2016

Influence of Overweight, Obesity, Social Support, and Self-Efficacy on Breastfeeding Outcomes Among African-American Women

Elizabeth Hoo
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral dissertation by

Elizabeth Hoo

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Chinaro Kennedy, Committee Chairperson, Public Health Faculty
Dr. Kimberly Brownley, Committee Member, Public Health Faculty
Dr. Mary Lou Gutierrez, University Reviewer, Public Health Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2016

Abstract

Influence of Overweight, Obesity, Social Support, and Self-Efficacy on Breastfeeding Outcomes Among African-American Women

by

Elizabeth Hoo

MPH, Armstrong Atlantic State University, 2008

BS, University of Georgia, 2002

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

May 2016

Abstract

Breastfeeding reduces morbidity and mortality among mothers and children, yet African-American women breastfeed at lower rates than women of other racial and ethnic groups do. Higher rates of overweight, obesity, and low socioeconomic status may be contributing factors in this population; however, limited research exists regarding the roles of maternal overweight and obesity on breastfeeding outcomes. The purpose of this study was to examine whether social support and self-efficacy positively influence breastfeeding outcomes among overweight and obese African American women. Self-efficacy and social support theories provided the theoretical framework for the study. Research questions examined whether (a) maternal overweight and obesity, social support, and self-efficacy were associated with breastfeeding initiation and duration among African-American women; and (b) self-efficacy mediated this association. The study design was a quantitative retrospective analysis of a subset of secondary data from the 2009–2011 Pregnancy Risk Assessment Monitoring System (n = 10,926). SPSS 21.0® was used for analyses. Obesity was significantly associated with breastfeeding durations of 9–16 weeks and 17 or more weeks. Self-efficacy was significantly associated with breastfeeding initiation only. Social support was negatively associated with breastfeeding durations of 9–16 weeks among obese women. Positive social change implications include increased knowledge of the associations between overweight, obesity, social support, self-efficacy, and breastfeeding outcomes among African-American women. This knowledge could be used to inform the development of interventions to improve breastfeeding and weight related health outcomes.

Influence of Overweight, Obesity, Social Support, and Self-Efficacy on Breastfeeding Outcomes Among African-American Women

by

Elizabeth Hoo

MPH, Armstrong Atlantic State University, 2008

BS, University of Georgia, 2002

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

May 2016

Dedication

To my husband, Vincent, and my daughters, Imani and Sydney.

Acknowledgments

First and foremost I give thanks to God for the strength, favor, and grace to continue to persevere through this process. I would also like to thank my family for their love, support, and understanding in allowing me to undertake this journey and for encouraging me to continue when I felt I could not. I would like to thank my chair and committee member, Drs. Chinaro Kennedy and Kimberly Brownley, for their insight and guidance. Dr. Kennedy has been a great resource, problem-solver, and cheerleader throughout this process. Dr. Brownley always provided a thoughtful critique and asked questions to improve the quality of the study. I would also like to thank my supervisor Dr. Kathleen Ethier for her support and encouragement and Dr. Donatus Ekwueme for his mentorship. Additionally, I would like to acknowledge the CDC PRAMS team and the PRAMS Working Group, without whom this study would not be possible. The PRAMS Working Group includes:

Alabama—Qun Zheng, MS; Alaska—Kathy Perham-Hester, MS, MPH; Arkansas—Mary McGehee, PhD; Colorado—Alyson Shupe, PhD; Connecticut—Jennifer Morin, MPH; Delaware—George Yocher, MS; Florida—Kelsi E. Williams; Georgia—Chinelo Ogbuanu, MD, MPH, PhD; Hawaii—Jane Awakuni; Illinois—Theresa Sandidge, MA; Iowa—Sarah Mauch, MPH; Louisiana—Amy Zapata, MPH; Maine—Tom Patenaude, MPH; Maryland—Diana Cheng, MD; Massachusetts—Emily Lu, MPH; Michigan—Patricia McKane; Minnesota—Judy Punyko, PhD, MPH; Mississippi—Brenda Hughes, MPPA; Missouri—Venkata Garikapaty, MSc, MS, PhD, MPH; Montana—JoAnn Dotson; Nebraska—Brenda CoufalI; New Hampshire—David J. Laflamme, PhD, MPH;

New Jersey—Ingrid M. Morton, MS; New Mexico—Eirian Coronado, MPH; New York State—Anne Radigan-Garcia; New York City—Candace Mulready-Ward, MPH; North Carolina—Kathleen Jones-Vessey, MS; North Dakota—Sandra Anseth; Ohio—Connie Geidenberger PhD; Oklahoma—Alicia Lincoln, MSW, MSPH; Oregon—Kenneth Rosenberg, MD, MPH; Pennsylvania—Tony Norwood; Rhode Island—Sam Viner-Brown, PhD; South Carolina—Mike Smith, MSPH; Texas—Tanya Guthrie, PhD; Tennessee—Ramona Lainhart, PhD; Utah—Laurie Baksh, MPH; Vermont—Peggy Brozicevic; Virginia—Christopher Hill, MPH, CPH; Washington—Linda Lohdefinck; West Virginia—Melissa Baker, MA; Wisconsin—Katherine Kvale, PhD; Wyoming—Amy Spieker, MPH; CDC PRAMS Team, Applied Sciences Branch, Division of Reproductive Health.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

Breastfeeding is the recommended method of infant feeding; however, many women do not breastfeed as recommended. The World Health Organization (WHO) recommends mothers breastfeed exclusively for the first 6 months and then continue for 2 years or more (WHO, 2014). African-American women in particular have the lowest rates of breastfeeding among racial and ethnic groups in the United States (Centers for Disease Control and Prevention [CDC], 2013). Maternal overweight and obesity, a lack of social support, and low maternal self-efficacy may contribute to decreased breastfeeding rates among African-American women (Kornides & Kitsantas, 2013). Overweight and obese women are more likely to breastfeed at lower rates and are more likely to discontinue breastfeeding earlier than their normal weight counterparts are (Wojcicki, 2011). Weight may also influence a woman's intention to breastfeed (Hauff, Leonard, & Rasmussen, 2014).

Among African-American women, lower breastfeeding rates may be explained in part by the high rates of overweight and obesity within this population (CDC, 2012). Although the specific factors that lead to poor breastfeeding outcomes in this population are not understood completely, some studies note that social support may in part affect breastfeeding outcomes (Reeves, Close, Simmons, & Hollis, 2006). Other studies noted that self-efficacy mediates the relationship between social support and breastfeeding (Brown, 2014; McCarter-Spalding & Gore, 2012). However, understanding the contextual role that overweight and obesity play in breastfeeding initiation and duration

among African-American women is vital given the maternal and infant risks of not breastfeeding.

The major sections of this chapter include the background, problem statement, purpose of the study, research questions and hypotheses, theoretical framework, nature of the study, definitions, assumptions, scope and delimitations, limitations, significance, and summary.

Background of the Study

Breastfeeding can help improve maternal health outcomes including increasing postpartum weight loss; however, African-American women are less likely to breastfeed than women in other racial and ethnic groups (CDC, 2014b). Initiation is the lowest among racial and ethnic minorities, with only 59% initiation versus 75% among all women nationally (CDC, 2014b). The reasons for the lower rates of breastfeeding among African-American women are not well understood but other health conditions could contribute.

Obesity may also be a barrier to breastfeeding for African-American women. African-American women have higher rates of obesity (56.6%) than non-Hispanic Whites (32.8%) and Hispanic women (44.4%) (Ogden, Carroll, Kit, & Flegal, 2012). Obese women tend to breastfeed for shorter durations than their normal weight counterparts, lowering breastfeeding rates (Wojcicki, 2011). Delayed Lactogenesis II, hesitation about nursing in public, and challenges latching infants due to larger breasts are possible reasons for this disparity in duration (Rasmussen, Hilson, & Kjolhede, 2001;Wojcicki, 2011).

Limited research exists on breastfeeding barriers specific to overweight and obese African-American women. However, a lack of social support and diminished self-efficacy may be contributing factors (Brown, 2014; McCarter-Spalding & Gore, 2012). The purpose of this study is to examine whether social support and self-efficacy can positively influence breastfeeding outcomes among overweight and obese African American women. In this hypothetical model (Figure 1), overweight and obesity will have a negative effect on breastfeeding initiation and duration. However if social support or self-efficacy are present, breastfeeding will increase regardless of overweight and obesity. In addition, self-efficacy may mediate the association between social support and breastfeeding initiation and duration.

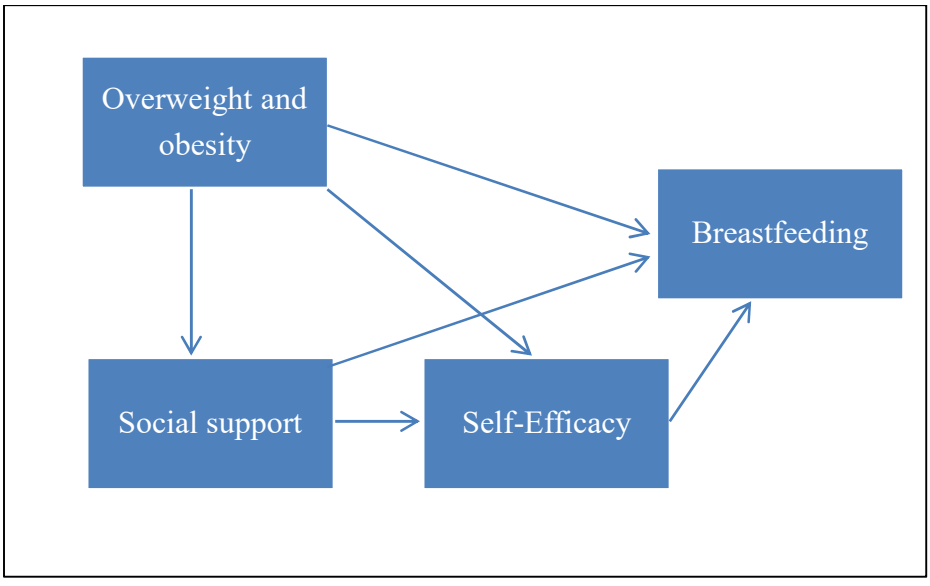

Figure 1. Association of overweight, obesity, social support, self-efficacy, and breastfeeding outcomes.

Historical Breastfeeding Rates

African-American women have historically breastfed at lower rates than recommended and below national goals. Healthy People 2020 goals for breastfeeding are 81.9% initiation, 60.6% breastfed at 6 months, 34.1% breastfed at 12 months, 46.2% exclusively breastfed through 3 months, and 25.5% exclusively breastfed at 6 months (U.S. Department of Health and Human Services, 2014). According to Allen et al. (2013), among births in 2000, fewer than one half (47.4%) of African-American women ever breastfed, 16.9% breastfed at 6 months, and 6.3% breastfed at 12 months. Though these numbers did increase among births in 2008, the rates remained suboptimal with 58.9% breastfeeding initiation, 30.1% breastfed at 6 months, and 12.5% breastfed at 12 months (Allen et al., 2013). More African-American mothers are breastfeeding and breastfeeding for longer durations; however, progress is slow and socioeconomic status, overweight, and obesity may contribute to the racial ethnic disparities.

African-American Versus White Women

The reasons for these suboptimal breastfeeding rates among African-American women vary. Socioeconomic factors such as low educational attainment and low income have been associated with decreased breastfeeding rates and poorer health outcomes (Grummer-Strawn, Scanlon, Darling, & Conrey, 2006). Among women with a high school education, 69% initiate breastfeeding compared with 91% of women with a college degree (CDC, 2014b). Breastfeeding duration at 6 months among women with a high school diploma is 38% compared with 68% of women with a college degree (CDC, 2014b).

Similarly, among lower income, women 70% initiate breastfeeding and 37% continue at 6 months compared with 90% initiation and 68% duration among higher income women (CDC, 2014b). For African-American women these factors may be influential because fewer than one quarter (23%) of African-American women have earned a high school diploma and 13% have earned a college degree, compared with 29% of White women with a high school diploma and 20% of White women with a college degree (United States Census Bureau, 2013). In addition, African-Americans were more than twice as likely (27.2%) as Whites (12.3%) to live below the federal poverty level in 2013 (DeNavas-Walt & Proctor, 2014). African-American women bear a disproportionate burden of low socioeconomic status relative to their White counterparts, which is reflected in their breastfeeding habits.

Disparities in rates of overweight and obesity between African-American and White women may contribute to the disparities in breastfeeding rates as well. Rates of overweight and obesity are higher among African-American women than among women of other racial ethnic groups. More than one half of African-American women are obese (56.6%) compared with fewer than one third (32.8%) of non-Hispanic White women and 44.4% of Hispanic women (Ogden et al., 2012). When overweight women are included, the disparities remain, with 82.0% of African-American women overweight or obese compared with 63.2% of non-Hispanic White women, and 77.2% of Hispanic women (Ogden, Carroll, Kit, & Flegal, 2014). Despite the high rates of overweight and obesity in all racial and ethnic groups, disparities in body mass index (BMI) persist with the highest rates among African-American women.

Maternal Risks of Not Breastfeeding

Breastfeeding is often presented in terms of the benefits to mothers but the risks of not breastfeeding for the mother are often overlooked. Bartick et al. (2013) noted that women who breastfeed at suboptimal levels are more likley to develop breast cancer and hypertension, and to suffer from myocardial infarctions, than women who breastfeed at optimal levels. More specifically, if a majority of women (90%) were to breastfeed at optimal levels, approximately 5,000 cases of breast cancer, more than 53,000 cases of hypertension, and nearly 14,000 cases of myocardial infarction could be prevented. For African-American women, this is important because the risk of death from breast cancer is higher than among White women, with 30.6 deaths per 100,000 among African-American women compared with 21.7 deaths per 100,00 among White women (National Cancer Institute, 2014). In addition, Palmer et al., (2014) found that breastfeeding reduced the risk of specific subtypes of breast cancer among African-American women. Hypertension also affects more African-American women (45.7%) than White women (31.3%), another disease that could be prevented if African-American women breastfed at optimal levels (Bartick et al., 2013).

Infant Risks of Not Breastfeeding

Infants are also at increased risk of disease if breastfed at suboptimal levels. Stuebe (2009) noted that infants who are not breastfed are 3.6 times more likely to develop a lower respiratory tract infection than infants who are breastfed. Infants who are not exclusively breastfed are also 2.8 times more likely to have a gastrointestinal infection (Stuebe, 2009). In addition, the risk of necrotizing enterocolitis is 2.8 times

higher among infants who are not breastfed compared with infants who are are (Stuebe, 2009).

Deaths from sudden infant death syndrome (SIDS) among infants are 1.6 times more likely among infants that have not been breastfed compared with infants that have been breastfed (Stuebe, 2009). This is important for African-American infants who are more likely to be born prematurely (60% risk among African-American mothers) (CDC, 2014c) and die of SIDS, with the risk of SIDS among African-American infants three times the risk of SIDS among White infants (Nemours Foundation, 2014). Thus, the consequences of not breastfeeding are greater for African-American infants.

The costs of suboptimal breastfeeding to society add significance to the consequences for not only the mother infant dyad but also for population health. According to Bartick et al. (2013) health care costs due to suboptimal breastfeeding amount to approximately $17.4 billion, of which $733.7 million is in direct medical costs. These costs are due both to morbidity and mortality of chronic diseases, which could potentially be decreased through increased and optimal breastfeeding.

