The Relationship Between Perinatal Weight Stigma and Breastfeeding Outcomes: A Mixed-Methods Study

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Background/Significance: Despite compelling evidence of protective effects of breastfeeding on obesity-related morbidity in mothers and children, individuals with increased body mass indices (BMIs) have poor breastfeeding outcomes compared to those of normal weight. Sub-par breastfeeding rates among overweight and obese individuals are attributed to a multitude of physiological, psychological, and support barriers. One potential contributing factor to BMI-related breastfeeding disparities may be weight-related stigma, which surfaces during patient-professional communication and is internalized. Obstetric and perinatal healthcare professionals endorse discomfort interacting and providing health advice to individuals with BMIs ≥ 25 - who report feeling stigmatized during obstetric contacts due to weight. This communication breakdown may result in fewer opportunities for healthcare professionals to offer breastfeeding promotion and assistance, and concomitantly, less enthusiasm and greater reservations among overweight and obese parents to initiate and maintain breastfeeding. No known research currently exists examining the potential association of weight stigma (both perceived and internalized by pregnant and postpartum individuals) and breastfeeding outcomes.

Purpose: In this prospective cohort mixed methods study, we examined the relationship between weight stigma and breastfeeding outcomes among individuals with pre-pregnancy BMIs ≥25

during the perinatal period. Specifically, we: 1) examined the temporal variation of internalized weight stigma at 28-40 weeks of pregnancy and 1 month postpartum, 2) explored the predictive relationship between prenatal internalized weight stigma and breastfeeding outcomes (initiation, continuation, exclusivity) and 3) explored postpartum individual's perceptions about weight stigma experienced during healthcare professional interactions in pregnancy, labor, and postpartum and its perceived impact on their breastfeeding experience.

Methods: A purposeful sample of 110 individuals with BMIs ≥25 who planned to breastfeed were recruited for Aims 1 and 2 at 28-40+ weeks of pregnancy. Participants completed a validated weight stigma questionnaire during the third trimester and at 1 month postpartum, at which time they were also surveyed on their breastfeeding practices. Additional breastfeeding data from the birth hospitalization were collected from the electronic medical record. For Aim 1, a repeated measures t-test was used to determine if differences existed among weight stigma scores during and after pregnancy. For aim 2, we used regression analysis to examine the predictive relationship between weight stigma and breastfeeding initiation, continuation and exclusivity. For Aim 3, we conducted semi-structured telephone interviews at one month postpartum with individuals purposively selected from Aims 1 and 2 regarding their experiences with weight stigma and breastfeeding. Interviews continued until we reached data saturation. A qualitative descriptive approach was utilized in the coding and interpretation of interviews to further explore how individuals perceive weight stigma in the obstetric setting and its influence on their breastfeeding outcomes.

Implications: This study set forth the groundwork for development of nursing interventions to mitigate experienced and perceived weight stigma and promote optimal patient-professional communication and breastfeeding among overweight/obese perinatal individuals. The study had

immediate clinical implications for obstetric providers and nursing staff who may be unaware of their unconscious biases in the care of birthing individuals with high BMIs. This research has the potential to lead to improved breastfeeding rates and, consequently, improved health outcomes among overweight and obese perinatal individuals.

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Preface

This research was supported by the Robert Wood Johnson Foundation Future of Nursing Scholars Program, the University of Pittsburgh Swigart-Gold Doctoral Award for Scholarship in Nursing Ethics and the AWHONN Every Woman Every Baby Research Grant. This dissertation research would not have been possible without the encouragement, support, and expertise from my dissertation chair, Dr. Jill Demirci and my committee members Dr. Cynthia Danford, Dr. Paul Scott and Dr. Judy Chang. I would also like to acknowledge the time and dedication of the participants who chose to participate in this research study and who offered their invaluable feedback and responses during data collection. Through this research, I hope that I can honor the hours of hard work and assistance that all of these individuals have provided throughout this exciting, trying, and rewarding journey. I would also like to acknowledge and express the most sincere gratitude toward my family and friends who have been instrumental in developing the woman, nurse educator, and scientist I have become today.

1.0 Proposal Introduction

1.1 Specific Aims

Internalized weight stigma (applying negative stereotypes relating to overweight or obesity to oneself) adversely impacts overweight and obese pregnant individuals. Despite compelling evidence of protective effects of breastfeeding on obesity-related morbidity in mothers and children, individuals with increased body mass indices (BMIs) have poor breastfeeding initiation and continuation rates compared to those of normal weight. Sub-par breastfeeding rates among overweight and obese parents are attributed to many physiological, psychological, and support barriers. Obstetric healthcare professionals endorse discomfort in interacting and providing health advice to lactating parents with BMIs ≥25. In turn, obese and overweight individuals also report the perception of being stigmatized by healthcare professionals during obstetric contacts due to their weight. No known research currently exists examining the potential association of weight stigma (both internalized and perceived during encounters with healthcare professionals) and breastfeeding outcomes. It is possible weight stigma impairs patient-professional communication in the obstetric setting, resulting in suboptimal support by professionals in offering breastfeeding promotion and assistance, and concomitantly, less enthusiasm and greater reservations among overweight and obese parents to initiate and maintain breastfeeding. Since 60% of child-bearing aged individuals in the United States are overweight or obese, exploring and addressing weight stigma's influence on breastfeeding is warranted to optimize maternal and child wellbeing.

The objective of this mixed-methods research proposal was to explore the impact of internalized weight stigma on breastfeeding outcomes (rates of initiation, continuation, and exclusivity) in overweight and obese childbearing individuals and how this population perceives weight stigma during patient-professional communication. A mixed-methods approach was justified to triangulate findings on the influence of weight stigma during obstetric contacts on breastfeeding outcomes among individuals with overweight or obesity. Elaboration of quantitative data was achieved by qualitatively querying participants on their weight stigma experience during obstetric contacts and how they perceived its impact on their breastfeeding outcomes.

Specifically, we:

1.) Examined the temporal variation of internalized weight stigma at 28-40 weeks of pregnancy and 1 month postpartum. *We compared weight stigma scores on the Weight Bias Internalization Scale (WBIS) during the third trimester and at 1 month postpartum.*

2) Explored the predictive relationship between prenatal internalized weight stigma and breastfeeding outcomes (initiation, continuation, exclusivity).

We examined the association between 3rd trimester WBIS scores and breastfeeding outcomes at 1 month postpartum using binomial logistic regression.

3.) Explored postpartum individuals' perceptions about weight stigma experienced during healthcare professional interactions in pregnancy, labor, and postpartum and perceived impact on their breastfeeding experience.

Semi-structured interviews with overweight and obese individuals were conducted at one month postpartum.

This was the first study to quantitatively and qualitatively explore the association between internalized prenatal and perceived weight stigma on breastfeeding outcomes in individuals with pre-pregnancy overweight or obesity. In achieving these aims, the data will inform development of interventions to decrease internalized and perceived weight stigma through optimal patient-professional communication and to provide breastfeeding-related anticipatory guidance to overweight and obese individuals. This study also has immediate clinical implications for obstetric healthcare professionals and nursing staff that may be unaware of their unconscious biases in communicating with and caring for childbearing individuals with high BMIs. Our ultimate goal in this research trajectory is to positively influence overweight and obese parent's breastfeeding outcomes and, consequently, maternal and child health.

