigned Best Buddy

-Meetings held on a bimonthly basis with activities such as hayrides, holiday parties, or basketball games occurring once per month

**LANGUAGE PROFICIENCY:**

English

Native proficiency

French

Elementary proficiency