Social Support, Self-Efficacy, and Breastfeeding

The role of social support and self-efficacy in promoting breastfeeding initiation and duration has been studied independently and collectively in several groups of women with varying outcomes. Reeves et al. (2006) studied the role of social support in breastfeeding decisions in a sample of mothers that included African-American women. Despite accounting for 44% of the survey population, only 18% of African-American mothers reported that their infant's father provided support (Reeves et al., 2006). This

number is in stark contrast to the 68% of White mothers who reported receiving support for breastfeeding from their infants'fathers (Reeves et al., 2006). The authors noted that the majority of women (62.6%) did not believe that support mattered in terms of their breastfeeding outcomes; however, the results were not stratified by race making it difficult to determine whether social support is more or less influential among African-American mothers. Robinson and VandeVusse (2011) explored self-efficacy among African-American mothers and found differences between what mothers reported for self-efficacy quantitatively and what they described qualitatively indicating the need for further study.

Problem Statement

The problem is overweight and obese African-American women breastfeed at lower rates and for shorter durations than their normal weight counterparts, putting themselves and their infants at increased risk of disease (Bartick et al., 2013; Stuebe, 2009). Although literature exists on the influence of overweight and obesity on breastfeeding rates among women, a gap in the literature exists regarding the influence of overweight and obesity on breastfeeding rates among African-American women. This gap needs to be addressed because women who do not breastfeed are more likely to suffer from chronic diseases and conditions such as obesity and certain cancers, whereas their infants are more likely to develop otitis media or die from SIDS (Stuebe, 2009; Bartick et al., 2013). Social support and self-efficacy are influential in predicting and improving breastfeeding outcomes among women (McCarter-Spalding & Gore, 2012; Brown, 2014); however, the effect was not examined among overweight and obese

African-American women. Knowledge of the relationships between overweight and obesity on breastfeeding rates and the effect that social support and self-efficacy may have on improving breastfeeding practice may help public health and health care professionals tailor health education messages to African-American mothers to improve breastfeeding rates.

Purpose of the Study

The purpose of this study was to examine whether social support and self-efficacy could positively influence breastfeeding outcomes among overweight and obese African-American women. This study adds information about the potential benefits of self-efficacy and social support in improving breastfeeding outcomes among overweight and obese African-American women.

Research Questions

RQ1: Are maternal overweight, obesity, social-support, and self-efficacy associated with breastfeeding initiation among African-American women?

$H1_{01}$: Among African-American women, being overweight or obese does not significantly influence breastfeeding initiation.

$H1_{a1}$: Among African-American women, being overweight or obese does significantly influence breastfeeding initiation.

$H2_{02}$: Among African-American women, social support does not significantly influence breastfeeding initiation.

$H2_{a2}$: Among African-American women, social support does significantly influence breastfeeding initiation.

H3$_{03}$: Among African-American women, self-efficacy does not significantly influence breastfeeding initiation.

H3$_{a3}$: Among African-American women, self-efficacy does significantly influence breastfeeding initiation.

H4$_{04}$: Among overweight and obese African-American women, social support does not significantly influence breastfeeding initiation.

H4$_{a4}$: Among overweight and obese African-American women, social support does significantly influence breastfeeding initiation.

H5$_{05}$: Among overweight and obese African-American women, self-efficacy does not significantly influence breastfeeding initiation.

H5$_{a4}$: Among overweight and obese African-American women, self-efficacy does significantly influence breastfeeding initiation.

H6$_{06}$: Self-efficacy does not mediate the association between social-support and breastfeeding initiation among overweight and obese African-American women.

H6$_{a6}$: Self-efficacy does mediate the association between social-support and breastfeeding initiation among overweight and obese African-American women.

RQ2: Are maternal overweight, obesity, social-support, and self-efficacy associated with breastfeeding duration among African-American women?

H7$_{07}$: Among African-American women, being overweight or obese does not significantly influence breastfeeding duration.

$H7_{a7}$: Among African-American women, being overweight or obese does significantly influence breastfeeding duration.

$H8_{08}$-: Among African-American women, social support does not significantly influence breastfeeding duration.

$H8_{a8}$: Among African-American women, social support does significantly influence breastfeeding duration.

$H9_{09}$: Among African-American women, self-efficacy does not significantly influence breastfeeding duration.

$H9_{a9}$: Among African-American women, self-efficacy does significantly influence breastfeeding duration.

$H10_{010}$: Among overweight and obese African-American women, there is no association between social support and breastfeeding duration.

$H10_{a10}$: Among overweight and obese African-American women, there is an association between social support and breastfeeding duration.

$H11_{011}$: Among overweight and obese African-American women, there is no association between self-efficacy and breastfeeding duration.

$H11_{a11}$: Among overweight and obese African-American women, there is an association between self-efficacy and breastfeeding duration.

$H12_{012}$: Self-efficacy does not mediate the association between social-support and breastfeeding duration among overweight and obese African-American women.

$H12_{a12}$: Self-efficacy does mediate the association between social-support and breastfeeding duration among overweight and obese African-American women.

Theoretical Framework

The theoretical framework for this study was self-efficacy theory and social-support theory. Social-support theory focuses on the role of peer support in achieving health outcomes (McAlister, Perry, & Parcel, 2008). Peer support or social support is thought to be protective against stress, which has a positive effect on health. However, protection against stress is not the only role social support plays, as it may also increase coping skills (McAlister et al., 2008). Social support can be grouped into four main types: emotional support, instrumental support, informational support, and appraisal support (McAlister et al., 2008), which will be discussed in detail in Chapter 2. Although multiple types of social support exist, they are difficult to parse out and study individually because more than one type of support is often provided in a single interaction (McAlister et al., 2008). Self-efficacy, by contrast, refers to an individual's belief in their ability to successfully adopt and maintain behavioral changes and achieve health outcomes (Heaney & Israel, 2008). Bandura (1994) referred to this more specifically as perceived self-efficacy. Self-efficacy has been shown to be a contributing factor in a woman's decision to initiate and continue breastfeeding (McCarter-Spalding & Gore, 2012). Self-efficacy can be increased through social support and "peer modeling," in which individuals learn new behaviors by watching others like them that demonstrate these behaviors (McAlister et al., 2008). Social support has also contributed both to a woman's decision to initiate breastfeeding and the woman's continuation of breastfeeding for longer durations (McCarter-Spalding & Gore, 2012). The belief in oneself (self-efficacy)

and others' belief in the individual's ability (social-support) may thus improve breastfeeding outcomes.

Nature of the Study

The nature of the study was a quantitative study with a cross-sectional design using secondary data. A cross-sectional study was used to examine the association between breastfeeding practices among African-American women, overweight and obesity, social-support, and self-efficacy. The cross-sectional design allowed for analysis of a large sample set in a relatively short time frame and made use of valid and reliable existing data. The independent variables maternal overweight and obesity were defined as women having a pre-pregnancy BMI of greater than or equal to 25.0 to 29.9 for overweight and greater than or equal to 30.0 for obese women. Additional independent variables, social support and self-efficacy, were defined as adequate social support and reasons for not breastfeeding, respectively. The dependent variables of breastfeeding outcomes were defined as any breastfeeding or offering pumped breast milk (initiation) and breastfeeding for more than 1 week (duration). Covariates included maternal age, number of previous live births, delivery method, income groups, maternal education, and marital status.

The data for this study were secondary data collected through PRAMS. PRAMS is surveillance system developed by the CDC in which participating states collect data from new mothers postpartum on a variety of prenatal and maternal health indicators (CDC, 2013). The number of women sampled each year per state ranged from 1,300 to 3,400 from all mothers who are residents of the state (CDC, 2013). Each state also used

PRAMS standardized data collection methodology, which allows for comparison across states (CDC, 2013). Data analysis was conducted using SPSS 21.0® and included data from several states.

Definitions

The independent variables for this study were maternal overweight, obesity, social-support, and self-efficacy. For the purposes of this study, maternal overweight referred to a pre-pregnancy BMI of greater than or equal to 25 to 29.9 and maternal obesity referred to a pre-pregnancy BMI of greater than or equal to 30. Social support was defined in the dataset as having adequate support and breastfeeding self-efficacy was defined as reasons for not breastfeeding. Adequate social support included the four types of emotional support noted by House (1981) including emotional, instrumental, informational, and appraisal support. These concepts are discussed in detail in Chapter 2. The first dependent variable was breastfeeding initiation, defined as ever having breastfed or offered pumped breast milk. The second dependent variable was breastfeeding duration, defined as breastfeeding for more than 1 week. The covariates, maternal age, and number of previous live births were defined as the age of the mother at time of delivery and the number of prior pregnancies resulting in an infant born alive. Additional covariates included maternal education, defined as the number of years of school completed, income, marital status, and delivery method. Each of these variables will be explained in detail in Chapter 3, including the coding of each in the dataset.

Terms and phrases used in this study were defined as follows:

Any breastfeeding: Feeding an infant breast milk either directly from the mother's breasts or expressed (American Academy of Pediatrics, 2012).

Breastfeeding: Feeding an infant human milk from the mother's breast (WHO, 2003).

Breastfeeding duration: Feeding an infant breast milk either expressed or directly from the breast for a period longer than 1 week (CDC, 2009b).

Breastfeeding initiation: Feeding a newborn breast milk either expressed or directly from the mother's breast (WHO, 2014).

Maternal age: The mother's age at the time of delivery (CDC, 2009b).

Maternal overweight: Having a pre-pregnancy body mass index between 25.0 and 29.9 (CDC, 2012).

Maternal obesity: Having a pre-pregnancy body mass index of greater than or equal to 30.0 (CDC, 2012).

Self-efficacy: The belief in one's ability to successfully implement a behavior change or complete an activity (Bandura, 1997).

Social support: The provision of assistance to a receiving individual in the form of information, aid, empathy, love, or financial assistance (Heaney & Israel, 2008).

Assumptions

The use of a secondary dataset containing self-reported data collected by a number of different individuals, although standardized, required the following assumptions to be made:

1. The survey respondents accurately reported information.

2. The survey instrument was culturally appropriate.
3. Interviewers followed survey protocols during respondent interviews to minimize risk of interviewer bias.

Scope and Delimitations

The study sought to examine the associations between maternal overweight, obesity, and breastfeeding outcomes among African-American women in the United States. Data for the study were from a secondary data source, PRAMS, which was collected in 40 states and one city across the United States (CDC, 2013). Sampled women included women who had given birth in the survey year and were residents of the state in which the birth occurred. In addition to the PRAMS scope, I chose to include only African-American women who had given birth to a singleton. I also excluded women who had given birth to a premature infant or low birth weight infant and women who were underweight. Premature and low birth weight infants were excluded because the infants face unique challenges that full-term, normal weight infants do not, which may complicate breastfeeding outcomes (Mulready-Ward & Sackoff, 2013). Women with missing data for the dependent variables were excluded from the final sample used for analysis. However, because the standard (optional) questions asked varied by state, women with missing data on the independent variables were included in the final sample but excluded from analysis if the state did not ask the relevant questions of their sample. A temporal relationship cannot be established due to the cross-sectional design; however, results are generalizable to the larger population because of the random sampling methodology (delimitation).

Limitations

Limitations of the study included being restricted to the structure of the questions and the variables existing in the dataset. Because the study used secondary data, the researcher was unable to design and ask questions specific to this study but rather relied on the data available. In addition, although the PRAMS methodology was standardized across all states, there was room for tailoring among the available questions (CDC, 2013). Each state asked respondents a standard set of core questions but also chose to ask some, all, or none of the standard (optional) questions.

The majority of states participated in PRAMS at some point; however, not all states currently participate. Ten states do not currently participate in PRAMS, which may potentially limit the generalizability of the results to the entire U.S. population of African-American mothers. Nonparticipating states include Arizona, California, Idaho, Indiana, Kansas, Kentucky, Montana, Nevada, North Dakota, and South Dakota (CDC, 2013).

Additional limitations of the study included:

1. Recall bias of the mother due to the timing of the interview after delivery. PRAMS states initially contact identified respondents within 2 to 4 months of delivery (CDC, 2013).
2. The inability to capture breastfeeding habits for the first full year of the infant's life. Because PRAMS states begin contact with the mothers within 2 to 4 months of delivery, there is the potential to capture breastfeeding to that point for early responders.

3. Variables known to affect breastfeeding outcomes, such as previous breastfeeding experience and breastfeeding intention were not assessed in this dataset.
4. Women included in the study could have been HIV positive and discouraged from breastfeeding.

Significance

Breastfeeding is one method by which current generations can impart health to future generations, yet many African-Americans miss this benefit. The current study attempted to fill this gap by seeking to understand the factors that were associated with initiating and continuing breastfeeding among African-American women. This study was unique because it addressed an area of need in a population that historically has higher rates of overweight and obesity and lower rates of breastfeeding. The higher prevalence of obesity can be both a barrier to breastfeeding and a risk of not breastfeeding. This study used national data and focused on African-American women to further explore associations among these factors.

Social Change Implications

Building social support and self-efficacy in this population may increase the number of overweight and obese African-American women who initiate and continue breastfeeding. This may in turn lead to better health outcomes for the mother, the infant, and future generations. More immediately, this research may help improve the design and implementation of public health programs to increase breastfeeding rates among African-American women. The results of this study could provide a more complete picture of the

effects of overweight and obesity on breastfeeding outcomes in a minority population. This information could be used to inform interventions to improve breastfeeding and weight related health outcomes by determining whether an association exists between overweight, obesity, and breastfeeding outcomes and whether self-efficacy or social support can be used to improve breastfeeding outcomes among African-American women. In addition, this information could be used to promote the inclusion of existing evidence based interventions, such as the Baby Friendly Hospital Initiative (Baby-Friendly USA, 2012) or Loving Support (Loving Support, 2015) in communities of color.

Summary and Transition

Breastfeeding is the preferred infant feeding method; however, many African-American mothers do not breastfeed. Factors such as maternal overweight, obesity, and lack of social support or self-efficacy may play a role in limiting breastfeeding initiation and duration in this population. This study used PRAMS data to examine the association between these factors among African-American women and to provide information to guide development of tailored public health interventions.

In Chapter 2, the literature review will address the risks of not breastfeeding for the mother, the infant and society, maternal overweight and obesity, and maternal race.

Chapter 2: Literature Review

The purpose of this study was to examine whether social support and self-efficacy could positively influence breastfeeding outcomes among overweight and obese African-American women. This study adds information about the potential benefits of self-efficacy and social support in improving breastfeeding outcomes among overweight and obese African-American women. Breastfeeding rates are suboptimal among overweight and obese African-American women, putting the women and their infants at increased risk of adverse health outcomes, disease, and potentially death (Bartick et al., 2013; Stuebe, 2009). Maternal overweight, obesity, self-efficacy, and social support may be associated with these outcomes in African-American women (McCarter-Spalding & Gore, 2012). This chapter will explore the literature on the theoretical framework of self-efficacy and social support, the risks of not breastfeeding for the mother and the infant, maternal overweight, and obesity.

Literature Search Strategy

A Google Scholar search was conducted for *maternal obesity* or *pre-pregnancy obesity* and *breastfeeding* in African-Americans published between 2004 and 2014, which returned 107 results, not all of which were relevant. Articles regarding health outcomes or obesity in the infant were excluded, which left 36 articles. These articles were imported into a Zotero library so that duplicates could be removed. Second, a PubMed search was conducted for articles related to Hauffet al. (2014), which identified 124 articles published between 2004 and 2014. A series of PubMed searches were conducted for articles published between 2004 and 2014 using Boolean operators AND

and OR to create different combinations of the following key terms*: maternal obesity*, *African-Americans*, *breastfeeding*, *social support*, and *self-efficacy*. Finally, the references in the articles retrieved through the searches were used to identify additional articles to include in the literature review.