1.2 Background, Significance and Innovation

1.2.1 Background and Significance

A. Breastfeeding Benefits and Challenges (Including Internalized Weight Stigma) Faced by Overweight and Obese Parents. The American Academy of Pediatrics and the World Health Organization recommend six months of exclusive breastfeeding, with breastfeeding continuation for at least one to two years postpartum (American College of Obstetricians and Gynecologists (ACOG) Committee on Health Care for Underserved Women, 2013; World Health Organization, 2019). Breastfeeding is especially important for pregnant parents with overweight or obesity due to its protective effects in reducing childhood obesity in offspring (Yan, Liu, Zhu, Huang, & Wang, 2014) and its role in reducing gestational weight gain retention among obese individuals (Sharma, Dee, & Harden, 2014). Additionally, those who breastfeed

and breastfeed more intensively are less likely to develop hypertension (Stuebe et al., 2011), subclinical and clinical cardiovascular disease (Gunderson et al., 2015) and cardiovascular mortality (Natland Fagerhaug et al., 2013) – all conditions for which overweight and obese individuals are at higher risk. Despite the well-documented breastfeeding benefits for this population, overweight and obese parents are less likely to initiate breastfeeding and continue breastfeeding, and are more likely to supplement breast milk feeds with complementary foods sooner than those of normal weight (Grube et al., 2016; Guelinckx, Devlieger, Bogaerts, Pauwels, & Vansant, 2012; Makela, Vaarno, Kaljonen, Niinikoski, & Lagstrom, 2014; Verret-Chalifour et al., 2015). Lower breastfeeding rates among overweight/obese parents may be partially attributed to a metabolic profile predisposing them to increased risk of delayed onset of lactogenesis II (longer time to mature milk production) and insulin resistance—both associated with delayed and/or insufficient milk production. Delayed and/or insufficient milk production may discourage parents from breastfeeding, leading to early breastfeeding cessation (Nommsen-Rivers, 2016; Preusting, Brumley, Odibo, Spatz, & Louis, 2017). Psychosocial barriers also contribute to poor breastfeeding outcomes among parents with increased BMIs. Overweight and obese individuals report stigmatizing and suboptimal communication with obstetric and perinatal professionals and report feeling uncomfortable when breastfeeding in public (Lindhardt, Rubak, Mogensen, Lamont, & Joergensen, 2013; Zimmerman, Rodgers, O'Flynn, & Bourdeau, 2019). Obese parents are less likely to be exposed to pro-breastfeeding practices (lower odds of receiving breastfeeding information, higher odds of pacifier use) during the postpartum hospitalization (Kair & Colaizy, 2016). Additionally, two qualitative studies conducted in Sweden and United States, respectively, documented that obese respondents felt socially and physically “awkward” when breastfeeding around others, and faced “mental strain” when

exposing the body in public to breastfeed (Claesson, Larsson, Steen, & Alehagen, 2018; McKenzie, Rasmussen, & Garner, 2018). Other psychosocial challenges include higher degrees of body image dissatisfaction compared to normal weight breastfeeding parents (Hauff & Demerath, 2012; Swanson, Keely, & Denison, 2017; Zanardo et al., 2014; Zimmerman, Rodgers, O'Flynn, & Bourdeau, 2018). Along with its deleterious influence on breastfeeding, research indicates that experiencing weight stigma is related to greater postpartum depression symptoms at one month after delivery and greater gestational weight gain (A. C. Incollingo Rodriguez, Tomiyama, Guardino, & Dunkel Schetter, 2019). This finding has important implications within the obstetric setting, considering that 60% individuals of child-bearing age in the United States are overweight or obese (Bever Babendure, Reifsnider, Mendias, Moramarco, & Davila, 2015). While more attention has been placed on physiologic breastfeeding barriers experienced by overweight and obese individuals, psychosocial challenges (such as weight stigma) are under-investigated. The first two aims of our study focus on *internalized weight stigma* (reduction of one's self-worth or confidence due to applying negative weight-based stereotypes to oneself) as a potential factor contributing to poor breastfeeding outcomes among individuals with pre-pregnancy overweight or obesity.

B. Interactions between Obstetric Healthcare Professionals and Overweight/Obese Pregnant Patients Represent Opportunities to Positively Influence Breastfeeding Uptake. In a national, longitudinal cohort study in the United States, breastfeeding support from an obstetric healthcare provider (physician, midwife, advanced practice registered nurse) or other obstetric healthcare professional (e.g., staff nurses) significantly increased the probability of breastfeeding initiation among obese individuals (Jarlenski et al., 2014). In fact, pregnant patients who positively view communication with midwives are more likely to participate in health promotion

behaviors in late pregnancy (Nicoloro-SantaBarbara et al., 2017). Additionally, breastfeeding-related counseling and support from healthcare professionals is associated with increased rates of initiation (Lu, Lange, Slusser, Hamilton, & Halfon, 2001), duration and exclusivity (U.S. Preventative Task Force, 2008). However, just 2% of obese individuals recalled having a discussion with a healthcare professional on weight-related breastfeeding challenges (Hawkins et al., 2019).

C. Evidence Suggests there may Weight Stigma on the Part of Healthcare Professionals When Breastfeeding-related Conversations occur, Which Individuals are able to Perceive. Weight stigma is a communication barrier between healthcare professionals and overweight/obese pregnant individuals, with obese pregnant patients reporting perceptions of stigmatizing behavior by professionals based on their weight (Furness et al., 2011; Grohmann et al., 2012; Lindhardt et al., 2013; Schmied, Duff, Dahlen, Mills, & Kolt, 2011). Researchers in Denmark conducted interviews with 16 pregnant individuals considered obese prior to pregnancy about their encounters with obstetric healthcare professionals. Respondents reported feeling as though healthcare professionals "singled them out" based on their weight; they also felt that they were met with negative attitudes and judgements which increased feelings of vulnerability. Individuals perceived healthcare professionals used an accusatorial tone and vague communication - causing a sense of uneasiness. Some also felt the pregnancy was overshadowed by their weight status, as respondents noted strained communication and felt humiliated or stigmatized during obstetric interactions (Lindhardt et al., 2013).There is no evidence, however, exploring individual's perceptions of weight stigma in the postpartum period. Thus, we addressed this gap through this dissertation research.

Also, healthcare professionals view offering breastfeeding care to obese parents as more challenging, time consuming and physically demanding compared to those of normal weight (Garner, Ratcliff, Devine, Thornburg, & Rasmussen, 2014). This may account for the absence of breastfeeding-related counseling or discussions between overweight and obese pregnant individuals and their obstetric providers – which may be indicative of weight stigma in itself (Biro et al., 2013; Furness et al., 2011; Grohmann et al., 2012; Stengel, Kraschnewski, Hwang, Kjerulff, & Chuang, 2012; M. L. Wang, Arroyo, Druker, Sankey, & Rosal, 2015; Waring et al., 2014). The lack of breastfeeding related conversations in the literature is not isolated to those with BMIs ≥ 25. A study that analyzed audio-recordings of initial prenatal visits between obstetric clinicians and pregnant individuals found that breastfeeding was discussed infrequently (addressed in 29% of visits) and was addressed in an ambivalent manner (Demirci et al., 2013). If/when breastfeeding-related conversations occur, healthcare professionals' counseling may be infrequent and lack clarity, as evidenced by general research on weight stigma during obstetric communication with patients who have pre-pregnancy overweight or obesity (Furness et al., 2011).

Additionally, in one cross-sectional survey study with 96 obstetric care providers, including residents, fellows, family physicians, midwives, nurses and registered dieticians, respondents agreed that they made negative assumptions about a pregnant patient's character or intelligence based on her weight (Grohmann et al., 2012). Similarly, Schmied et al. (2012) interviewed 34 nurse midwives and found a high degree of intolerance and discomfort when caring for obese pregnant patients (Schmied et al., 2011). Healthcare professionals stated they lacked confidence in counseling obese pregnant individuals, felt it was embarrassing or difficult talking with "large women," were reluctant to introduce the topic of weight with obese patients

for fear of "offending them" and relied on vague and indirect messages (Furness et al., 2011; Smith, Cooke, & Lavender, 2012).

General habits of professionals when communicating with overweight/obese pregnant patients were examined by Washington-Cole et al. (2017). A cross-sectional secondary data analysis was conducted to determine the association of body weight with healthcare professional communication during prenatal care. It was discovered that healthcare professionals used fewer concern (i.e., "I am worried about your high blood pressure") and approval statements when interacting with overweight versus normal weight patients. Individuals with higher BMIs were also asked fewer lifestyle questions during prenatal care visits. Therefore, the quality and nature of perinatal conversations between individuals with BMIs ≥25 and healthcare professionals needs to be further explored in light of the suboptimal and discrepant communication described in the literature. The third aim of our study focuses on *perceived weight sigma during patient-professional communication* as a potential factor contributing to the lower breastfeeding rates observed within our target population (Argan, Pryor, Reeder, & Stutterheim, 2013).

D. Overweight and Obese Individuals Interact with Other Healthcare Professionals in the Perinatal Period who have the Potential to Influence Breastfeeding Outcomes, and who may Contribute to Perceived Weight Stigma in the Obstetric Setting. In addition to obstetric care providers**,** individuals with pre-pregnancy overweight or obesity interact with additional healthcare professionals in the perinatal period who can influence breastfeeding outcomes. Pediatric care providers, in particular, are poised to influence breastfeeding outcomes regardless of BMI due to the timing of their interactions with individuals in the postpartum period. For instance, pediatric providers typically see newborns frequently within the first days and weeks of life in both the birth hospital and outpatient settings. This early postpartum period

is also when individuals are most likely to report breastfeeding problems such as insufficient milk supply, difficulty latching, and pain (Wagner, Chantry, Dewey, & Nommsen-Rivers, 2013), which are all associated with introduction of formula and reduced duration of breastfeeding (Ware & Piovanetti, 2020). Recognition of these commonly cited breastfeeding problems at pediatric visits may prevent early breastfeeding cessation and improve the overall breastfeeding experience of lactating parents. Along with direct breastfeeding support and assistance, perceived breastfeeding attitudes and beliefs of pediatric providers have been shown to influence infant feeding behaviors. In fact, individuals who perceived that their pediatric care provider favored exclusive breastfeeding had higher odds of breastfeeding exclusivity at 1 and 3 months postpartum compared to those who perceived their pediatric provider was neutral about infant feeding type (Ramakrishnan, Oberg, & Kirby, 2014). Pediatric providers also have the potential to positively influence breastfeeding outcomes by engaging in breastfeeding related conversations. Postpartum individuals who were able to discuss their breastfeeding problems and obtain clarification on breastfeeding issues with pediatric providers had a longer duration of any breastfeeding compared to those who did not (Bano-Pinero, Martinez-Roche, Canteras-Jordana, Carrillo-Garcia, & Orenes-Pinero, 2018). While the influential role of pediatric care providers in promoting breastfeeding is evident, the existence and nature of weight stigma during encounters between pediatric providers and individuals with BMIs ≥ 25 is unclear.

Lactation consultants are also healthcare professionals who commonly interact with lactating parents during the perinatal period and provide antenatal breastfeeding education and postpartum support. A systematic review of randomized controlled trials involving lactation consultants and counselors demonstrated increased breastfeeding initiation, continuation and exclusivity rates (Patel & Patel, 2016) among individuals who obtained breastfeeding care from

these healthcare professionals. The ability of International Board-Certified Lactation Consultants (IBCLCs) to positively influence breastfeeding initiation and exclusivity rates was once again emphasized in a scoping review of the literature exploring the impact of IBCLCs on breastfeeding experiences and outcomes of parents in the postpartum period (Haase, Brennan, & Wagner, 2019). The specialized training and knowledge of IBCLCs has the potential to increase breastfeeding outcomes and subsequently promote maternal and infant wellbeing irrespective of pre-pregnancy BMI (United States Lactation Consultant Association, 2019). However, no evidence currently exists exploring the presence or nature of weight stigma during contacts between individuals with BMIs ≥ 25 and lactation consultants/counselors.

Registered nurses also have frequent contacts with perinatal individuals, especially during the immediate postpartum period. In fact, in the United States, 98% of births occur in hospitals where nurses are the primary healthcare professionals supporting individuals from labor and delivery through discharge (Association of Women's Health, 2015). Nurses are a key element in promoting best breastfeeding practices within hospitals and in implementing the Ten Steps to Successful Breastfeeding, a WHO-led initiative to promote breastfeeding outcomes (World Health Organization, 2003). Hospitals that implement these nurse-driven practices experience increased breastfeeding initiation and exclusivity rates compared to those who do not (Weddig, Baker, & Auld, 2011). Additionally, postpartum individuals who received home visits from a registered nurse through 6 months postpartum were more likely to continue any breastfeeding at 6 months postpartum compared to those who did not (Mejdoubi et al., 2014). Despite the established ability of registered nurses to positively influence breastfeeding outcomes, one qualitative study found registered nurses felt ambivalent when providing breastfeeding support to postpartum individuals. Registered nurses reported perceptions of

having very little to no influence on maternal infant feeding decisions and viewed infant feeding as a personal decision made by the individual (Radzyminski & Callister, 2015). There is no current literature explicating the nature or extent of breastfeeding related conversations between individuals with BMIs ≥ 25 and registered nurses during the perinatal period. This, coupled with the lack of evidence exploring the presence or nature of weight stigma during contacts between individuals with BMIs ≥ 25 and pediatric care providers and lactation consultants/counselors – justifies the need for our proposal. Therefore, we addressed this gap in the literature by qualitatively exploring how individuals perceive weight stigma when interacting with perinatal healthcare professionals (including pediatric providers, lactation consultants and registered nurses) and its perceived impact on their breastfeeding outcomes.

1.2.2 Innovation

This study generated preliminary data (e.g., reliability/validity of measures within target population, effect sizes) to determine the impact of weight stigma on breastfeeding outcomes. This study provided novel accounts of how overweight and obese individuals perceive weight stigma when communicating with healthcare professionals and its influence on their breastfeeding outcomes. In turn, this line of research will facilitate the eventual development and implementation of interventions designed to enhance patient-professional communication in the obstetric setting and increase breastfeeding rates among overweight/obese individuals. This dissertation study expanded and challenged our current understanding of breastfeeding barriers experienced by overweight and obese individuals. To our knowledge, this study was:

- The first study to quantitatively measure internalized weight stigma among obstetric patients with pre-pregnancy overweight or obesity.

- The first study exploring the potential influence of internalized weight stigma on breastfeeding outcomes in individuals with pre-pregnancy overweight or obesity.
- The first study using qualitative methodology to query individuals on how they have perceived or experienced weight stigma during patient-professional communication and its impact on their breastfeeding outcomes.

1.3 Preliminary Studies

To gain a better understanding of weight stigma in the obstetric setting, the principal investigator (PI) completed three manuscripts pertaining to the dissertation study. The preliminary research activities summarized in this section provided insight to the existence and significance of weight stigma in the obstetric setting and aided the conceptualization of weight stigma related to pregnancy. The first study, a scoping review of communication practices between healthcare professionals and pregnant individuals with overweight or obesity, directly informed conceptualization of this proposal and identified a gap (lack of evidence on the influence of weight-based discrimination on infant feeding behavior) in the literature the dissertation study addressed. The PI also conducted a concept analysis to more fully operationalize and describe weight stigma in relation to pregnancy. Lastly, in conjunction with the dissertation chair, the PI completed a secondary data analysis of a breastfeeding dataset from a clinical trial to determine the influence of BMI on breastfeeding outcomes among primiparous individuals.