After a thorough review of the literature on the risks of not breastfeeding, maternal overweight and obesity as barriers to breastfeeding, and the role of self-efficacy and social support, I identified the following topics for discussion: (a) the theoretical framework for the study relative to self-efficacy and social support; (b) the risks of not breastfeeding for the mother, infant, and society; and (c) physical characteristics of the mother such as pre-pregnancy BMI and race that could determine breastfeeding outcome. Consequently, I hypothesized that African-American women who maintain a healthy pre-pregnancy BMI, have higher self-efficacy, and have more social support are more likely to initiate and continue to breastfeed.

Theoretical Foundation

Self-efficacy and social-support theories formed the theoretical foundation of the study. Bandura (1977) proposed the theory of self-efficacy in the 1970s as part of a larger theoretical framework to explain behavioral change and understand the circumstances in which change is achieved. Bandura (1997) postulated that self-efficacy and self-efficacy beliefs determined whether an individual would attempt behavioral change, the individual's degree and duration of perseverance, resilience, stress, and coping. Perceived self-efficacy differs from other estimations of self, such as self-esteem, that are comprehensive assessments of self as opposed to the assessment of capability in a

specific circumstance (Bandura, 1997). For example, an individual may have a low estimation of themselves (self-esteem) while feeling capable of successfully implementing a behavior change such as losing weight (self-efficacy). Similar to self-esteem, however, self-efficacy can be developed or increased.

Social support refers to the provision of aid or assistance and was first proposed by Barnes (1954), although its link to health was not articulated until the 1970s by Cassel (1976). Cassel argued that social support was protective against disease by minimizing the stress response that can decrease the effectiveness of the body's immune response. From this knowledge, House (1981) identified four primary types of social support: emotional support, instrumental support, informational support, and appraisal support. Each type of support can be useful in improving health outcomes by minimizing stress and enhancing or building coping skills (Heaney & Israel, 2008).

Self-Efficacy

Bandura (1997) described four processes by which self-efficacy can be built including enactive mastery experiences, vicarious experiences, verbal persuasion and social influence, and physiological and emotional states. Enactive mastery experience refers to the experience gained by performing a task or behavior (Bandura, 1997, p. 80). Bandura claimed that enactive mastery experience is the most influential source of self-efficacy development because it allows the individual to assess their capabilities directly (p. 80). However, simply performing the task or behavior successfully does not inherently imply an increase in self-efficacy (Bandura, 1997, p. 80). Similarly, failure to perform the task successfully may not increase or decrease self-efficacy but rather the

experience and subsequent self-appraisal is guided by the individual's effort in addition to pre-existing efficacy beliefs (Bandura, 1997, p. 80).

The second process by which self-efficacy is developed is vicarious experience or learning from others and their experiences (Bandura, 1997, p. 80). Although less influential than enactive mastery experiences this may be the only method of comparison for some activities and can serve as a proxy for actual experience (Bandura, 1997, p. 86). Modeling is a key component of developing self-efficacy through the vicarious learning experience process in which individuals look to peers and their successes or failures to determine whether or not they will be successful themselves (Bandura, 1997, p. 87). Bandura noted that success of the model in the given task does not necessarily translate into increased self-efficacy of the observer but rather depends on the attention, retention, production and motivation of the observer (p. 89).

The third process of developing self-efficacy is verbal persuasion and social influence (Bandura, 1997). Verbal persuasion and social influence are less influential than the previous two processes; however, they can be complementary. Bandura noted that the process of verbal persuasion is not limited to a single event but rather involves sustained influence over a period of time in order to build efficacy (p. 106). In addition, the credibility of the influencer in the view of the observer affects their receptivity to and acceptance of the message (Bandura, 1997, p. 105).

The fourth process by which self-efficacy is conveyed is through physiologic and affective states (Bandura, 1997). Physiologic and affective states refer to the individual's assessment of and responses to external stimuli such as difficult tasks inducing a stress

response (Bandura, 1997, p. 106). This stress response is interpreted as a sign of inefficacy and further reinforces the individual's belief that the requisite skill and capability to succeed in the task is lacking (Bandura, 1997, p. 106). However, Bandura noted that an individual's level of self-efficacy may predispose them to misconstrue these physiologic and affective states (p. 109).

Self-efficacy has been applied to a wide variety of health behaviors including breastfeeding (Nichols, Schutte, Brown, Dennis, & Price, 2009). Consequently, women would be more likely to initiate breastfeeding, continue breastfeeding for longer durations, and persevere to overcome challenges if they believed they would be successful (Nichols et al., 2009). Hauff et al. (2014) also supported this claim and noted that self-efficacy plays an important role in a woman's decision to initiate breastfeeding as well as the duration of breastfeeding.

Social Support

House (1981) identified four main types of social support including emotional support, instrumental support, informational support, and appraisal support. Emotional support involves providing compassion and understanding that makes the receiver feel cared for and loved (Heaney & Israel, 2008). The strength of the response to and outcome of the emotional support can vary depending on the socioeconomic status and environment of the receiving individual. Ryff, Singer, and Dienberg Love (2004) argued that individuals of lower socioeconomic status were more likely to experience greater benefits of social support particularly emotional support. However, individuals of all

socioeconomic statuses benefit from strong emotional support provided through social support (Seeman, 2008).

The second type of social support is instrumental support which refers to the provision of support through financial aid and services (Heaney & Israel, 2008). Although this type of support is also beneficial and often needed it is not regarded as influential in terms of health as emotional support (Seeman, 2008). Informational support, the third type of social support, is often the type provided by health professionals because it involves the provision of knowledge to solve problems (Heaney & Israel, 2008). Although this is the type of social support that is usually provided by professionals it does not mean that others cannot also provide this type of support. The final type of social support is appraisal support. Appraisal support also involves the provision of information however the purpose of that information differs from the information provided as part of informational support in that it is used to assess or self-evaluate (Heaney & Israel, 2008). Similar to self-efficacy, more than one type of social support can be provided simultaneously which can complicate assessment of each type individually (Heaney & Israel, 2008).

Social support theory has been applied to several health topics including breastfeeding (Reeves et al., 2006). Accordingly, women will initiate and continue breastfeeding if they have adequate support. Among African-American women, who have lower breastfeeding rates social support did not only increase breastfeeding initiation (Reeves et al., 2006) it also built self-efficacy which also led to improved breastfeeding outcomes (McCarter-Spalding & Gore, 2012).

The theoretical framework that guided this study was based on the combination of self-efficacy and social support theories. Self-efficacy theory proposes that individuals' likelihood of undertaking a behavior can be predicted by the individuals' belief that they have the ability to accomplish the behavioral change successfully; thus women will initiate and continue breastfeeding if they believe they can do so successfully. Social support theory ties in with self-efficacy theory because it proposes that individuals who receive support are better able to cope with stresses such as attempting behavioral change; thus women who have adequate support are more likely to initiate and continue breastfeeding. The focus of this secondary analysis was to determine whether maternal overweight and obesity were associated with breastfeeding initiation and duration among African-American women.

Risks of Not Breastfeeding

The risks of women choosing not to breastfed are well documented in the literature and include risks for the mother, the infant, and society. Increased risk of certain diseases, higher medical costs and even death can be consequences of a woman's decision not to breastfeed her infant.

Maternal Risks

Many health education messages and literature focus on the benefits of breastfeeding for the mother. Even though there are benefits of breastfeeding for the mother this type of messaging fails to underscore the risks of mothers choosing not to breastfeed and may perpetuate lower breastfeeding rates among women. Stuebe (2009) noted several preventable chronic diseases that are associated with mothers not

breastfeeding including an increased risk of developing breast cancer, ovarian cancer, diabetes, and myocardial infarction. Additional research by Stuebe and Schwarz (2010) corroborated these findings and identified additional increased risks for hypertension and hyperlipidemia. Ip et al. (2007) further clarified the findings on decreased risk of type II diabetes stating that the decreased risk of diabetes due to breastfeeding was found among women who had not previously been diagnosed with gestational diabetes. Recent findings by Xu et al. (2014) also suggested that breastfeeding may decrease the mothers risk of hospitalization due to mental health disorderes such as schizophrenia in the first year postpartum.

Infant Risks

Infants are at risk of adverse health outcomes if breast milk is not given as the primary food source during the first year of life. Stuebe (2009) noted that infants who are not breastfed are at increased risk of developing ear infections, becoming obese in childhood, developing type I and type II diabetes and dying prematurely from SIDS. Stuebe and Schwarz (2010) later found that infants who are not breastfed are at increased risk of premature death, developing infectious diseases such as *Haemophilus influenzae* and *Streptococcus pneumoniae,* and childhood cancer.

Societal Risks

Society also faces risks due to women choosing not to breastfeed both due to higher risk of preventable diseases in women and infants but also due to the medical costs associated with those diseases. Bartick and Reinhold (2010) found that the cost of not breastfeeding at optimal levels in America was $13 billion per year and resulted in 911

preventable deaths mostly among infants. A more recent study conducted by Bartick et al. (2013) further illuminated the costs of suboptimal brestfeeding rates to society and argued that costs were more than $17 billion per year. Additionally Bartick et al. (2013) noted that 4,396 premature deaths could be prevented by achieving optimal breastfeeding rates.

Maternal Characteristics and Breastfeeding Outcomes

Similar to other health behaviors, breastfeeding outcomes differ based on characteristics of the mother. Factors such as race, overweight, obesity, and socioeconomic status may all be associated with differences in breastfeeding outcomes.

Maternal Race

The race of the mother has been shown to impact breastfeeding outcomes for both initiation and duration (Allen et al., 2013). African-American women in particular have lower rates of breastfeeding initiation and duration than other racial and ethnic groups (CDC, 2014b). Although some studies suggest the gap in breastfeeding initiation and duration rates between African-American women and women in other racial and ethnic groups is decreasing, African-American women still lag far behind (Allen et al., 2013).

Despite these findings being consistent with the majority of the literature, these disparities were not found in a study conducted by (Celi, Rich-Edwards, Richardson, Kleinman, & Gillman, 2005). One potential explanation for these findings could be that the sample of women studied was 74% White and only 18% African-American (Celi et al., 2005). A study conducted by Spinelli, Endicott, and Goetz (2013) also found no disparities in breastfeeding rates between African-Americans and Whites however the

authors noted that the results may be atypical due to the larger intervention in which the study took place. The larger intervention to treat depression provided increased provider encouragement and support which the authors noted likely accounted for the increased breastfeeding rates in African-American women in the study (Spinelli et al., 2013). Conversely, Jones, Kogan, Singh, Dee, and Grummer-Strawn (2011) found that the odds of ever having been breastfed were lower among African-Americans than their White counterparts. In their study, the rates of ever breastfed for African-Americans were 21% lower than their White counterparts, 17% lower for breastfed at six months and 9% lower for breastfed at one year (Jones et al., 2011). The reasons for these disparities are not well understood however cultural beliefs and socioeconomic status could be contributors.

Socioeconomic Factors

Socioeconomic status influences breastfeeding initiation and duration rates with women of lower socioeconomic status having lower rates of both than women of higher socioeconomic status (Grummer-Strawn et al., 2006). Celi et al. (2005) specifically noted education and income as contributors to higher breastfeeding rates. Li, Darling, Maurice, Barker, and Grummer-Strawn (2005) also found that the likelihood of breastfeeding was decreased among women who received assistance through, the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). Although not a direct measure of socioeconomic status, WIC eligibility is determined partly by federal poverty guidelines (United States Department of Agriculture Food and Nutrition Service, 2014).

Maternal Overweight and Obesity

Overweight and obesity have been associated with decreased likelihood of breastfeeding initiation and increased likelihood of shorter duration of breastfeeding (Visram et al., 2013; Wojcicki, 2011). Visram et al. (2013) noted that overweight and obese women were less likely to initiate breastfeeding (aOR 0.67) in the early postpartum period in the hospital than normal weight women. In addition, the likelihood of breastfeeding upon discharge was lower in overweight and obese women (aOR 0.68) than in normal weight women (Visram et al., 2013). Visram et al. (2013) did not however examine potential associations between the outcomes of interest in this study and factors such as social support . Additionally breastfeeding practices beyond the mother's time in the hospital were not assessed as part of this study (Visram et al., 2013).

Conversely in a study that included maternal race, Kugyelka, Rasmussen, and Frongillo (2004) found no association between maternal pre-pregnancy obesity and breastfeeding outcomes among African-American women despite finding a negative association among Hispanic women. One potential consideration for this study is that the BMI used for normal weight, overweight and obese differ from other studies and the BMI categories that will be used in this study. Kugyelka et al. (2004) used a BMI range of 19.01to 26, a range of 26.01 to 29, and a range of 29.01 and above for normal weight, overweight, and obese respectively as compared to the 18.5 to 24.9, 25 to 29.9, and 30 or greater for normal weight, overweight, and obese respectively used by CDC (CDC, 2015) and WHO (WHO, 2015). Thus, the authors may have excluded some normal weight women from the analyses in addition to including overweight women in the normal

weight category which could have effected the results. In addition, the authors noted that the small sample sample size of women in each weight category may have effected the results (Kugyelka et al., 2004). As a whole, African-American women in this study breastfed at higher rates than expected based on previous studies and national rates which may also speak to potential confounding factors among this sample (Kugyelka et al., 2004).

Summary and Transition

Breastfeeding is important for maternal and infant health. Breastfeeding initiation and duration rates are lower among African-American women than women of other racial and ethnic groups putting the mothers and infants at increased risk of disease and death (Stuebe , 2009; Stuebe & Schwarz, 2010). Factors such as maternal overweight and obesity, lack of social support, and self-efficacy may be associated with poor breastfeeding outcomes (Visram et al., 2013; Allen et al., 2013; Hauff et al., 2014). Several studies have examined some of the factors hypothesized to be associated with decreased breastfeeding initiation and duration rates but few have examined the combination of social support, self-efficacy and maternal overweight and obesity on breastfeeding outcomes among African-American women.

Chapter 3 will include a discussion of the research methodology, design, the independent and dependent variables as well as covariates. In addition, the target population, sampling and sampling procedures, access to the secondary data set, instrumentation and operationalization of constructs, data analysis plan, threats to validity, and ethical procedures will be discussed.

Chapter 3: Research Method

The purpose of this study was to examine whether social support and self-efficacy could positively influence breastfeeding outcomes among overweight and obese African-American women. This study adds information about the potential benefits of self-efficacy and social support in improving breastfeeding outcomes among overweight and obese African-American women.

I used a cross-sectional quantitative approach to assess the relationship between all African-American mothers and African- American mothers who were overweight and obese and social support, self-efficacy, and breastfeeding outcomes. I used 2009 to 2011 PRAMS data from all participating locations. Addressing the gap in knowledge of the role of maternal obesity on breastfeeding outcomes among African-American mothers can help to improve interventions designed to increase breastfeeding rates in this group. This chapter will include a discussion of the research design and rationale, methodology including the population, sampling procedures and data analysis plan, threats to validity, and ethical procedures.

Research Design and Rationale

The research design for this study was a cross-sectional study design. A cross-sectional design allowed for a larger sample of women and stratification within the sample by BMI. This stratification and design was also necessary to answer the research questions and determine whether an association between the independent and dependent variables existed. I created a categorical variable that allowed for stratification of the sample into groups based on BMI and comparison within the same analysis. Although a

longitudinal design would allow for sampling at multiple time points, the cost and time required to accomplish this were prohibitive and would not add enough value to outweigh these costs. The current literature includes a mix of cross-sectional and longitudinal studies; however, a cross-sectional design was the most appropriate for the current study. The time constraints for the current study were largely limited to the time required to gain access to the PRAMS dataset as described in the following section.