1.3.1 Communication Practices of Healthcare Professionals when Caring for Overweight/Obese Pregnant Women: A Scoping Review (Manuscript #1) – Published in *Patient Education and Counseling*

Purpose: The purpose of this review was to synthesize research on communication practices between healthcare professionals and overweight and obese pregnant individuals.

Sample: Of 1,100 titles evaluated for relevance, the full text of 25 articles were reviewed. Eleven of the 25 fully reviewed articles were excluded because they were either not original research or did not address communication practices and experiences of healthcare professionals in counseling overweight or obese pregnant individuals. Fourteen articles met inclusion criteria and were included in the review.

Methods: The search strategy and study selection was informed by PRISMA guidance on conducting and reporting scoping reviews. Scoping reviews are especially useful to summarize findings from research studies with diverse methodologies, to identify gaps in the literature before embarking on future, related research and to determine what is known about a phenomenon of interest (Tricco et al., 2018). Study quality was assessed by examining methodological rigor and the strengths and limitations of each study. Synthesis of search results involved: a) comparisons between studies according to setting, purpose and outcome measures, study design and sample, results and limitations/study quality; and b) organization of individual study results into common categories/themes. The process of synthesizing findings was aided by use of a comparative table. The table guided our final evaluation of what is currently known, what knowledge gaps remain, and clinical and research implications regarding communication between overweight/obese pregnant patients and healthcare professionals.

Results: Three cross-cutting themes for the reviewed articles were identified: (a) topics addressed during encounters, (b) healthcare professionals' comfort/confidence, knowledge and methods in communicating with overweight/obese pregnant individuals, and (c) overweight/obese pregnant individual's experiences in communicating with healthcare professionals.

Discussion: This review revealed a lack of depth, consistency, and accuracy in weight-related counseling of overweight/obese pregnant patients by their healthcare professionals. Overweight/obese individuals tended to receive weight gain recommendations exceeding current IOM guidelines, while pregnant individuals without overweight or obesity received accurate weight gain advice. Both professionals and patients experience feelings of discomfort and stigmatization during communication, solidifying the existence of weight stigma in the obstetric setting. Healthcare professionals desire additional training and education to more confidently and effectively manage the care for obstetric patients with high BMIs. Of note, breastfeeding was not a topic discussed or mentioned by the healthcare professionals when interacting with overweight and obese pregnant individuals.

Implications of findings to the proposed dissertation study. This scoping review solidified the existence and significance of weight stigma in the obstetric setting. Additionally, through this scoping review, the PI discovered a lack of breastfeeding-related conversations between healthcare professionals and pregnant individuals with overweight of obesity – bringing into question the role weight stigma has on breastfeeding outcomes within this vulnerable population. This study led to further investigation into the concept of weight stigma related to pregnancy by informing development of the second manuscript, a concept analysis to more fully

address weight stigma as a barrier to effective patient-professional communication and breastfeeding uptake and maintenance.

1.3.2 Weight Stigma Related to Pregnancy: Concept Analysis - Published in *Advances in Nursing Science*

In the scoping review, we found that weight stigma in the obstetric setting is a significant, unexplored issue leading to suboptimal patient-professional communication. Additionally, through this preliminary research, we noted a complete lack of breastfeeding-related conversations between overweight/obese pregnant individuals and healthcare professionals in the included studies. The weight stigma experienced by overweight/obese pregnant individuals and the absence of breastfeeding-related counseling noted in this preliminary research may negatively influence breastfeeding outcomes of this prevalent patient population. Before exploring the impact of weight stigma on breastfeeding outcomes, the PI completed a concept analysis to more fully conceptualize weight stigma related to pregnancy. This concept analysis was imperative as we proceeded with our innovative program of research seeking to explore the influence of weight stigma on breastfeeding outcomes.

Theoretical Framework: We followed Walker and Avant's concept analysis methodology using an iterative approach to ensure a robust and conceptually sound definition of weight stigma related to pregnancy.

Background/Purpose: Weight stigma - discrimination or stereotyping based on weight, routinely surfaces within the maternal-child health literature and is increasingly prevalent in the obstetric setting, as the majority (60%) of reproductive-aged individuals in the country are overweight or obese. Weight stigma exerts negative consequences on pregnant and recently-

pregnant individuals including increased incidence of postpartum depression symptoms and excessive gestational weight gain. Current literature suggests pregnant patients with overweight and obesity experience weight stigma during patient-professional communication. Yet, a universally accepted definition of weight stigma related to pregnancy has not been identified. The purpose of this concept analysis is to delineate the concept of weight stigma as it applies to pregnant and postpartum individuals.

Methods: Following the 8-step method proposed by Walker and Avant, all uses of the concept were identified, defining attributes were determined and a model and "other" cases were identified. Then, antecedents and consequences of weight stigma related to pregnancy were identified prior to defining empirical referents.

Results: Weight stigma related to pregnancy has yet to be defined by the scientific community, however researchers and organizations offer definitions of the general concept of weight stigma. Using these definitions and findings from the maternal child health literature, we identified four defining attributes of weight stigma related to pregnancy: a) it is directed toward pregnant or postpartum persons with overweight or obesity, b) stereotyping, c) social devaluation and d) alienation. All four of these attributes must be present for weight stigma related to pregnancy to exist.

Conclusions: Weight stigma related to pregnancy is an under-investigated topic which warrants further exploration due to the well-documented deleterious effects of weight stigma in the general population. Recognizing and addressing personal biases will improve quality of care and optimize maternal and infant wellbeing. To mitigate weight stigma related to pregnancy and its maternal and infant consequences, nurses should offer patient education and health behavior counseling void of biases.

Implications of findings to the proposed dissertation study. In conducting this concept analysis, we developed a novel definition for weight stigma related to pregnancy which informed creation of the instruments and interview guides for the dissertation research. In doing so, our data collection instruments are informed by the literature and adequately capture the concept of interest (internalized weight stigma related to pregnancy).

1.3.3 Trajectories of Breastfeeding Exclusivity and Perceived Insufficient Milk and their Association with Prenatal Body Mass Index among Primiparous Individuals

To gain familiarity and experience working with clinical breastfeeding data, the PI completed a secondary quantitative data analysis using a dataset obtained from her mentor, Dr. Jill Demirci. Through this research, the PI conducted a binomial logistic regression to determine the predictive relationship between pre-pregnancy BMI and breastfeeding exclusivity group membership. Also, in completing this study, the PI had the opportunity to gain additional insight and evidence regarding the potential influence of BMI on breastfeeding outcomes. This analysis used a novel analytic technique, group-based trajectory modeling, which has seldom been used in the breastfeeding literature - a novel contribution to this area of research.

Purpose: To explore breastfeeding exclusivity and perceived insufficient milk (PIM) trajectories among primiparous individuals and whether BMI predicts trajectory group membership. To this end, we first 1) defined distinct trajectories of breastfeeding exclusivity and PIM over the first eight weeks postpartum, and then 2) examined whether pre-pregnancy maternal BMI predicted trajectory group membership for breastfeeding exclusivity and PIM over time.

Aims: Increased maternal body mass index (BMI) is associated with reduced breastfeeding exclusivity and perceived insufficient milk volume (PIM). We explored trajectories of

breastfeeding exclusivity and PIM over the first 8 weeks postpartum among first-time mothers and their association with pre-pregnancy BMI.

Methods: We surveyed 122 primiparous individuals (mean age 28.7±5.3 years; 75% white) with prenatal intention to exclusively breastfeed about their breastfeeding patterns and perception of insufficient breast milk at 1, 2, 5 and 8 weeks postpartum. Group-based trajectory modeling was used to classify individuals into breastfeeding exclusivity and PIM trajectory groups. Logistic regression was used to explore the predictive relationship between pre-pregnancy BMI and breastfeeding exclusivity and PIM trajectory group memberships.

Results: We identified two distinct trajectories for both breastfeeding exclusivity and PIM. For breastfeeding exclusivity, one trajectory group (n=60, 49% of sample) had low initial probability of exclusive breastfeeding, with a linear decline in likelihood over time. The other trajectory group (n=62, 51% of sample) had high initial probability of exclusive breastfeeding which remained constant over the four time points. For PIM, one trajectory group (n=41, 34% of sample) had consistently high probability of endorsing PIM at each assessment, while the other trajectory group (n=81, 66% of sample) had consistently low probability of endorsing PIM over time.

Pre-pregnancy BMI did not predict breastfeeding exclusivity ($X^2(1)=2.8$, p=.094) or PIM ($X^2(1)=0.72$, p=.397) group membership.

Conclusion: Breastfeeding exclusivity and PIM trajectories appear to be relatively stable phenomena in the postpartum period among first-time parents intending to breastfeed, without a clear association with pre-pregnancy BMI. These findings reify the importance of lactation

support aimed at preventing—rather than rectifying, early formula supplementation and milk supply problems.

1.4 Methods

1.4.1 Design

This was a mixed-methods, prospective cohort pilot study with a convergent design to explore the influence of internalized and perceived weight sigma on breastfeeding outcomes among individuals with pre-pregnancy overweight or obesity. The quantitative and qualitative data collection were conducted concurrently and true to the paradigmatic assumptions of each method to maintain the integrity and unique contribution of each to the overall study. We analyzed the quantitative and qualitative data separately. We then merged our quantitative and qualitative data to provide a more complete understanding of internalized and perceived weight stigma's influence on breastfeeding outcomes (see section 1.4.6.1 Mixed Methods).

This was the first study to incorporate a mixed-methodology approach to explore internalized weight stigma's influence on breastfeeding outcomes in overweight and obese individuals. We used quantitative data (BMI, WBIS scores, breastfeeding outcomes) in our maximum variation sampling framework when conducting the semi-structured telephone interviews. In turn, we gained a broad perspective of overweight and obese individual's perceptions of weight stigma during obstetric contacts, and its influence on their breastfeeding outcomes. A qualitative descriptive approach provided a broad, exploratory and descriptive account of how individuals experience and perceive weight stigma when interacting with obstetric healthcare professionals, and its influence on their breastfeeding outcomes. Qualitative

description is especially useful in mixed-methods research (Neergaard, Olesen, Andersen, & Sondergaard, 2009) and when exploring a new, or under-investigated phenomenon (Sandelowski, 2000), such as weight stigma and breastfeeding, which we examine in this study.

For Aims 1 and 2, we administered two surveys. Survey one was administered during the third trimester of pregnancy and include demographics and the Weight Bias Internalization Scale (WBIS). Survey two was administered at 1 month postpartum and contained items addressing breastfeeding outcomes (initiation, duration, exclusivity) and the WBIS. We collected additional data known to influence breastfeeding outcomes via the prenatal and birth hospital electronic medical record. The qualitative arm (Aim 3) used semi-structured postpartum interviews to explore how individuals perceived weight stigma during interactions with healthcare professionals during the perinatal period and its influence on their breastfeeding experience with a subset of study participants purposively sampled from Aims 1 and 2. Employing a mixed-methods design offers additional depth when studying a phenomenon of interest (weight stigma) that cannot be achieved through quantitative means alone. We also used quantitative data (WBIS scores, BMI, breastfeeding outcomes) from Aim 2 as part of our maximal variation sampling framework for Aim 3.

Theoretical Framework: The study is informed by Life Course Theory, previously used as an explanatory framework for breastfeeding behavior among a large, nationally representative cohort of individuals in the United States (Crosnoe, 2018; Pitonyak, Jessop, Pontiggia, & Crivelli-Kovach, 2016). This theory posits that health behaviors (including breastfeeding outcomes of initiation, continuation and exclusivity) are influenced by cumulative multifactorial determinants (biological, social, economic, etc.) and the unique life trajectory of an individual (Halfon, Larson, Lu, Tullis, & Russ, 2014). Time is an important concept in this theory, with

events which occur during sensitive/critical periods bearing more heavily on later behavior. We suggest that changes in internalized weight stigma and stigmatizing encounters with healthcare professionals during pregnancy represent critical periods with the potential to shape an individual's perception, motivation, and eventual breastfeeding outcomes.

1.4.2 Setting for all Study Aims

Clinical Recruitment Site (Magee-Womens Hospital of UPMC (MWH): The University of Pittsburgh and UPMC have a well-established collaborative relationship, and together, are recognized as national leaders in healthcare innovation, delivery, and a hub for cutting-edge biomedical research. MWH prenatal clinics served as the primary recruitment site for pregnant individuals in the study. MWH is the region's largest maternity hospital and referral center; approximately 10,000-11,000 new obstetric patients of diverse racial, ethnic and cultural backgrounds are seen each year. Additionally, Dr. Judy Chang (obstetrician for MWH and co-investigator) is affiliated with the MWH clinic, which facilitated the recruitment process.

1.4.3 Sample and Recruitment

1. Sample Aim 1 and Aim 2: We planned to recruit 110 individuals. Inclusion criteria were: a) ≥18 years of age, b) in the third trimester (28-40+ weeks gestation), c) pre-pregnancy overweight or obesity, (d) plan to breastfeed, e) able to speak and read the English language and independently complete the Weight Bias Internalization Scale (WBIS), and f) provide informed consent. Determination of sample size was informed by recommendations suggesting a 10:1 ratio for respondents-to-items when assessing psychometric properties of an instrument (WBIS) within a population (Nunnally, 1978) as well as funding and time constraints. Given the

longitudinal study design, an attrition rate of 20% was anticipated (n=22), yielding approximately 88 subjects completing a one-month postpartum survey. Using logistic regression, 88 subjects will detect an odds ratio (effect size) for breastfeeding exclusivity as small as 0.48 at 80% power (α=.05).

2. Sample Aim 3: Individuals were purposively selected from Aim 1 and Aim 2 for diversity using maximum variation sampling (e.g., in demographics, breastfeeding practices, WBIS scores in pregnancy). Semi-structured telephone interviews were conducted with individuals at 4-6 weeks postpartum to ensure subjects gained adequate patient-professional communication experience to provide information-rich interview content. Based on available literature describing general experiences of overweight and obese individuals when communicating with healthcare professionals during pregnancy (Furness et al., 2011; Lindhardt et al., 2013), we estimated a sample size of 14-15 necessary to reach data saturation and to adequately address the weight stigma experience of overweight and obese pregnant individuals during patient-professional communication.

3. Recruitment: The study PI queried staff at MWH affiliated practices about availability of pregnant individuals in their care/being seen for prenatal care at MWH who might meet basic eligibility requirements (i.e., pre-pregnancy BMI, gestational weeks). Alternatively, the PI accessed the MWH patient lists in the medical record to assess potentially eligible patients. Clinic staff then approached potentially eligible individuals at their prenatal visit to determine interest in talking to research staff about the study. If permission was granted to approach an individual, the PI entered the clinic room, introduced the study, confirmed eligibility via a screening form, and obtained written informed consent for study participation, and continued

with study procedures. **This proposed study was approved by the IRB as of July 25, 2019, STUDY19050061.**

1.4.4 Variables

Table 1 provides a list of all variables and covariates collected for eligibility screening and analysis, including data level, description/how assessed, timing, and collection methods.