Description of Variables

The study variables included the independent variables: maternal overweight, obesity, self-efficacy, and social support; and the dependent variables: breastfeeding initiation and duration in addition to covariates. Self-efficacy was also examined as a mediating variable between social support and breastfeeding outcomes. Maternal overweight and obesity were defined as having a BMI of 25.0 to 29.9 and greater than 30.0, respectively. Breastfeeding outcomes were measured using breastfeeding initiation and breastfeeding duration. Covariates for the study included maternal age and the number of previous live births which were defined in the dataset as the mother's age at time of delivery and the number of prior pregnancies resulting in an infant born alive. Additional covariates included maternal education, income, marital status, and delivery method defined in the dataset as the number of years of school completed, total income, whether the mother was married, and how the baby was born.

Research Questions and Hypotheses

RQ1: Are maternal overweight, obesity, social-support, and self-efficacy associated with breastfeeding initiation among African-American women?

$H1_{01}$: Among African-American women, being overweight or obese does not significantly influence breastfeeding initiation.

$H1_{a1}$: Among African-American women, being overweight or obese does significantly influence breastfeeding initiation.

$H2_{02}$: Among African-American women, social support does not significantly influence breastfeeding initiation.

$H2_{a2}$: Among African-American women, social support does significantly influence breastfeeding initiation.

$H3_{03}$: Among African-American women, self-efficacy does not significantly influence breastfeeding initiation.

$H3_{a3}$: Among African-American women, self-efficacy does significantly influence breastfeeding initiation.

$H4_{04}$: Among overweight and obese African-American women, social support does not significantly influence breastfeeding initiation.

$H4_{a4}$: Among overweight and obese African-American women, social support does significantly influence breastfeeding initiation.

$H5_{05}$: Among overweight and obese African-American women, self-efficacy does not significantly influence breastfeeding initiation.

$H5_{a5}$: Among overweight and obese African-American women, self-efficacy does significantly influence breastfeeding initiation.

$H6_{06}$: Self-efficacy does not mediate the association between social support and breastfeeding initiation among overweight and obese African-American women.

$H6_{a6}$: Self-efficacy does mediate the association between social and breastfeeding initiation among overweight and obese African-American women.

RQ2: Are maternal overweight, obesity, social-support, and self-efficacy associated with breastfeeding duration among African-American women?

$H7_{07}$: Among African-American women, being overweight or obese does not significantly influence breastfeeding duration.

$H7_{a7}$: Among African-American women, being overweight or obese does significantly influence breastfeeding duration.

$H8_{08}$: Among African-American women, social support does not significantly influence breastfeeding duration.

$H8_{a8}$: Among African-American women, social support does significantly influence breastfeeding duration.

$H9_{09}$: Among African-American women, self-efficacy does not significantly influence breastfeeding duration.

$H9_{a9}$: Among African-American women, self-efficacy does significantly influence breastfeeding duration.

$H10_{010}$: Among overweight and obese African-American women, there is no association between social support and breastfeeding duration.

$H10_{a10}$: Among overweight and obese African-American women, there is an association between social support and breastfeeding duration.

$H11_{011}$: Among overweight and obese African-American women, there is no association between self-efficacy and breastfeeding duration.

$H11_{a11}$: Among overweight and obese African-American women, there is an association between self-efficacy and breastfeeding duration.

$H12_{012}$: Self-efficacy does not mediate the association between social support and breastfeeding duration among overweight and obese African-American women.

$H12_{a12}$: Self-efficacy does mediate the association between social and breastfeeding duration among overweight and obese African-American women.

Methodology

Study Population

The target population for the study was non-Hispanic African-American women of childbearing age in the United States who had given birth to a live, singleton infant within the surveillance period. Women of childbearing age ranged from 18 to 44 years of age for the purposes of this study. As of 2013, there were 56,839,117 women of childbearing age in the United States of which 7, 885,757 self-identified as African-American (United States Census Bureau, Population Division, 2014). Approximately 4 million infants are born in the United States annually (CDC, 2015b).

Sampling and Sampling Methodology

The sample was drawn from the women included in PRAMS. PRAMS data were collected in 40 states and one city according to a standard established methodology that allowed for comparison across states (CDC, 2014a). The sample size for each state varied but ranged from 1,300 to 3,400 women sampled each year (CDC, 2014a). PRAMS

methodology required the use of birth certificates as the sampling frame to identify live born infants for the surveillance period in participating states (CDC, 2009a). The use of birth certificates as the sampling frame helps to ensure that the sample includes only women who have given birth to a live infant. PRAMS exclusion criteria for the sample included out-of-state births to residents, in-state births to nonresidents, birth certificates with the mother's last name missing, delayed or early processing of birth certificates, multiple gestation births, and adopted and surrogate births (CDC, 2009a).

PRAMS also used a stratified sampling methodology to ensure sufficient representation of subpopulations of interest such as racial and ethnic minorities (CDC, 2009a). In addition to PRAMS stratified sampling methodology, PRAMS oversampled in minority populations to ensure adequate representation in the data (CDC, 2013).

An a priori power analysis for logistic regression was conducted to determine what sample size (*n*) was needed for the study to have adequate power in answering the research questions. The effect size was determined based on previous research (Hauff & Demerath, 2012). G*Power 3.1 was used to calculate (*n*) for *z* test for logistic regression with a power of 0.80, H_0= 0.35, and an error probability of 0.05 (Faul, Erdfelder, Lang, & Buchner, 2007). The sample size needed was 406 African-American women.

PRAMS Data

Each PRAMS state recruited a sample of women from the eligible population of women who had given birth to a live infant within the sampling time frame (CDC, 2009b). Data were collected from the birth certificates of infants in participating states and supplemented with questionnaire data sent to the mothers via postal mail (CDC,

2009b). Selected women were contacted first via mail and then via telephone for those who had not responded by mail after several attempts by mail (CDC, 2014a). The expected response rate for PRAMS states ranged from 70% to 75% for among high-risk respondents and from 80% to 85% among low risk respondents (CDC, 2009a).

PRAMS data are available to researchers upon request if approved by CDC PRAMS staff. Researchers are required to submit a proposal to CDC PRAMS to obtain PRAMS data (CDC, 2014a).The proposal must include a completed PRAMS proposal application form, a project abstract that is 350 words or less and a signed data sharing agreement all of which must be submitted to CDC PRAMS by the close of business on the first day of the month (CDC, 2014a). Data sets will be provided for approved proposals about 6 to 8 weeks after approval (CDC, 2014a).

Instrumentation and Materials

Although PRAMS data were collected in multiple states, each state used a core survey instrument developed by CDC to collect data from selected women but may also use additional questions from a CDC and state developed survey instrument (CDC, 2013). The two survey instruments were the core survey which was the main survey instrument used by all PRAMS states and the standard survey which contained the optional questions developed by CDC in conjunction with the states (CDC, 2014a).

The first core survey instrument was developed in 1987 and has been revised every couple of years to ensure the appropriateness of the questions (CDC, 2014a). Core questions include maternal morbidity, infant healthcare, and attitudes and feelings about pregnancy (CDC, 2013).

Operationalization of Variables

The dependent variables, breastfeeding initiation and duration were operationalized in the dataset as follows. Breastfeeding initiation was determined by question 45 on the core questionnaire that asked, “Did you ever breastfeed or pump breast milk to feed your new baby after delivery?” The responses were coded as 0 for no and 1 for yes as a dichotomous categorical variable Table 1). Breastfeeding duration was determined by question 47 on the core questionnaire that asked, “How many weeks or months did you breastfeed or pump milk to feed your new baby?” The responses were coded in the data set as a categorical variable grouped by 2 month breastfeeding intervals (Table 1).

The independent variables, overweight and obesity were operationalized in the dataset as follows. Overweight and obesity were represented in the dataset as BMI which was an analytic variable calculated from two questions on the core questionnaire (CDC, 2014a). Question 4 asks, “Just before you got pregnant with your new baby, how much did you weigh?” Question 5 asks, “How tall are you without shoes?” The responses from these two questions were coded in the dataset as continuous variables and then grouped according to normal weight, overweight and obese based on BMI (Table 1).

Table 1

Operational Definitions

Name of variable	Variable coding	Range/description	Level of measurement
Dependent variables			
Breastfeeding initiation	BF5EVER	0 = No 1 = Yes	Dichotomous
Breastfeeding duration	BF5Weeks_GRP	0 = 0 weeks 1 = 1–8 weeks 2 = 9–16 weeks 3 = 17+ weeks	Categorical
Independent variables			
Maternal BMI	MOM_BMI_GRP	0 = Normal weight 1 = Overweight 2 = Obese	Categorical
Social Support	Social_Support	0.0–7.0	Continuous (sum of responses)
Self-Efficacy	Self_Efficacy	0.0–12.0	Continuous (sum of responses)
Covariates			
Maternal age grouped	MAT_AGE_GRP	1 = ≤19 2 = 20–24 3 = 25–29 4 = 30–34 5 = ≥35	Ordinal
Maternal education	MAT_ED_GRP	1= ≤11 y 2=12 y 3=13–15 y 4= ≥16 y	Categorical
Previous live births	Parity	0 = 0, 1=1+	Categorical
Income	Income_GRP	1 = <20,000 2 = 20,000–34,999 3 = 35,000–49,999 4 = ≥50,000	Ordinal
Marital status	MARRIEDF	0 = Not married 1 = Married	Nominal
Delivery method	Del_Vag	0 = No, 1 = Yes	Nominal

The independent variables, overweight and obesity, were operationalized in the dataset as maternal BMI which was a categorical variable calculated from maternal height and weight and then women were categorized as normal weight, overweight or obese. The other independent variables, social support and self-efficacy, were operationalized in the dataset as continuous variables that reflect the sum of the number of yes responses from each of the multipart questions. Social support included social support during pregnancy operationalized as a multipart question (W2) with yes or no responses to each of the following: Someone to loan me $50; Someone to help me if I were sick and needed to be in bed; Someone to take me to the clinic or doctor's office if I needed a ride; Someone to talk with about my problems (CDC, 2009b).

Social support after delivery was operationalized by question W3 and W4. Question W3 asked, "Since you delivered your new baby, who would help you if a problem came up?" with the following as choices: My husband or partner; My mother, father, or in-laws; Other family member or relative; A friend; Religious community; Someone else; No one would help me. Question W4 asked, "Since you delivered your new baby, would you have the kinds of help listed below if you needed them?" Someone to loan me $50; Someone to help me if I were sick and needed to be in bed; Someone to talk with about my problems; Someone to take care of my baby; Someone to help me if I were tired and feeling frustrated with my new baby (CDC, 2009b). Social support before and after pregnancy were combined into a single social support indicator.

Self-efficacy was the final independent variable and was operationalized in the dataset by two questions, B1 and B2. Question B2 asked, “What were your reasons for not breastfeeding your new baby?” My baby was sick and was not able to breastfeed; I was sick or on medicine; I had other children to take care of; I had too many household duties; I didn’t like breastfeeding; I tried but it was too hard; I didn’t want to; I was embarrassed to breastfeed; I went back to school or work; I wanted my body back to myself; Other (CDC, 2009b). Question B2. asked, “What were your reasons for stopping breastfeeding?” My baby had difficulty latching or nursing; Breastmilk alone did not satisfy my baby; I thought my baby was not gaining enough weight; My nipples were sore, cracked, or bleeding; It was too hard, painful, or too time consuming I thought I was not producing enough milk; I had too many other household duties; I felt it was the right time to stop breastfeeding; I got sick and was not able to breastfeed; I went back to work or school My baby was jaundiced (yellowing of the skin or whites of the eyes); Other (CDC, 2009b). Self-efficacy was reverse coded in the dataset because yes responses corresponded to more reasons for not breastfeeding or lower self-efficacy.

Covariates for the study included maternal characteristics that have been shown in the literature to impact breastfeeding outcomes. Maternal education, income, number of previous births, marital status, and delivery method were included as control variables.

Data Cleaning and Management

A subset of the larger data file was created with only the variables of interest. PRAMS data was cleaned and screened according to the PRAMS Model Surveillance Protocol including analyzing response rates and running frequencies to check for missing

data. CDC PRAMS creates three weighting variables to adjust for sample design, nonresponse, and omissions from the sampling frame (CDC, 2009a). These weighting variables were used to adjust the dataset and report findings. Women with missing data for the dependent variables were excluded from the final sample used for analysis. However, because the standard (optional) questions asked varied by state, women with missing data on the independent variables were excluded from the final sample if the state did not ask the relevant questions for those variables. A missing values analysis was conducted to determine which data were missing and if there was an association between the missing values and other variables in the data set. Missing values for continuous variables will be imputed using Estimation Maximization methods if data are missing completely at random (MCAR) (Enders, 2010).

Data Analysis Plan

The statistical analyses were performed using IBM® SPSS® Statistics 21. Simple logistic regression analyses were used to examine main effects associations for each of the hypotheses. Significance was measured at $p < .05$. A series of logistic regressions were conducted to test for associations between the independent and dependent variables together and separately. Multivariable logistic regression analysis was used to test the complex associations between the independent and dependent variables including whether or not self-efficacy mediated social support's effect on breastfeeding outcomes. Logistic regression was the most appropriate statistical analysis when the dependent variable(s) was categorical (Field, 2013).

The assumptions for logistic regression were independence of errors, linearity, multicollinearity, outliers, and normality (Stoltzfus, 2011). Independence of errors assumes that the data points were not related as in repeated measures for example. The independence of errors assumption was tested by examining the boxplots of the residuals. Linearity in logistic regression refers to the assumption that the logit-transformed outcomes have a linear relationship with the continuous predictor variables (Stoltzfus, 2011). This assumption was tested by creating an interaction term that tested the interaction between the variable and the log transformed variable (Field, 2013). If the p >.05 then the assumption had not been violated. However, violation of this assumption may be corrected by dummy coding the independent variable (Stoltzfus, 2011). This violation can also be corrected by transforming the data such as using a log transformation or a square root transformation (Field, 2013).

Multicollinearity occurs when two or more of the variables are closely related which could lead to large standard errors. Collinearity diagnostics were calculated in SPSS®. The assumption was violated if the VIF >10 and the tolerance < 0.1. This could be resolved by removing one of the correlated variables from the analysis.

The presence of outliers in the data could impact the overall model. Outliers are data points that are extremely different than expected. Outliers could be identified by looking at the residuals and comparing the overall model fit with and without the outliers included (Stoltzfus, 2011). If the model fit is affected by the outliers, the outliers could be removed. For each of the research questions, the null hypothesis was rejected where p <.05 (Table 2.)

Table 2

Summary of Statistical Analyses

Examining Main Effects Associations and Confounding		
Research Question 1: Are maternal overweight, obesity, social-support, and self-efficacy associated with breastfeeding initiation among African-American women?		
Hypothesis	**Variables**	**Statistical procedure**
$H1_{a1}$: Among African American women, being overweight or obese does significantly influence breastfeeding initiation.	IV: Maternal BMI DV: BF Initiation CV: Maternal age, Maternal education, income, number of previous births, marital status, delivery method	Unadjusted analysis examining main effects association. Adjusted multivariable logistic regression modeling to examine confounding. (OR, 95% CI)
Hypothesis	**Variables**	**Statistical procedure**
$H2_{a2}$: Among African American women, social support does significantly influence breastfeeding initiation.	IV: Social support DV: BF initiation CV: Maternal age, Maternal education, income, number of previous births, marital status, delivery method	Unadjusted analysis examining main effects association. Adjusted multivariable logistic regression modeling to examine confounding. (OR, 95% CI)
$H3_{a3}$: Among African American women, self-efficacy does significantly influence breastfeeding initiation.	IV: Self-efficacy DV: BF initiation CV: Maternal age, Maternal education, income, number of previous births, marital status, delivery method	Unadjusted analysis examining main effects association. Adjusted multivariable logistic regression modeling to examine confounding. (OR, 95% CI)
$H4_{a4}$: Among overweight and obese African American women, social support does significantly influence breastfeeding initiation.	IV: Social Support DV: BF initiation CV: Maternal age, Maternal education, income, number of previous births, marital status, delivery method	Unadjusted analysis examining main effects association. Adjusted multivariable logistic regression modeling to examine confounding. (OR, 95% CI)
$H5_{a5}$: Among overweight and obese African American women, self-efficacy does significantly influence breastfeeding initiation.	IV: Self-efficacy DV: BF initiation CV: Maternal age, Maternal education, income, number of previous births, marital status, delivery method	Unadjusted analysis examining main effects association. Adjusted multivariable logistic regression modeling to examine confounding. (OR, 95% CI)

(*table continues*)

Hypothesis	Variables	Statistical procedure
Examining mediation		
H6$_{a6}$: Self-efficacy does mediate the association between social support and breastfeeding initiation among overweight and obese African-American women.	IV: Social Support MV: Self-efficacy DV: BF initiation CV: Maternal age, Maternal education, income, number of previous births, marital status, delivery method	Unadjusted analysis examining main effects association. Adjusted multivariable logistic regression modeling to examine confounding. (OR, 95% CI)
Research Question 2: Are maternal overweight, obesity, social-support, and self-efficacy associated with breastfeeding initiation among African-American women?		
Hypothesis	**Variables**	**Statistical procedure**
H7$_{a7}$: Among African American women, being overweight or obese does significantly influence breastfeeding duration.	IV: Maternal BMI DV: Breastfeeding duration CV: Maternal age, Maternal education, income, number of previous births, marital status, delivery method	Unadjusted analysis examining main effects association. Adjusted multivariable logistic regression modeling to examine confounding (OR, 95% CI)
H8$_{a8}$: Among African American women, social support does significantly influence breastfeeding duration.	IV: Social support DV: BF duration CV: Maternal age, Maternal education, income, number of previous births, marital status, delivery method	Unadjusted analysis examining main effects association. Adjusted multivariable logistic regression modeling to examine confounding. (OR, 95% CI)
H9$_{a9}$: Among African American women, self-efficacy does significantly influence breastfeeding duration.	IV: Self-efficacy DV: BF duration CV: Maternal age, Maternal education, income, number of previous births, marital status, delivery method	Unadjusted analysis examining main effects association. Adjusted multivariable logistic regression modeling to examine confounding. (OR, 95% CI)
H10$_{a10:}$ Among overweight and obese African American women, social support does significantly influence breastfeeding duration.	IV: Social Support DV: BF duration CV: Maternal age, Maternal education, income, number of previous births, marital status, delivery method	Unadjusted analysis examining main effects association. Adjusted multivariable logistic regression modeling to examine confounding. (OR, 95% CI)

(*table continues*)

Hypothesis	Variables	Statistical procedure
$H11_{a11}$: Among overweight and obese African American women, self-efficacy does significantly influence breastfeeding duration.	IV: Self-efficacy DV: BF duration CV: Maternal age, Maternal education, income, number of previous births, marital status, delivery method	Unadjusted analysis examining main effects association. Adjusted multivariable logistic regression modeling to examine confounding. (OR, 95% CI)
Examining mediation		
Hypothesis	**Variables**	**Statistical procedure**
$H12_{a12}$: Self-efficacy does mediate the association between social support and breastfeeding duration among overweight and obese African-American women.	IV: Social Support MV: Self-efficacy DV: BF duration CV: Maternal age, Maternal education, income, number of previous births, marital status, delivery method	Unadjusted analysis examining main effects association. Adjusted multivariable logistic regression modeling to examine confounding. (OR, 95% CI)

Abbreviations: IV, independent variable; DV, dependent variable; MV, mediating variable; CV= covariates.

Threats to Validity

Internal validity of the results may be affected by participant recall bias, reporting bias, and mode bias. PRAMS data collection occurs between two and eight months after delivery which may impact the ability of participants to recall the answers to questions about early pregnancy or events that happened months prior. Reporting bias may impact internal validity if women chose not to accurately represent health behaviors or events that they perceive as negative (CDC, 2009b). In addition, though the two-mode data collection methodology can increase response rates it may contribute to bias if women who are surveyed through mail respond differently than women who are surveyed by phone (CDC, 2009b).

External validity refers to the generalizability of the results and findings to the larger population (Creswell, 2009).The results should be generalizable to the population of African-American women because the PRAMS sample population captured 78% of all births in the United States in the 40 states and New York City that participate (CDC, 2014a).

Ethical Procedures

PRAMS survey participants were protected according to human subjects' research requirements through informed consent, institutional review board review, and the release of their data in de-identified form only (CDC, 2009b). Informed consent provides potential study participants with information about the study, how their information will be used, and the knowledge that no harm will come to them if they choose not to participate (CDC, 2009b). The study proposal was submitted to the Walden University Institutional Review Board for approval. Additional confidentiality and data sharing agreements were included in the proposal to CDC PRAMS to request access to the data. The data was destroyed or returned to the CDC upon study completion as required by the CDC PRAMS Data Sharing Agreement (CDC, 2014a).

Summary and Transition

Chapter 3 provided detailed information on the study design and methods to assess the association between maternal overweight and obesity, social support, self-efficacy, and breastfeeding outcomes among African American women. Cross-sectional data from the 2009 to 2011 PRAMS survey was used to examine the association between

maternal overweight and obesity, social support, self-efficacy and breastfeeding outcomes among African American women.

Chapter 4 will provide detailed information on the data collection process and the results of the statistical analyses.

Chapter 4: Results

The purpose of this study was to examine whether social support and self-efficacy could positively influence breastfeeding outcomes among overweight and obese African-American women. This study adds information about the potential benefits of self-efficacy and social support in improving breastfeeding outcomes among overweight and obese African-American women.

The 2009 to 2011 PRAMS dataset from all participating sites with data on maternal BMI, breastfeeding outcomes, self-efficacy, and social support were used. Two research questions and 12 hypotheses were developed to examine these associations. Chapter 4 includes an overview of data collection, data analysis, descriptive statistics, univariate, bivariate, and logistic regression analyses. The chapter will conclude with a summary of the results.

Overview of Data Collection

Data for this study were obtained from CDC PRAMS by submitting an application, proposal, and data sharing agreement for review as well as submitting an application through Walden University Institutional Review Board (IRB). CDC PRAMS data were collected by each of the participating states in accordance with the PRAMS Model Surveillance Protocol (CDC, 2009a). The response rate was reported as 65% (CDC, 2014a). IRB approval was obtained and the approval number was 11-05-15-0373334. The application and proposal were submitted for review by the CDC PRAMS working group to obtain data for all participating states. Once the proposal was approved, a deidentified dataset containing 2009 to 2011 data were created by CDC PRAMS on

disc and delivered via FedEx. The disc was stored in a locked drawer to which only the researcher had access. The disc was returned to CDC PRAMS upon completion of data analysis as required by the CDC PRAMS Data Sharing Agreement (CDC, 2014a).

Data Analysis

PRAMS data were cleaned according to PRAMS Model Surveillance Protocol after a smaller subset of the PRAMS data set was created which included only the variables of interest for this study. Additional data cleaning steps in preparation for the descriptive statistical analyses, univariate, bivariate, and logistic regression analyses were conducted including checking for outliers and identifying out of range or erroneous values. One state, Vermont, declined to provide racial and ethnic data according to the five federal categories. Vermont classified participants as White/non-White. The data from this state were removed from the analyses because it was not possible to select only African-American women from the sample. Missing values analysis was conducted on the final sample after the inclusion criteria described in the descriptive statistics section below were applied. Across the 11 variables included in the analyses, the percentage of missing data ranged from 0.2% to 64.6%, although the majority of variables had less than 7% missing. Table 3 gives the percentage missing for each of the variables.

Table 3

Unweighted Percent Missing Values by Variable (n = 587)

Variable	Missing *n* (%)
Breastfeeding initiation	0 (0)
Breastfeeding duration	0 (0)
Self-efficacy	379 (64.6)
Social support	8 (1.4)
Number of previous live births	9 (1.5)
Maternal BMI	38 (6.5)
Maternal age	0 (0)
Maternal education	22 (3.7)
Income	41 (7.0)
Marital status	0 (0)
Vaginal delivery	1 (0.2)

Abbreviation: BMI, body mass index.

Little's MCAR test was conducted to assess the pattern of missing values and determine whether an association existed between the two continuous variables and the other variables in the analysis. The results were not significant for social support and self-efficacy, $\chi 2\ (2) = .46$, $p = .977$. This indicated that the data were missing completely at random. In order to preserve the sample size, and because the Little's MCAR was not significant, the missing values for social support and self-efficacy were imputed using estimation maximization.

Descriptive Statistics

The target population for the study was non-Hispanic African-American women of childbearing age in the United States who had given birth to a live, singleton infant within the surveillance. Women of childbearing age ranged from 18 to 44 years of age for the purposes of this study. The total PRAMS population for all participating states with

data included 118,067 participants. After removing data from Vermont (3,226) because race was not provided; removing women who identified as Hispanic (18,704), women who were 17 years of age or less (2,397), women who were multiple gestation (4,563), women who were not African-American (71,688), and women who had missing data on breastfeeding initiation (909) and breastfeeding duration (158), the preliminary study population was 15,603. In addition, women who were underweight (600), had a preterm birth for the most recent pregnancy (3,361), or had a low birth weight infant for the most recent pregnancy (1,400) were also excluded. Finally, women from states that did not ask both the self-efficacy and social-support questions (7,971) were excluded from the dataset. Of the remaining 587 cases in the data set representing three states, 491 had complete data for all study variables and were weighted according to the PRAMS developed weighting variable, analysis weight. The analysis weight includes weights for the sampling frame, noncoverage and nonresponse for each sample year. Descriptive statistics and analyses were then calculated. To weigh the sample according to the analysis weight noted above, a complex samples analysis plan was created in SPSS®. The plan included a variable to account for the stratified sampling design of PRAMS and a variable, called analysis weight, which accounted for noncoverage and nonresponse. Analysis weights ranged from 1.12 to 127.85. For the weighted sample, descriptive statistics for the remaining women are presented in Table 4.

Table 4

Weighted and Unweighted Descriptive Statistics by Pre-pregnancy Body Mass Index

	Total (N = 10,926)	Normal Weight (n = 5,295)	Overweight (n = 2,762)	Obese (n = 2,868)	p value
Sociodemographic characteristics					
Age (years)					.537
18–-19	887 (55)	448 (30)	282 (16)	157 (9)	
20–-24	2,947 (138)	1,541 (70)	825 (37)	580 (31)	
25–-29	3,359 (156)	1,508 (56)	675 (40)	1,176 (60)	
30–-34	2,742 (97)	1,298 (31)	695 (23)	748 (43)	
35+	990 (45)	499 (17)	283 (14)	206 (14)	
Education (years)					.155
≤11	1,583 (67)	939 (33)	282 (16)	361 (18)	
12	4,742 (184)	1,976 (68)	1,460 (53)	1,305 (63)	
13–-15	2,988 (147)	1,534 (62)	548 (31)	905 (54)	
≥16	1,612 (93)	845 (41)	471 (30)	295 (22)	
Not married	6,910 (352)	3,016 (146)	1,844 (93)	2,049 (113)	.164
Income					.892
<$20,000	6,816 (280)	3,393 (120)	1,752 (72)	1,671 (88)	
$20,000–-$34,999	2,262 (98)	1,011 (37)	584 (27)	666 (34)	
$35,000–-$49,999	714 (41)	343 (17)	124 (9)	245 (15)	
≥$50,000	1,133 (72)	547 (30)	301 (22)	284 (20)	
Health factors					
Previous live birth	6,690 (286)	2,922 (103)	1,497 (65)	2,271 (118)	.001
Vaginal delivery	8,463 (347)	4,425 (44)	2,198 (39)	1,839 (61)	.002

P<0.05 statistically significant. Chi-square measures the association between BMI and the demographic characteristics. Unweighted counts presented in parentheses.

Univariate Analysis

Weighted frequencies and percentages were calculated for each of the study variables. The majority of women (82.7%) in the study initiated breastfeeding. However, only 18.2% of women breastfed for 1 to 8 weeks and only 26.8% of women breastfed for

17 weeks or more. Weighted frequencies and percentages for breastfeeding outcomes are presented in Table 5.

Table 5

Weighted Frequencies and Percentages for Breastfeeding Outcomes (n = 10,926)

Breastfeeding outcomes	Yes n (%)	No n (%)
Breastfeeding initiation	9,035 (82.7)	1,891 (17.3)
Never breastfed or < 1 week	2,186 (20.0)	
Breastfeed 1–8 weeks	1,991 (18.2)	
Breastfed 9–16 weeks	3,817 (34.9)	
Breastfed 17+ weeks	2,931 (26.8)	

Approximately one half of the women in the study had a BMI within normal range (48.5%) were categorized as normal weight based on their BMI, 25.3% were overweight, and 26.3% were obese.

Social support ranged from a low of 0 to a high of 7 with the mean amount of social support at 3.44. Self-efficacy ranged from a low of 4 to a high of 12 with the mean self-efficacy score at 9.57.

Hypothesis Testing

Statistical Assumptions

Several statistical assumptions were tested for the logistic regressions including independence of errors, linearity, multicollinearity, outliers, and normality. Boxplots of each of the residuals were created to ensure the data points were not related and that the independence of errors assumption has not been violated. The independence of errors assumption was not violated. The assumption of linearity was tested by creating an interaction term for each continuous independent variable and the log transformed

variable. These interaction terms were entered into the complex samples logistic regression model to test for significance for both initiation (binomial regression model) and duration (multinomial regression model). The interaction terms for social support were not significant for either breastfeeding initiation (p =.460) or breastfeeding duration (p =.266) which indicated that the assumption of linearity of the logit had not been violated. The interaction terms for self-efficacy were not significant for breastfeeding initiation (p =.056) or breastfeeding duration (p =.056) indicating that the assumption of linearity of the logit had not been violated.

Multicollinearity was tested using the Variance Inflation Factor (VIF) and tolerance. VIF for all independent variables was <10 and Tolerance was > .1 so the assumption of multicollinearity was not violated. Table 6 shows the VIF and tolerance for all independent variables.

Table 6

Analysis of Multicollinearity in Independent Variables (n = 10,926)

Independent variable	Collinearity statistics	
	Tolerance	VIF
Maternal BMI	.920	1.087
Social support	.937	1.068
Self-efficacy	.984	1.016

Abbreviations: BMI, body mass index

Case-wise diagnostics were used to test for outliers in the dataset. No outliers were found.

Statistical Analysis Results

To answer the research questions and test the associated hypotheses, a series of logistic regressions using SPSS Complex Samples were conducted as recommended by CDC PRAMS. Unadjusted analyses were conducted to examine main effects associations and adjusted multivariable logistic regression was conducted to examine confounding. The results are presented as unadjusted and adjusted OR by breastfeeding outcome. Research Question 1: Are maternal overweight, obesity, social-support, and self-efficacy associated with breastfeeding initiation among African-American women?