Detail of the stigma scale, breastfeeding outcome survey, and interviews follows:

1. The WBIS (unidimensional measure) is an 11-item instrument using a 7-point Likert scale to measure internalized weight stigma and the degree to which an individual believes negative statements and stereotypes about overweight or obese individuals applies to him or herself. Higher scores on the WBIS indicate a higher degree of internalized weight stigma. The WBIS has high internal reliability ($\alpha = 0.90$) among adults with a BMI ≥ 25 (Durso & Latner, 2008). In a study examining population norms and psychometric properties of the WBIS using a large community sample (N=1128), results indicated good internal consistency ($\alpha = 0.87$) (Hilbert et al., 2014).

2. The Breastfeeding Outcome Survey was administered 1 month postpartum to all study participants. Development of this investigator-created survey was informed by a questionnaire used in the Infant Feeding Practices Study (IFPS)- II, a U-S based, longitudinal study focusing on infant feeding behaviors throughout the first year of life (Fein et al., 2008). Data obtained from the IFPS has widely been used in the breastfeeding literature to inform research exploring various breastfeeding related barriers, facilitators, and outcomes among individuals in the United States (Wallenborn & Masho, 2018; S. Wang, Guendelman, Harley, & Eskenazi, 2018), including one study investigating whether breastfeeding initiation and duration

differs based on prenatal care provider type (Wallenborn, Lu, Perera, Wheeler, & Masho, 2018). The original postnatal questionnaire used in the IFPS was slightly modified to include questions querying individuals on our infant feeding outcomes of interest (breastfeeding initiation, continuation, and exclusivity). Additionally, the same breastfeeding outcome questions used in this proposal have been developed and refined through the mentor's research with similar populations.

3. The Semi-Structured Interview used a script we developed with input from dissertation team members with expertise in qualitative methods, patient-provider communication, breastfeeding, and obstetrics. The interview script was piloted with several colleagues who self-identified as having overweight/obesity and breastfeeding experience and was modified based on their feedback. We used the script to start, prompt or refocus an interview but relied on participants to guide interview direction and the time/emphasis ascribed to the discussion of a particular issue. See appendix for script. The script was modified as interviews progressed to establish consensus and divergence among participants with respect to particular topics broached.

Rationale for Covariates of Interest: We collected data on covariates known to influence breastfeeding outcomes including BMI (Flores, Mielke, Wendt, Nunes, & Bertoldi, 2018), previous breastfeeding experience (Huang, Ouyang, & Redding, 2019), infant admission to the neonatal intensive care unit (NICU) (Hannan, Juhl, & Hwang, 2018), type of delivery (Kling, Haile, Francescon, & Chertok, 2016), enrollment in Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) (Francescon, Haile, Kling, & Chertok, 2016), gestational age at delivery (O. Lutsiv et al., 2013), and maternal history of substance use (Jimenez et al., 2017). Additionally, breastfeeding outcomes differ based on ethnic and racial

backgrounds (McKinney et al., 2016), employment status and number of hours worked postpartum (Lubold, 2016) and maternal age and marital status at time of pregnancy (Brand, Kothari, & Stark, 2011). Therefore, in our study, we collected data on these covariates of interest with a known association on breastfeeding outcomes and controlled for them during our binomial regression analyses.

Table 1: Variables and Level of Measurement for Aim 1 and Aim 2.

Variable	Level	Description/How Assessed	Assessment Timing	Data Collection Method
Predictor Variable				
WBIS score (Predictor)	Continuous	Degree of internalized weight stigma assessed via summary score	28-40+ wks gestation; 1 month postpartum	Self-report (emailed REDcap survey)
Outcome Variables				
BF Initiation	Dichotomous	Has infant ever been placed at-breast and/or received breast milk?	1 month postpartum	Self-report (emailed REDcap survey, EMR)
BF Continuation (current)	Dichotomous	Is infant currently receiving any breast milk?	1 month postpartum	Self-report (emailed REDcap survey)
BF Exclusivity (current) **used in power analysis*	Dichotomous	Is the infant currently receiving only breast milk?	1 month postpartum	Self-report (emailed REDcap survey), EMR abstraction
Covariates				
Pre-pregnancy Body Mass Index (BMI)	Continuous	Documented height and weight at initial prenata visit (self-report if unavailable)	Enrollment	EMR abstraction
Demographics (ethnicity, race, education, employmen WIC status, age, marital status)	Categorical	Assessed via Demographics survey	28-40+ wks gestation	Emailed survey link (REDcap)
Previous BF experience	Dichotomous	Assessed via Demographics survey	28-40+ wks gestation	Emailed survey link (REDcap)
Type of delivery	Categorical	Vaginal, Cesarean	Post-discharge	EMR abstraction
Gestational age at delivery	Continuous	Gestational age of infant at time of delivery	Post-discharge	EMR abstraction
Prior substance use	Dichotomous	Any prior alcohol, cigarette or marijuana use in last 12 months	28-40+ wks gestation	Emailed survey link (REDcap)
NICU Admission	Dichotomous	Was infant admitted to NICU after delivery?	1 month postpartum	EMR abstraction

WIC: Special Supplemental Nutrition Program for Women, Infants, and Children

1.4.5 Methods

Aim 1 and 2 Methods: To increase participant comfort with a potentially sensitive topic (weight, particularly during pregnancy—a time of major body changes), we administered the

WBIS online (emailed REDCap link) during the third trimester of pregnancy and again at 1 month postpartum. However, if requested by the subject or if no survey response was received after 3 consecutive email attempts to reach the subject, we administered the survey via telephone or in-person if the participant desired. At 1 month postpartum, participants completed the WBIS and the Breastfeeding Outcome Survey including items querying participants on their breastfeeding outcomes (initiation, continuation, exclusivity). One month postpartum was selected as our primary outcome endpoint for several reasons: 1) the majority of individuals who stop breastfeeding due to discomfort, lack of support, or low breastfeeding self-efficacy (which we hypothesize to co-occur with weight stigma and increased BMI) do so within the first 1-2 months postpartum (Chantry, 2011); 2) given the one-year grant period, following participants further than 1 month postpartum (given that enrollment may occur 3 months earlier) would not provide sufficient time to complete data collection and analysis.

Aim 3 Methods: We used a qualitative descriptive approach to offer a comprehensive summary of overweight and obese individual's perceptions of weight stigma during patient-professional communication and its perceived impact on breastfeeding outcomes. Qualitative description was chosen over other qualitative study designs due to its ability to allow researchers to stay close to the data, thereby facilitating an accurate and straightforward description of the data and events (Sandelowski, 2000). Telephone interviews were conducted by the PI with guidance from faculty mentors with qualitative expertise. Interviews were audio-recorded and transcribed verbatim using an online transcription platform offered by NVivo. Techniques such as summarizing (to validate understanding), probing (to dig deeper) and questioning (to expand/clarify) were used during the interview process. This transcription service automatically encrypts and securely stores

all downloaded data to protect participant privacy according to HIPAA standards (QSR International, 1999).

1.4.6 Data Analysis Plan

Aim 1 and 2 Analysis: For Aim 1, we used a paired t-test to determine if mean differences exist between weight stigma scores during pregnancy and scores at 1 month postpartum, offering insight into the stability of the construct of weight stigma in perinatal individuals. Doing so will help inform the timing of future nursing interventions to mitigate the influence of weight stigma on breastfeeding behaviors. For instance, if WBIS scores decrease in the postpartum period, potential interventions should target individuals earlier in their pregnancy (at which time these scores would be higher) and when interventions would be most salient. We also examined the internal consistency (Cronbach's alpha) and test-retest reliability (Pearson's correlation coefficient) of the WBIS in the obstetric setting, given that this instrument has not been previously administered in this population. For Aim 2, binomial logistic regression was used to examine the relationship between prenatal weight stigma scores and breastfeeding initiation, continuation and exclusivity at 1 month postpartum. Covariates (race, ethnicity, education level, etc.) were hierarchically added to the regression models. Block 1, for example, contained prenatal WBIS scores and Block 2 contained covariates. We used a forward selection technique when adding covariates of interest to the model such that all covariates of interest were added to Block 2 simultaneously. Using the forward selection option in SPSS provided a final regression model containing covariates that significantly improved our overall model fit and explained the greatest amount of variance in the dependent variable. Prenatal WBIS scores were used

in data analysis to explore the influence of weight-stigma experienced during pregnancy on breastfeeding outcomes.

Aim 3 Analysis: All interviews were double-coded by the PI and a trained research assistant for major themes using the qualitative analysis/data management software program, NVivo. The PI and research assistant worked in conjunction to develop the initial codebook and to discuss and settle any coding discrepancies. The codebook was developed as the PI and assistant interacted with the transcripts, allowing the codes and coding process to evolve as we reviewed additional transcripts – thereby following an inductive coding process. Every two weeks, virtual meetings were held with the PI and research assistant to discuss project progress and to review codes and emerging themes. Analysis of transcriptions was conducted iteratively, such that interview questions were modified as necessary to address and explore certain constructs or themes as they arose. We used content analysis to analyze our qualitative interview data and to describe if/how individuals perceived weight stigma during perinatal healthcare professional interactions and its influence on their breastfeeding outcomes. Qualitative content analysis is the strategy of choice for qualitative descriptive studies (Sandelowski, 2000) and aims to summarize the informational contents of the interview data (Morgan, 1993). Content analysis is data-driven, meaning that codes will be derived from the data itself during the course of the study and then systematically applied to the data. To begin data analysis, we read interview transcripts word by word to derive codes by highlighting the exact words from the text that appear to capture key thoughts of concepts, otherwise known as open coding (Bengtsson, 2016). Next, we made notes regarding initial impressions and thoughts during this initial data analysis phase. This process was repeated until labels for codes emerged that were reflective of more than just one key thought. Codes were then be sorted into categories based on how different codes were related and linked with one another (Hsieh & Shannon, 2005). These

categories were then used to organize and group codes into meaningful clusters that informed theme development (Morse & Field, 1995). We used a constant comparative technique such that text units were compared with previously coded data to ensure stability and theme relevance (Miles & Huberman, 1994). To ensure rigor of our findings, we maintained a detailed, and up to date audit trail throughout the entire analysis phase and explained decision rules and justifications. Credibility of results was achieved via frequent debriefing meetings with the PI and research assistant to discuss findings and concerns. The PI also maintained a reflexive journal, in which regular entries were made during the entire data collection and analysis phase to explain methodological decisions and reasoning, logistics of the study, and reflections on what is happening in terms of personal values and beliefs. Reflexive research and clearly describing the relationships between research participants and the study team increases credibility of findings and deepens our understanding of the data obtained (Barrett, Kajamaa, & Johnston, 2020). We also used member checking (Patton, 2015) in which interview participants were invited to review key findings before submission for publication, to promote confirmability of our results.

1.4.6.1 Mixed Methods

Convergent Design Data Analysis and Interpretation: The intent of integration in our proposal was to develop results and interpretations that expand our understanding of how weight stigma influences breastfeeding outcomes among individuals with pre-pregnancy overweight or obesity. After collecting both quantitative and qualitative data concurrently, we analyzed the information separately. We then looked for common concepts across the results and compared the quantitative and qualitative results that address weight stigma's influence on breastfeeding outcomes. In this way, we determined to what extent and in what ways the results confirmed, disconfirmed, or expanded upon each other.

Representation of the Integration of Results: We presented the integration of this convergent design in a narrative discussion. To integrate the results in our narrative discussion we first presented the quantitative statistical results followed by qualitative results in the form of quotes about the same topic. We followed this with a comment specifying how the qualitative quotes either confirm, disconfirm, or complement the quantitative results. In this way, the reader is able to make a direct comparison of the two results and determine whether the results are in agreement or disagreement (Creswell & Plano Clark, 2018).

Interpretation of Integrated Results: We considered how the confirming, disconfirming, and expanded results provided additional insight on how (or if) weight stigma in the obstetric setting influences overweight and obese individual's breastfeeding outcomes. We noted any discrepant and congruent results and explored how the quantitative and qualitative data told different stories and assessed whether the statistical results and qualitative themes supported or contradicted each other (Creswell & Plano Clark, 2018).

1.4.6.2 Descriptive Statistics

For our quantitative aims (1 and 2), we collected and reported various descriptive statistics to summarize our sample. Mean BMI and WBIS scores of the sample were reported along with measures of dispersion including the range and standard deviation. We also reported more robust measures of central tendency and variability, such as the mean and inter-quartile range (IQR) which will more accurately represent the data in the case of non-normality. Information such as race and ethnicity was reported via frequency statistics including frequency counts (n) accompanied by corresponding percentages (%). Other baseline information such as education level, employment, and marital status was reported as frequency counts and percentages to demonstrate how often the values of the categorical variables were represented in

our sample and to provide insight into the distribution of these variables. We also provided measures of frequency for our primary outcomes of interest (breastfeeding initiation, exclusivity and continuation). We calculated the overall percentage of individuals who initiated breastfeeding, the percentage of who exclusively breastfed at 1 month postpartum and the percentage who continued any breastfeeding at 1 month postpartum. Descriptive statistics present data such that it is easily visualized by others. Therefore, we produced graphical representations of the data as necessary to give a sense of the shape of distributions.

1.4.6.3 Data Screening Procedures

Outlier Assessment: To assess for univariate outliers, we visually assessed the distributions for our key variables of interest (BMI, WBIS scores, breastfeeding initiation, exclusivity and continuation). We also produced box and whisker plots, scatter plots and normality probability plots to visually screen our continuous data (BMI, WBIS scores) for potential outliers. For our nominal or ordinal categorical variables (covariates such as race, ethnicity, education level, etc.) we examined the frequency distribution of these variables and identified those with very uneven splits among the categories.

Treatment of Missing Data: Missing data are inevitable in any research study, especially in longitudinal designs such as the one described here. However, there are various statistical methods available to identify the nature of the missing data and to appropriately handle missing values when running analyses. We first conducted a *missing value analysis* in SPSS to determine the amount and pattern of missing data. If the data are deemed missing at random or completely at random (MAR or MCAR) the research team will consider using imputation methods. To clarify, MAR indicates that there is a systematic relationship between the likelihood of missing values and the observed vales, but not the actual missing data. In contrast, MCAR indicates that

there is no relationship between the missingness of data and any values, whether observed or missing. However, if the values are found to be missing not at random (NMAR), the research team will need to consider if these values are valid and consider possible sources of response bias contributing to these missing values. Therefore, imputation methods may not be appropriate to use. We had minimal missing data (<10%) for all outcome variables. Therefore, imputation methods were not used.