$H1_{a1}$: Among African American women, being overweight or obese does significantly influence breastfeeding initiation.

To assess hypothesis 1_{a1}, a logistic regression analysis was conducted to assess if overweight or obesity, as measured by maternal BMI, significantly influenced whether or not a woman initiated breastfeeding.

In the unadjusted logistic regression, breastfeeding initiation was entered into the complex samples logistic regression as the dependent variable and maternal BMI was entered into the model as the independent variable. The independent variable, maternal BMI, was not found to contribute to the model (p = .156, Nagelkerke R^2 = .015) indicating that maternal BMI did not influence breastfeeding initiation (Table 7).

Table 7

All Mothers: Association Between Maternal BMI and Breastfeeding Initiation, Using Logistic Regression (n =10,926)

Breastfeeding initiation, Maternal BMI	COR (95% CI)
Normal	1.00
Overweight	.779 (.389- 1.560)
Obese	.547 (.292- 1.025)

Abbreviations: COR, crude odds ratio; CI, confidence interval; BMI, body mass index. Bolded estimates indicate statistically significant results.

H2$_{a2}$: Among African-American women, social support does significantly influence breastfeeding initiation.

To assess hypothesis *2$_{a2}$*, a logistic regression analysis was conducted to assess if social support significantly influenced whether a woman initiated breastfeeding.

In the unadjusted logistic regression, breastfeeding initiation was entered into the complex samples logistic regression as the dependent variable and social support was entered in as the independent variable. The independent variable, social support, was not found to contribute to the model (p = .113, Nagelkerke R^2 = .011) indicating that social support did not influence breastfeeding initiation (Table 8).

Table 8

All Mothers: Association Between Social Support and Breastfeeding Initiation Using Logistic Regression (n=10,926)

Breastfeeding initiation, Social support		COR (95% CI)
	Social support	.875 (.741- 1.033)

Abbreviations: COR, crude odds ratio; CI, confidence interval

$H3_{a3}$: Among African-American women, self-efficacy does significantly influence breastfeeding initiation.

To assess hypothesis *3_{a3}*, logistic regression analyses were conducted to assess if self-efficacy significantly influenced whether a woman initiated breastfeeding.

In the unadjusted logistic regression, breastfeeding initiation was entered into the complex samples logistic regression as the dependent variable and self-efficacy was entered as the independent variable. The independent variable, self-efficacy, was found to contribute to the model (p =.033, Nagelkerke R^2 = .006) indicating that self-efficacy did influence breastfeeding initiation. The estimated odds ratio favored an increase of nearly 20%, Exp (B) =1.206, 95% CI (1.016, 1.432) for breastfeeding initiation for every one unit increase in self-efficacy.

In the adjusted logistic regression, breastfeeding initiation was entered into the complex samples logistic regression as the dependent variable and self-efficacy was entered as the independent variable. The independent variable, self-efficacy, was not found to contribute to the model (p =.310, Nagelkerke R^2 = .202) indicating that self-efficacy did not influence breastfeeding initiation (Table 9).

Table 9

All Mothers: Association Between Self Efficacy and Breastfeeding Initiation Using Logistic Regression (n =10,926)

Breastfeeding initiation, Self-efficacy	COR (95% CI)	AOR (95% CI)
Self-efficacy	**1.206 (1.016- 1.432)**	1.188 (.947, 1.491)

Abbreviations: COR, crude odds ratio; AOR, adjusted odds ratio; CI, confidence interval. Bolded estimates indicate statistically significant results.

$H4_{a4}$: Among overweight and obese African-American women, social support does significantly influence breastfeeding initiation.

To assess hypothesis 4_{a4}, a logistic regression analyses was conducted to assess if social support among overweight and obese African-American women significantly influenced whether a woman initiated breastfeeding.

In the unadjusted logistic regression, breastfeeding initiation was entered into the complex samples logistic regression as the dependent variable and social support was entered in as the independent variable, after excluding cases where BMI was normal. The independent variable, social support, was not found to contribute to the model (p = .352, Nagelkerke R^2 =.005) indicating that social support did not influence breastfeeding initiation (Table 10).

Table 10

Overweight and Obese Mothers: Association Between Social Support and Breastfeeding Initiation Using Logistic Regression (n = 5,631)

Breastfeeding initiation, Social support	COR (95% CI)
Social support	.920 (.772- 1.097)

Abbreviations: COR, crude odds ratio; CI, confidence interval

H5$_{a5}$: Among overweight and obese African-American women, self-efficacy does significantly influence breastfeeding initiation.

To assess hypothesis *5$_{a5}$*, a logistic regression analysis was conducted to assess if self-efficacy among overweight and obese African-American women significantly influenced whether a woman initiated breastfeeding.

In the unadjusted logistic regression, breastfeeding initiation was entered into the complex samples logistic regression as the dependent variable and self-efficacy was entered in as the independent variable, after excluding cases where BMI was normal. The independent variable, self-efficacy, was not found to contribute to the model (p = .054, Nagelkerke R^2 = .009) indicating that self-efficacy did not influence breastfeeding initiation (Table 11).

Table 11

Overweight and Obese Mothers: Association Between Self-Efficacy and Breastfeeding Initiation Using Logistic Regression (n = 5,631)

Breastfeeding initiation, Self-efficacy	COR (95% CI)
Self-efficacy	1.264 (.996–1.604)

Abbreviations: COR, crude odds ratio; CI, confidence interval

$H6_{a6}$: Self-efficacy does mediate the association between social and breastfeeding initiation among overweight and obese African-American women.

To assess hypothesis 6_{a6}, the results of the regression analyses conducted to assess if social support and self-efficacy were independently significantly associated with breastfeeding initiation among overweight and obese African-American were used. These analyses were conducted above in hypotheses $H4_{a4}$ and $H5_{a5}$. Since there was not a statistically significant association between self-efficacy and breastfeeding initiation nor social support and breastfeeding initiation independently there will be no mediation or association.

Research Question 2: Are maternal overweight, obesity, social-support, and self-efficacy associated with breastfeeding duration among African-American women?

$H7_{a7}$: Among African American women, being overweight or obese does significantly influence breastfeeding duration.

To assess hypothesis 7_{a7}, multinomial logistic regression analyses were conducted to assess if overweight or obesity, as measured by BMI, significantly influenced whether a woman continued breastfeeding (duration).

In the unadjusted logistic regression, breastfeeding duration was entered into the complex samples logistic regression as the dependent variable and maternal BMI was entered as the independent variable. The independent variable, maternal BMI, was found to contribute to the model (p = .000, Nagelkerke R^2 =.064) indicating that BMI did influence breastfeeding duration. However the results were only significant for obese women who breastfed for either 9to16 weeks or 17 weeks or more. The estimated odds

ratio favored a decrease of nearly 60%, Exp (*B*) =.339, 95% CI (.173, .665) for a breastfeeding duration of 9 to 16 weeks for every one unit increase in obesity. The estimated odds ratio favored a decrease of more than 60%, Exp (*B*) =.406, 95% CI (.185, .891) for a breastfeeding duration of 17 weeks or more for every one unit increase in obesity.

In the adjusted logistic regression, breastfeeding duration was entered into the model as the dependent variable, maternal BMI was entered as the independent variable and the related demographic and health factors were entered as factors. The independent variable, maternal BMI, was found to contribute to the model (p = .001, Nagelkerke R^2 = .310). However the results were only significant for obese women who breastfed for either 9to16 weeks or 17 weeks or more. The estimated odds ratio favored a decrease of nearly 70%, Exp (*B*) =.286, 95% CI (.136, .599) for a breastfeeding duration of 9 to 16 weeks for every one unit increase in obesity. The estimated odds ratio favored a decrease of more than 70%, Exp (*B*) =.308, 95% CI (.135, .704) for a breastfeeding duration of 17 weeks or more for every one unit increase in obesity(Table 12).

Table 12

All Mothers: Association Between Maternal BMI and Breastfeeding Duration Using Logistic Regression (n = 10,926)

Breastfeeding duration (weeks), Maternal BMI		COR (95% CI)	AOR (95% CI)
1–8 weeks	Normal	1.000	1.00
	Overweight	1.296 (.605–2.773)	1.174 (.537–2.567)
	Obese	1.520 (.750–3.080)	1.420 (.695–2.900)
9–16 weeks	Normal	1.00	1.00
	Overweight	.701 (.322–1.524)	.677 (.311–1.473)
	Obese	**.339 (.173–.665)**	**.286 (.136– .599)**
17+ weeks	Normal	1.000	1.00
	Overweight	.627 (.240–1.635)	.664 (.245–1.800)
	Obese	**.406 (.185–.891)**	**.308 (.135–.704)**

Abbreviations: COR, crude odds ratio; AOR, adjusted odds ratio; CI, confidence interval; BMI, body mass index. Bolded estimates indicate statistically significant results.

H8$_{a8}$: Among African-American women, social support does significantly influence breastfeeding duration.

To assess hypothesis δ_{a8}, multinomial logistic regression analyses were conducted to assess if social support significantly influenced whether a woman continued breastfeeding (duration).

In the unadjusted logistic regression, breastfeeding duration was entered into the complex samples logistic regression as the dependent variable and social support was entered in as the independent variable. The independent variable, social support, was

found to contribute to the model (p = .009, Nagelkerke R^2 =.036). However the results were only significant for women who breastfed for 9 to16 weeks. The estimated odds ratio favored a decrease of nearly 25%, Exp (B) =.749, 95% CI (.628, .894) for a breastfeeding duration of 9 to 16 weeks for every one unit increase in social support.

In the adjusted logistic regression, breastfeeding duration was entered into the model as the dependent variable, social support was entered as the independent variable, and the related demographic and health factors were added in as factors. The independent variable, social support, was found to contribute to the model (p =.000, Nagelkerke R^2 = .290). However the results were only significant for women who breastfed for 9 to16 weeks. The estimated odds ratio favored a decrease of nearly 30%, Exp (B) =.702, 95% CI (.579, .850) for a breastfeeding duration of 9 to16 weeks for every one unit increase in social support.

The results suggest that African-American women in this study who had adequate social support, were less likely to breastfeed for 9 to16 weeks than if they did not have adequate social support (Table 13),

Table 13

All Mothers: Association Between Social Support and Breastfeeding Duration Using Logistic Regression (n = 10,926)

Breastfeeding duration (weeks), Social support	COR (95% CI)	AOR (95% CI)
1–8 weeks	.952 (.772–1.173)	.935 (.751–1.162)
9–16 weeks	**.749 (.628–.894)**	**.702 (.579–.850)**
17+ weeks	.918 (.728–1.159)	.812 (.635–1.037)

Abbreviations: COR, crude odds ratio; AOR, adjusted odds ratio; CI, confidence interval. Bolded estimates indicate statistically significant results.

$H9_{a9}$: Among African-American women, self-efficacy does significantly influence breastfeeding duration.

To assess hypothesis 9_{a9}, a multinomial logistic regression analysis was conducted to assess if self-efficacy significantly influenced whether a woman continued breastfeeding.

In the unadjusted logistic regression, breastfeeding duration was entered into the complex samples logistic regression as the dependent variable and self-efficacy was entered in as the independent variable. The independent variable, self-efficacy was not found to contribute to the model (p = .310, Nagelkerke R^2 = .013) (Table 14).

Table 14

All Mothers: Association Between Self-Efficacy and Breastfeeding Duration Using Logistic Regression (n = 10,926)

Breastfeeding duration (weeks), Self-efficacy	COR (95% CI)
1–8 weeks	.794 (.544– 1.159)
9–16 weeks	1.174 (.843–1.634)
17+ weeks	.935 (.767–1.140)

Abbreviations: COR, crude odds ratio; CI, confidence interval. Bolded estimates indicate statistically significant results.

$H10_{a10}$: Among overweight and obese African-American women, social support does significantly influence breastfeeding duration.

To assess hypothesis 10_{a10}, a multinomial logistic regression analysis was conducted to assess if social support among overweight and obese African-American women significantly influenced whether a woman continued breastfeeding.

In the unadjusted logistic regression, breastfeeding duration was entered into the complex samples logistic regression as the dependent variable and social support was entered in as the independent variable, after excluding cases where BMI was normal. The independent variable, social support was not found to contribute to the model (p = .321, Nagelkerke R^2 = .018) (Table 15).

Table 15

Overweight and Obese Mothers: Association Between Social Support and Breastfeeding Duration Using Logistic Regression (n = 5,631)

Breastfeeding duration (weeks), Social support	COR (95% CI)
1–8 weeks	.978 (.728–1.244)
9–16 weeks	.819 (.658–1.021)
17+ weeks	.924 (.709–1.205)

Abbreviations: COR, crude odds ratio; CI, confidence interval. Bolded estimates indicate statistically significant results.

$H11_{a11}$: Among overweight and obese African-American women, self-efficacy does significantly influence breastfeeding initiation.

To assess hypothesis 11_{a11}, a multinomial logistic regression analysis was conducted to assess if self-efficacy among overweight and obese African-American women significantly influenced whether a woman continued breastfeeding.

In the unadjusted logistic regression, breastfeeding duration was entered into the complex samples logistic regression as the dependent variable and self-efficacy was entered in as the independent variable. The independent variable, self-efficacy, was not found to contribute to the model ($p = .518$, Nagelkerke $R^2 = .009$) (Table 16).

Table 16

Overweight and Obese Mothers: Association Between Self-Efficacy and Breastfeeding Duration Using Logistic Regression (n = 5,631)

Breastfeeding duration (weeks), Self-efficacy	COR (95% CI)
1–8 weeks	.840 (.514–1.371)
9–16 weeks	1.147 (.788–1.670)
17+ weeks	.935 (.711–1.229)

Abbreviations: COR, crude odds ratio; CI, confidence interval. Bolded estimates indicate statistically significant results.

$H12_{a12}$: Self-efficacy does mediate the association between social and breastfeeding duration among overweight and obese African-American women.

To assess hypothesis 12_{a12}, the results of the regression analysis conducted to assess if social support and self-efficacy independently were significantly associated with breastfeeding duration among overweight and obese African-American. These analyses were conducted above in hypotheses $H10_{a10}$ and $H11_{a11}$. Since neither self-efficacy nor social support were significantly associated with breastfeeding duration independently there will be no mediation or association.

Based on these results the original model showing the hypothesized association between each of the independent variables and breastfeeding outcomes was revised.

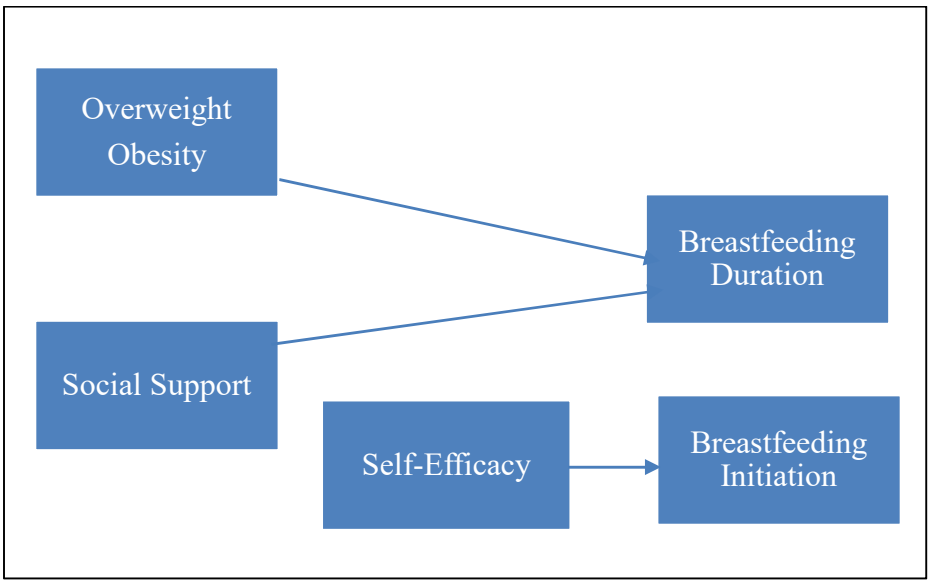

Figure 2. Revised association of overweight, obesity, social support, self-efficacy, and breastfeeding outcomes.

Summary and Conclusions

Chapter 4 provided detailed information on the data collection and management processes, sample characteristics and results of statistical tests to assess the association between maternal overweight and obesity, social support, self-efficacy and breastfeeding outcomes among African American women. Cross-sectional data from the 2009 to 2011 PRAMS survey were used to examine the association between maternal overweight and obesity, social support, self-efficacy and breastfeeding outcomes among African American women.

Results of the logistic regression analyses were mixed and showed that maternal BMI and social support were not significantly associated with breastfeeding initiation. Self-efficacy was significantly associated with breastfeeding initiation. Maternal BMI

and social support did influence breastfeeding duration except when restricting the sample to only overweight and obese women. In addition, social support was negatively associated with breastfeeding duration among obese women who breastfed 9 to 16 weeks. However, self-efficacy did not mediate the association between social support and breastfeeding initiation and duration.

Chapter 5 will provide a discussion of the findings, significance, implications for positive social change, and recommendations for further research.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this study was to examine whether social support and self-efficacy could positively influence breastfeeding outcomes among overweight and obese African-American women. This study adds information about the potential benefits of self-efficacy and social support in improving breastfeeding outcomes among overweight and obese African-American women.

Breastfeeding reduces the risk of morbidity and mortality in mothers and infants however many African-American women never breastfeed or do not continue breastfeeding to benefit (CDC, 2014b). Only 58.9% of African-American women initiate breastfeeding and only 30.1% are still breastfeeding at 6 months (Allen et al., 2013). Despite knowing the benefits of breastfeeding, this gap in breastfeeding by race remains. This study sought to better understand the association between race and breastfeeding outcomes. The nature of this study is a quantitative cross-sectional study using secondary data from the 2009 to 2011 PRAMS to examine whether social support and self-efficacy could positively influence breastfeeding outcomes among overweight and obese African American women. This was accomplished by answering the following two research questions: (RQ1) Are maternal overweight, obesity, social support, and self-efficacy associated with breastfeeding duration? (RQ2) Are maternal overweight, obesity, social support, and self-efficacy associated with breastfeeding duration?

A series of unadjusted and adjusted logistic regression analyses were conducted to determine what, if any association existed between these variables and the breastfeeding outcomes. Results of the logistic regression analyses were mixed and showed that

maternal BMI and social support were not significantly associated with breastfeeding initiation. Self-efficacy was significantly associated with breastfeeding initiation. Maternal BMI and social support did influence breastfeeding duration except when restricting the analyses to overweight and obese women. Self-efficacy was not significantly associated with breastfeeding duration. In addition, self-efficacy did not mediate the association between breastfeeding initiation and duration.

Interpretation of the Findings

Historical Breastfeeding Outcomes

The race of the mother has been shown to impact breastfeeding initiation and duration rates in the United States (Allen et al., 2013). Some studies such as the study conducted by Celi et al. (2005) did not find a statistically significant difference in breastfeeding outcomes by race, while others such as (Jones et al., 2011) noted disparities. The literature shows that African-American women are less likely than women of other racial and ethnic groups to breastfeed and that these women often do not breastfeed for as long as women of other racial and ethnic backgrounds (Allen et al., 2013). However in this study, a higher percentage of African-American women initiated breastfeeding than African-American women in the United States (82.7% compared with 58.9%) (Allen et al., 2013). This higher rate of breastfeeding initiation may explain why the findings for breastfeeding initiation were different than anticipated.

Breastfeeding duration rates were also higher in this study population than in the literature. More than a quarter (26.8%) of the women in this study breastfed for 17 weeks or more compared with 16.9% of women in the United States breastfeeding at 24 weeks

(Allen, 2013). Although not an exact comparison for 6 months breastfeeding duration, it seems likely that the percentage of women breastfeeding at 17 weeks would be relatively similar to the percent breastfeeding at 24 weeks. Even though the percentage of women who continued breastfeeding in this study is higher than in the literature, the percentages are still well below the recommendations. The Healthy People 2020 goal for breastfeeding at 6 months is 60.6% of women (U.S. Department of Health and Human Services, 2014). The specific reasons for lower breastfeeding rates among African-American women are not fully understood; however, socioeconomic status and pre-pregnancy BMI may play a role.

Maternal BMI and Breastfeeding Outcomes

The role of overweight and obesity as measured by maternal BMI, in breastfeeding outcomes was examined in this study. African-American women are more likely to be overweight or obese than women of other racial and ethnic backgrounds making maternal BMI a particular concern for breastfeeding in this population (Ogden et al., 2012). Consistent with the findings of Kugyelka et al. (2004), overweight and obesity were not significantly associated with breastfeeding initiation in this study. Similar to the potential confounding faced by Kugyelka et al. (2004), the lack of association may be due to the higher than normal breastfeeding initiation rates in this study population. In addition, a lower percentage of women (26.3%) were obese in this study compared with 56.6% of African-American women in the United States (Ogden et al., 2012). These findings contradict the results of Visram (2013) and Wojcicki (2011) who found that maternal overweight and obesity were significantly associated with a decreased

likelihood of breastfeeding initiation. Kachoria, Moreland, Cordero, and Oza-Frank (2015) also found that increasing BMI was associated with poorer breastfeeding outcomes including decreased initiation, continuation, and exclusivity.

Several studies have noted an association between maternal BMI and breastfeeding outcomes. A recent study conducted by Masho, Cha, and Morris (2015) found that the odds of not breastfeeding was higher among obese African-American women than their normal weight counterparts. The findings of this study differed with those of Masho et al.(2015) in that I found no statistically significant association between pre-pregnancy maternal BMI and breastfeeding inititation. Maternal BMI was significantly associated with breastfeeding duration in this study. As Kair and Colaizy (2015) found, obese women were less likely than normal weight women to breastfeed for longer durations.

Social Support, Self-Efficacy and Breastfeeding Outcomes

Social support and self-efficacy formed the theoretical foundation of this study. Social support involves the provision of aid or assistance to another person and can be emotional, instrumental, informational or appraisal support (Barnes, 1954; House, 1981). Social support is thought to reduce stress and help individuals enhance or build coping skills (Heaney & Israel, 2008). In theory, decreased stress and or increased coping skills to deal with stress, through social support, can lead to decreased illness and improved health outcomes (Cassel, 1976). In this case, it can lead to higher percentages of breastfeeding initiation and longer durations of breastfeeding. Self-efficacy is a complimentary theory and refers to the belief in oneself and one's ability to successfully

implement and maintain positive behavioral changes (Bandura, 1977; Bandura, 1997). Bandura (1997) proposed that self-efficacy determines not only an individual's willingness to attempt change but also their ability and willingness to persevere in the face of difficulty. Applied to this study, self-efficacy determines the women's breastfeeding initiation and if they will continue to breastfeed for longer durations.

Based on the theories of self-efficacy and social support I hypothesized that African-American women with higher self-efficacy and social support would be more likely to initiate breastfeeding and would continue breastfeeding for longer durations. The findings in this study, on the contrary, did not significantly indicate an association between social support and breastfeeding initiation among African-American women. Conversely, there was a significant association between self-efficacy and breastfeeding initiation. The lack of association between social support and breastfeeding initiation may be due to the higher than anticipated percentage of women who initiated breastfeeding in this study. These findings are inconsistent with the findings of Kornides and Kitsantas (2013) who noted that women with breastfeeding support prenatally were more likely to initiate and continue breastfeeding.

The findings for breastfeeding duration and social support in this study were significant indicating that women with adequate support were less likely to continue breastfeed for 9 to 16 weeks than women without adequate support. This finding is somewhat counterintuitive because women with more support should be empowered to breastfeed longer. Contrary to the results of Kornides and Kitsantas (2013), I found that

social support did not increase breastfeeding duration. However, the association between self-efficacy and breastfeeding duration was not significant.

Limitations of the Study

Analyzing secondary data provides an opportunity for the researcher to benefit from existing, valid and reliable data however there are limitations associated with analyzing secondary data. One of the main limitations of this study was the optional survey questions that states were not required to ask. The PRAMS survey is comprised of two sets of questions, the core questions that all states must ask and the standard questions that are optional for states. Two of the key study variables, social support and self-efficacy, relied on data collected through the standard questionnaire which only three states used for both variables. This limits the generalizability of the findings beyond the study population. Additionally, values were imputed using Expectation-Maximization (EM) for cases with missing data on self-efficacy and social support which, according to some of the literature, may result in bias and slightly overestimated standard errors (Dong & Peng, 2013). However, compared to other missing data methods, the authors found that EM provided similar regression coefficients and bias to the complete data set used in their study even with 60% missing data (Dong & Peng, 2013). Tabachnick and Fidell (2012) suggest that the pattern of missingness be considered in addition to the percent of missingess. Schroeder and Weinberg (2001) further expand upon this recommendation, noting that data missing at random (MAR) or missing completely at random (MCAR) was amenable to EM estimates and the results were unbiased. Since, the pattern of missing data for this study was MCAR, EM was used to impute the missing values.

Another limitation is the sample size. Although the PRAMS complete sample for 2009 to 2011 included 118,067 women, the final sample had considerably less (n = 587) after applying the inclusion and exclusion criteria. According to the sample size calculations undertaken this sample size is sufficient to have adequate power for most of the analyses however the sample size was further reduced to exclude normal weight women in the analyses of overweight and obese mothers.

Limitations previously noted include recall bias of the mother due to the timing of the interview after delivery. PRAMS states initially contact identified respondents within 2 to 4 months of delivery (CDC, 2013). The inability to capture breastfeeding habits for the first full year of the infant's life. Because PRAMS states begin contact with the mothers within 2 to 4 months of delivery there is the potential to only capture breastfeeding to that point for early responders. Variables known to impact breastfeeding outcomes, such as previous breastfeeding experience and breastfeeding intention were not assessed in this dataset. Women included in the study could have been HIV positive and discouraged from breastfeeding. Additionally, exclusivity was not examined in this study, nor was the timing of the introduction of other liquids and foods which may impact breastmilk supply and feeding (Grummer-Strawn et al., 2008).

Recommendations for Future Research

Future research should focus on the role of self-efficacy and social support on breastfeeding initiation among African-American women in a population with initiation rates more like those of the general population in the United States. The sample of African-American women in this study initiated breastfeeding at much higher rates than

African-American women in the general population which may have confounded the results. A prospective study that follows women from pregnancy through the first year after delivery may provide more information on duration rates. Additionally, a qualitative study that explores the reasons why overweight and obese African-American women breastfeed for shorter durations would help to identify barriers to breastfeeding in this population and possible ways to overcome those barriers to improve breastfeeding outcomes. Factors such as length of time between delivery and returning to work should also be explored as potential contributors to breastfeeding duration in this population.

Implications

Positive Social Change

Building social support and self-efficacy in this population may increase the number of overweight and obese African-American women who initiate and continue breastfeeding. This may in turn lead to better health outcomes for the mother, the infant and future generations. More immediately this research may help improve the design and implementation of public health programs to increase breastfeeding rates among African-American women. The results of this study add to the knowledge base of the effects of overweight and obesity on breastfeeding outcomes in a minority population. This information could be used to inform interventions to improve breastfeeding and weight related health outcomes by using the knowledge that an association exists between overweight, obesity, and breastfeeding outcomes. Although the relationship between self-efficacy or social support and breastfeeding outcomes among African-American women was not significant there may be some benefit to social support and self-efficacy in this

population. Additionally this information could be used to promote the inclusion of existing evidence based interventions, such as the Baby Friendly Hospital Initiative (Baby-Friendly USA, 2012) or Loving Support (Loving Support, 2015), in communities of color.

Recommendations for Practice

African-American women have poorer breastfeeding outcomes than women of other racial and ethnic backgrounds. Rates of overweight and obesity are also higher among these women. Public health practitioners and providers can help reduce this disparity by promoting healthy behaviors and choices beginning in pre-pregnancy with weight management and continuing to provide support after delivery to encourage breastfeeding initiation and duration.

Conclusions

Breastfeeding is an important way to provide infants with a healthy start in life and is the recommended method of infant feeding (World Health Organization, 2014). It can reduce the risk of illness and diseases such as otitis media, certain cancers, and SIDS among infants and their mothers (Bartick and Reinhold, 2010; Bartick, et al., 2013). However many African-American women and their infants do not receive this reduced risk because many do not breastfeed. Breastfeeding initiation and duration has been shown to be lower in this population and some studies show that higher rates of overweight and obesity may be associated with decreased initiation and duration in this population (CDC, 2014b; Masho et al., 2015). Interventions to increase self-efficacy and social support may increase breastfeeding inititation and duration among African-

American women even if the rates of overweight and obesity are higher than in other racial and ethnic groups (Kornides & Kitsantas, 2013).

This study provided mixed results which both supported and contradicted the findings of similar studies. No significant association was found between overweight, obesity, social support, and breastfeeding inititation. Self-efficacy was significantly associated with breastfeeding initiation. While surprising based on the literature to the contrary, this may be due to a higher initiation and lower overweight and obesity percentages in this sample. Consistent with the literature, overweight, obesity, and social support were significantly associated with breastfeeding duration in this study (Masho et al., 2015). However, the directionality of the association between social support and breastfeeding duration was different than anticipated with additional support leading to decreased likelihood of obese women breastfeeding for 9 to 16 weeks. Further studies may help clarify these associations as well as delve deeper into the reasons for these associations through qualitative study. Regardless, the results of this study provide a better understanding of the factors associated with breastfeeding initiation and duration among African-american women.

References

Allen, J., Li, R., Scanlon, K., Perrine, C., Chen, J., Odom, E., & Black, C. (2013). Progress in increasing breastfeeding and reducing racial/ethnic differences-United States, 2000-2008 births. *MMWR*, 62(05);77–80.

American Academy of Pediatrics. (2012). Policy statement: Breastfeeding and the use of human milk. *Pediatrics, 129*(3), e827–e841. doi:10.1542/peds.2011-3552

Baby-Friendly USA. (2012). *Baby-Friendly Hospital Inititative*. Retrieved from https://www.babyfriendlyusa.org/about-us/baby-friendly-hospital-initiative

Bandura, A. (1977). Self-efficacy:Toward a unifying theory of behavioral change. *Psychological Review*, 84(2);191–215.

Bandura, A. (1997). *Self-Efficacy: The exercise of control.* New York, NY: W.H. Freeman and Company.

Barnes, J. (1954). Class and committees in a Norweigan island parrish. *Human Relations, 7*, 39–58.

Bartick, M., & Reinhold, A. (2010). The burden of suboptimal breastfeeding in the United States: A pediatric cost analysis. *Pediatrics, 125*, e1048–e1056.

Bartick, M., Stuebe, A., Schwarz, E., Luongo, C., Reinhold, A., & Foster, E. (2013). Cost analysis of maternal disease associated with suboptimal breastfeeding. *Obstetrics and Gynecology, 122*, 111–119.

Cassel, J. (1976). The contribution of the social environment to host resistance. *American Journal of Epidemiology, 107*, 107–123.

Celi, A., Rich-Edwards, J., Richardson, M., Kleinman, K., & Gillman, M. (2005). Immigration, race/ethnicity, and social and economic factors as predictors of breastfeeding initiation. *Archives of Pediatric and Adolescent Medicine, 159*, 255–260.

Centers for Disease Control and Prevention. (2009a, April). *PRAMS Model Protocol 2009 Version.* Retrieved from http://www.cdc.gov/prams/methodology.htm

Centers for Disease Control and Prevention. (2009b). *PRAMS Phase 6 Questionnaire Topic reference.* Retrieved from http://www.cdc.gov/prams/pdf/phase6_topicsreference.pdf

Centers for Disease Control and Prevention. (2012, April 27). *Defining overweight and obesity*. Retrieved from http://www.cdc.gov/obesity/adult/defining.html

Centers for Disease Control and Prevention. (2013, August 27). *About PRAMS*. Retrieved from http://www.cdc.gov/prams/AboutPRAMS.htm

Centers for Disease Control and Prevention. (2014a, May 1). *PRAMS*. Retrieved from http://www.cdc.gov/prams/researchers.htm

Centers for Disease Control and Prevention. (2014b, October 20). *Rates of Any and Exclusive Breastfeeding by Socio-demographics Among Children Born in 2011*. Retrieved from http://www.cdc.gov/breastfeeding/data/nis_data/rates-any-exclusive-bf-socio-dem-2011.htm

Centers for Disease Control and Prevention. (2014c, November 10). *National Prematurity Awareness Month*. Retrieved from http://www.cdc.gov/Features/PrematureBirth/

Centers for Disease Control and Prevention. (2015a, February 23). *Healthy Weight- it's not a diet, it's a lifestyle*. Retrieved from http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html

Centers for Disease Control and Prevention. (2015b, March 2). *Natality-public use data, 2007-2013*. Retrieved from http://wonder.cdc.gov/natality-current.html

Creswell, J. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: Sage Publications.

DeNavas- Walt, C., & Proctor, B. (2014). *Income and Poverty in the United States: 2013.* Washington D.C.: United States Census Bureau. Retrieved from https://www.census.gov/content/dam/Census/library/publications/2014/demo/p60-249.pdf

Dong, Y., & Peng, C.-Y. (2013). Principled missing data methods for researchers. *SpringerPlus, 2*, 222–239. doi:10.1186/2193-1801-2-222

Enders, C. (2010). *Applied Missing Data Analysis.* New York, NY: The Guilford Press.

Faul, F., Erdfelder, E., Lang, A., & Buchner, A. (2007). G*Power 3: a flexible statistical power analysis program for the social,behavioral, and biomedical sciences. *Behavior Research Methods, 41*(4), 175-191.

Field, A. (2013). *Discovering Statistics Using IBM SPSS Statistics* (4th ed.). London: Sage.

Grummer-Strawn, L., Scanlon, K., & Fein, S. (2008). Infant Feeding and Feeding Transitions During the First Year of Life. *Pediatrics, 122*(Supp 2), 536- 542. doi:10.1542/peds.2008-131d

Grummer-Strawn, L., Scanlon, K., Darling, N., & Conrey, E. (2006). Racial and Socioeconomic Disparities in Breastfeeding--United States 2004. *MMWR*, 55 (12),335-339.

Hauff, L., & Demerath, E. (2012). Body image concerns and reduced breastfeeding in primiparous overweight and obese women. *American Journal of Human Biology, 24*, 339-349.

Hauff, L., Leonard, S., & Rasmussen, K. (2014). Associations of maternal obesity and psychosocial factors with breastfeeding intention, initiation, and duration. *The American Journal of Clinical Nutrition, 99*, 524-34.

Heaney, C., & Israel, B. (2008). Social networks and social support. In K. Glanz, K. Rimer, & B. Viswanath, *Health behavior and health education: Theory, research, and practice* (pp. 189- 210). San Francisco: Jossey- Bass.

House, J. (1981). *Work stress and social support.* Reading: Addison-Wesley.

Ip, S., Chung, M., Raman, G., Chew, P., Magula, N., DeVine, D., . . . Lau, J. (2007). *Breastfeeding and maternal and infant health outcomes in developed countries.* Rockville: Agency for Healthcare Research and Quality.

Jackson, S. (2010). *Statistics Plain and Simple* (2nd ed.). Belmont, CA: Wadsworth, Cengage Learning.

Jones, J., Kogan, M., Singh, G., Dee, D., & Grummer-Strawn, L. (2011). Factors associated with exclusive breastfeeding in the United States. *Pediatrics, 128*, 1117-1125. doi:10.1542/peds.2011-0841

Kachoria, R., Moreland, J., Cordero, L., & Oza-Frank, R. (2015). Trends in breastfeeding inititation, continuation, and exclusivity by maternal pre-pregnancy weight: 2004-2011. *Obesity, 23*(9), 1895-1902. doi:10.1002/oby.21151

Kair, L., & Colaizy, T. (2015). When breast milk alone is not enough: Barriers to breastfeeding continuation among overweight and obese mothers. *Journal of Human Lactation, 32(2),250-257*. doi:10.1177/08090334415605303

Kornides, M., & Kitsantas, P. (2013). Evaluation of breastfeeding promotion, support, and knowledge of benefits on breastfeeding outcomes. *Journal of Child Health Care, 17*(3), 264-273. doi:10.1177/1367493512461460

Kugyelka, J., Rasmussen, K., & Frongillo, E. (2004). Maternal obesity is negatively associated with breastfeeding success among Hispanic but not Black women. *The Journal of Nutrition, 134*(7), 1746-1753.

Li, R., Darling, N., Maurice, E., Barker, L., & Grummer-Strawn, L. (2005). Breastfeeding rates in the United States by characteristics of the child, mother, or family. *Pediatrics, 115*(1), e31-e37.

Loving Support. (2015). *Breastfeeding*. Retrieved from http://lovingsupport.org/home/

Masho, S., Cha, S., & Morris, M. (2015). Pre-pregnancy obesity and breastfeeding noninitiation in the United States: An examination of racial and ethnic differences. *Breastfeeding Medicine, 10*(5), 253-262. doi:10.1089/bfm.2015.0006

McAlister, A., Perry, C., & Parcel, G. (2008). How individuals, environments, and health behaviors interact:Social Cognitive Theory. In K. Glanz, B. Rimer, & K.

Viswanath, *Health behavior and health education: Theory, research, and practice* (4th ed., pp. 169- 188). San Francisco, CA: Jossey-Bass.

McCarter-Spalding, D., & Gore, R. (2012). Social support improves breastfeeding self-efficacy in a sample of Black women. *Clinical Lactation, 3*(3), 114-117.

Mulready-Ward, C., & Sackoff, J. (2013). Outcomes and factors associated with breastfeeding for <8 weeks among preterm infants: Findings from 6 States and NYC, 2004-2007. *Maternal and Child Health Journal, 17*(9), 1648-1657. doi:10.1007/s10995-012-1178-5

National Cancer Institute. (2014, April). *Surveillance, Epidemiology, and End Results Program*. Retrieved from http://seer.cancer.gov/statfacts/html/breast.html

Nemours Foundation. (2014). *Sudden Infant Death Syndrome (SIDS)*. Retrieved from http://kidshealth.org/parent/general/sleep/sids.html

Nichols, J., Schutte, N., Brown, R., Dennis, C., & Price, I. (2009). The impact of a self-efficacy intervention on short-term breastfeeding outcomes. *Health Education & Behavior, 36*(2), 250-259. doi:10.1177/1090198107303362

Ogden, C., Carroll, M., Kit, B., & Flegal, K. (2012). Prevalence of obesity in the United States, 2009-2010. *NCHS Data Brief*, 82,1-8.

Ogden, C., Carroll, M., Kit, B., & Flegal, K. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *The Journal of the American Medical Association, 311*(8), 806-814.

Reeves, C., Close, F., Simmons, M., & Hollis, A. (2006). Social support indicators that influence breastfeeding decisions in mothers of North Florida. *Florida Public Health Review, 3*, 1-7.

Rudestam, K., & Newton, R. (2007). *Surviving your dissertation: A comprehensive guide to content and process* (3rd ed.). Thousand Oaks, CA: Sage.

Ryff, C., Singer, B., & Dienberg Love, G. (2004). Positive health: connecting well-being with biology. *Philosophical Translations of The Royal Society: Biological Sciences, 359*, 1383-1394.

Schroeder, J., & Weinberg, C. (2001). Use of missing-data methods to correct bias and improve precision in case-control studies in which cases are subtyped but subtype information is incomplete. *American Journal of Epidemiology, 154*(10), 954-962. doi:10.1093/aje/154.10.954

Seeman, T. (2008). *Support & social conflict: Section one- social support.* Retrieved from http://www.macses.ucsf.edu/research/psychosocial/socsupp.php

Spinelli, M., Endicott, J., & Goetz, R. (2013). Increased breastfeeding rates in Black women after a treatment intervention. *Breastfeeding Medicine, 8*(6), 479-484.

Stoltzfus, J. (2011). Logistic regression: A brief primer. *Academic Emergency Medicine, 18*, 1099-1104.

Stuebe, A. (2009). The risks of not breastfeeding for mothers and infants. *Reviews in Obstetrics and Gynecology, 2*(4), 222-231.

Stuebe, A., & Schwarz, E. (2010). The risks and benefits of infant feeding practices for women and their children. *Journal of Perinatology, 30*, 155-162. doi:10.1038/jp.2009.107

Tabachnick, B., & Fidell, L. (2012). *Using Multivariate Statistics* (6th ed.). Needham Heights, MA: Allyn & Bacon.

U.S. Department of Health and Human Services. (2014). *Maternal, infant, and child Health*. Retrieved from http://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health/objectives

United States Census Bureau. (2013, July 1). *Educational attainment in the United States: 2013 detailed tables*. Retrieved fromhttp://www.census.gov/hhes/socdemo/education/data/cps/2013/tables.html

United States Census Bureau, Population Division. (2014, June). *Annual estimates of the resident population by sex, age, race, and Hispanic Origin for the United States and states: April 1, 2010 to July 1, 2013.* Retrieved from http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

United States Department of Agriculture Food and Nutrition Service. (2014, June 23). *Women, Infants, and Children (WIC)*. Retrieved from http://www.fns.usda.gov/wic/wic-eligibility-requirements

Visram, H., Finklestein, S., Feig, D., Walker, Y. A., Tu, X., & Keely, E. (2013). Breastfeeding intention and early post-partum practices among overweight and

obese women in Ontario: a selective population-based cohort study. *Journal of Maternal-Fetal and Neonatal Medicine, 26*(6), 611- 615.

Wojcicki, J. (2011). Maternal pre-pregnancy body mass index and initiation and duration of breastfeeding: a review of the literature. *Journal of Women's Health, 20*(3), 341- 347.

World Health Organization. (2003). *Global strategy for infant and young child feeding.* Retrieved from http://whqlibdoc.who.int/publications/2003/9241562218.pdf

World Health Organization. (2014, October 23). *Early initiation of breastfeeding*. Retrieved from http://www.who.int/elena/titles/early_breastfeeding/en/

World Health Organization. (2015, January). *Obesity and Overweight*. Retrieved from http://www.who.int/mediacentre/factsheets/fs311/en/

Xu, F., Li, Z., Binns, C., Bonello, M., Austin, M., & Sullivan, E. (2014). Does infant feeding method impact on maternal mental health? *Breastfeeding Medicine, 9*(4), 215-221. doi:10.1089/bfm.2013.0142

Appendix A: Selected PRAMS Questions

Birth Certificate Variables

Demographic Questions:

Maternal age [BOX]

Maternal education…unknown, 0-8 years, 9-11 years, 12 years, 13-15 years, ≥ 16 years

Previous live births…unknown [BOX]

Income: (Core Questionnaire)
54. During the 12 months before your new baby was born, what was your yearly total household income before taxes? Include your income, your husband's or partner's income, and any other income you may have received. (All information will be kept private and will not affect any services you are now getting.)
□ Less than $10,000 □ $10,000 to $14,999 □ $15,000 to $19,999 □ $20,000 to $24,999 □ $25,000 to $34,999 □ $35,000 to $49,999 □ $50,000 or more

Marital Status…….unknown, married, other

Delivery method……..delivered vaginally? Y N

Phase 6 Core Questions:

Maternal BMI Questions:

4. Just before you got pregnant with your new baby, how much did you weigh?

[BOX] Pounds OR [BOX] Kilos

5. How tall are you without shoes?

[BOX] Feet [BOX] Inches

OR [BOX] Meters

Breastfeeding Initiation:

45. Did you ever breastfeed or pump breast milk to feed your new baby after delivery,

even for a short period of time? No Yes

Breastfeeding Duration:

47. How many weeks or months did you breastfeed or pump milk to feed your baby?

[BOX] Weeks OR [BOX] Months

Less than 1 week

Phase 6 Standard Questions:

Self-efficacy:

B1. What were your reasons for not breastfeeding your new baby? Check all that apply	
My baby was sick and was not able to breastfeed	N Y
I was sick or on medicine	N Y
I was sick or on medicine	N Y
I had other children to take care of	N Y
I had too many household duties	N Y
I didn't like breastfeeding	N Y
I tried but it was too hard	N Y
I didn't want to breastfeed	N Y
I was embarrassed to breastfeed	N Y
I went back to work or school	N Y
I wanted my body back to myself	N Y
Other ≡ Please tell us:	N Y

Self-efficacy:

B2. What were your reasons for stopping breastfeeding? Check all that apply	
My baby had difficulty latching or nursing	N Y
Breast milk alone did not satisfy my baby	N Y
I thought my baby was not gaining enough weight	N Y
My nipples were sore, cracked, or bleeding	N Y
It was too hard, painful, or too time consuming	N Y
I thought I was not producing enough milk	N Y
I thought I was not producing enough milk	N Y
I had too many other household duties	N Y
I felt it was the right time to stop breastfeeding	N Y
I got sick and was not able to breastfeed	N Y
I went back to work or school	N Y
My baby was jaundiced (yellowing of the skin or whites of the eyes)	N Y
Other ≡ Please tell us:	N Y

Social support:

W2. During your most recent pregnancy, would you have had the kinds of help listed below if you needed them? For each one, circle Y (Yes) if you would have had it or circle N (No) if not. No Yes

a. Someone to loan me $50 N Y
b. Someone to help me if I were sick and needed to be in bed N Y
c. Someone to take me to the clinic or doctor's office if I needed a ride N Y
d. Someone to talk with about my problems N Y

W3. Since you delivered your new baby, who would help you if a problem came up? For each one, circle Y (Yes) if you would have had it or circle N (No) if not. No Yes

a. My husband or partner N Y
b. My mother, father or in-laws N Y
c. Other family member or relative N Y
d. A friend N Y
e. Religious community N Y
f. Someone else N Y

W4. Since you delivered your new baby, would you have the kinds of help listed below if you needed them? For each one, circle Y (Yes) if you would have it or circle N (No) if not. No Yes

a. Someone to loan me $50 N Y
b. Someone to help me if I were sick and needed to be in bed N Y
c. Someone to talk with about my problems N Y
d. Someone to take care of my baby N Y
e. Someone to help me if I were tired and feeling frustrated with my new baby N Y