Checking Underlying Assumptions: Underlying assumptions of the data were examined with particular attention to the normality assumption when conducting the T-test in Aim 1. We used graphical assessment including histograms with normal distribution overlays. Normal probability plots were also be examined in this process. The normality assumption is required in the continuous type variables (WBIS score, BMI, etc.). The assumptions of binomial logistic regression include independence of observations, lack of collinearity among the independent variables, and linearity of continuous independent variables and the logit transformation of the dependent variable. Collinearity occurs when variables are too highly correlated with each other and contain near redundant information. We screened for collinearity by examining the tolerance indices and variance inflation factors based on the squared multiple correlation (SMC) for WBIS scores and continuous covariate variables (BMI). We also considered the Belsey, Khu and Welsch (BKW) conditioning indices with their corresponding variance decomposition proportions. Doing so can help identify the specific independent variables contributing to multicollinearity. In SPSS, we assessed linearity of the continuous type independent variables with the logit transformation of the dependent variable using the Box-Tidwell approach where interactions between each continuous predictor variable and its natural logarithm (i.e., WBISscore × ln(WBISscore)) were added to the logistic regression model for each dichotomized

primary outcome variable (breastfeeding initiation, exclusivity and continuation). Of note, a significant interaction term using the Box-Tidwell approach indicates a violation of the linearity assumption. We also used the Box-Tidwell approach for our continuous covariates (BMI).

Data Transformations as Remedial Measure: Data transformations were not necessary as we met all assumptions of linearity, homoscedasticity, and normality. We did use meaningful collapsing of categories for categorical variables with more than two categories due to small cell sizes in certain demographic variables (specifically education level and race).

1.5 Potential Limitations and Alternative Approaches

While we believed the study was of sound methodological, conceptual, and theoretical rigor, we acknowledged several limitations and offered solutions to potential problems that may have occurred during the course of our research. Despite the support and research-focused culture of the clinical recruitment site, delays or stalled recruitment of subjects was a possibility. If we did not reach our anticipated recruitment rate of 8-10 subjects per month, we considered the use of an online recruitment platform (such as TrialSpark or TrialWire). These recruitment strategies would supplement our primary recruitment at MWH in the event the study team encounters difficulty meeting monthly recruitment goals. As noted previously, to our knowledge, the WBIS has not been administered exclusively to an obstetric population- therefore reliability and validity evidence for this measure in the obstetric setting does not exist. The WBIS was developed using a sample of overweight and obese adults in the general population (Durso & Latner, 2008). To ensure appropriate operationalization of weight stigma, the PI consulted with a content expert in the field of weight stigma and health psychology research (Dr. A. Janet

Tomiyama, University of California - Los Angeles, Assistant Professor, Department of Psychology). In consultation with this content expert, it was decided that the WBIS would an appropriate tool to use for this study and will allow the PI and research team to provide preliminary reliability and validity evidence for the WBIS in the obstetric setting; a novel contribution to this field of inquiry. Another limitation was the potential for attrition due to the longitudinal study design. A longitudinal, interview-based study exploring the breastfeeding practices of 555 mother-baby dyads over a 24-month period observed an 80% return rate on surveys and interviews (Karall et al., 2015). Informed by the literature, we accounted for 80% attrition rates in our power analysis and we aimed to recruit 110 individuals to retain 80% power for our data analyses. Additionally, we compensated participants at the completion of the 1-month postpartum WBIS and breastfeeding outcome survey to encourage participants to finish study procedures and provide complete responses on data collection instruments.

1.6 Publications Relevant to the Proposed Research

Dieterich, R. (2019). Integrative Review to Investigate Communication Practices of Health Care Professionals With Pregnant Women Who Are Overweight and Obese. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *48*(3), S142. doi:10.1016/j.jogn.2019.04.236

Dieterich, R., Caplan, E., Yang, J., & Demirci, J. (2020). Integrative Review of Breastfeeding Support and Related Practices in Child Care Centers. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *49*(1), 5-15. doi:https://doi.org/10.1016/j.jogn.2019.10.006

Dieterich, R., Demirci, J., & Danford, C. (2020). Weight Stigma Related to Pregnancy: A Concept Analysis. *ANS Adv Nurs Sci*. doi:10.1097/ans.0000000000000297

Dieterich, R., & Demirci, J. (2020). Communication practices of healthcare professionals when caring for overweight/obese pregnant women: A scoping review. *Patient Educ Couns*. doi:10.1016/j.pec.2020.05.011

1.7 Protection of Human Subjects

This was a minimal risk study and there was no direct benefit to individuals who participated in the study. A subject's participation in the study was completely voluntary and an individual was able to end participation in the study at any time even after signing the consent form. An individual's decision to withdraw from the study had no effect on their current for future medical care. If a subject requested to withdraw from the study in writing, their previously collected data was maintained, but they were not contacted for any further surveys or data collection. Most common anticipated risks included emotional discomfort when participating in the semi-structured interviews or when completing the WBIS. This research protocol was approved by the University of Pittsburgh Institutional Review Board. See attached IRB approval letter.

Measures were taken to protect the identity of participants and the confidentiality of collected data. All participants were assigned a unique study ID, and this was used on all study forms and electronic files, rather than the participant's actual name. Data that could be used to identity subjects (names, social security numbers) was not recorded on data collection instruments and no identifying data was entered into the study database, with one exception. Contact information, linked with a participant's study ID, was stored in a single, password-protected, user-restricted computer file. All other hard-copy study materials, including consent forms, were kept in a locked desk drawer (accessible only to the study team) within a locked room in the school of nursing at the University of Pittsburgh. Other non-identifiable electronic data (including audio MP3s of semi-structured interviews) were password-protected. Non-vital identifying information was modified or omitted from the final research report to protect participant anonymity. Data storage was in REDCap, the secure online data collection and

management system administered through the University of Pittsburgh. We also used REDCap to collect survey data (through email link).

2.0 Summary of Study

2.1 Dissertation Study Overview

The purpose of this dissertation study was to explore the relationship between perinatal weight stigma and breastfeeding outcomes among individuals with pre-pregnancy overweight or obesity. Implementation of this primary data collection study transpired with minimal changes from the proposed study described in detail above. One change from the original dissertation proposal was that the QDAP at the University of Pittsburgh was not utilized for qualitative data analysis as anticipated. In consulting with the dissertation committee members, it was determined use of QDAP would limit the principal investigator's interaction and involvement in the qualitative data analysis process. Therefore, the principal investigator conducted all qualitative data collection and analysis in consultation with her dissertation committee and a trained research assistant via the Undergraduate Research Mentorship Program (URMP). Additionally, NVivo 12 was used for qualitative data storage and organization versus Atlas, TI. NVivo 12 was chosen as the software of choice due to ease of access via a University-sponsored license and increased investigator familiarity. Of note, due to the COVID-19 pandemic and resultant visitor and research restrictions at the recruitment site, we enrolled 103 out of the anticipated 110 participants for this research study. However, due to higher than expected response rates for the 1-month postpartum follow up survey, we had a final sample of N=95 compared to the estimated N=88 in the original proposal. Thus, the COVID-19 pandemic caused limited to no disruption in the functional execution of our proposal. However, COVID-19 and its related social, economic and public health consequences are a potential threat to internal validity

via history. Participants may have responded differently to items on the WBIS or to questions posed during interviews due to stress and anxiety wrought by the ongoing COVID-19 pandemic. Our results are reported in two separate manuscripts, which are discussed below. Manuscript 1 contains our quantitative results from study Aims 1 and 2, and Manuscript 2 contains results from our qualitative Aim 3. Integration of study findings is summarized below.

2.1.1 Integration of Findings

The intention for integration in this study was to expand our understanding of how weight stigma influences breastfeeding outcomes among individuals with pre-pregnancy overweight or obesity. In line with this goal, the quantitative and qualitative data were collected simultaneously, with results analyzed separately and true to the paradigmatic assumptions of each respective methodology. The quantitative findings were then compared with findings from the qualitative data to determine the unique contribution of each type of data and to offer elaboration of how individuals perceive and experience weight stigma during the perinatal period and its influence (if any) on their infant feeding practices.

Our quantitative analyses indicated that prenatal internalized weight stigma scores did not have a statistically significant prediction of breastfeeding outcomes (i.e., initiation, continuation, and exclusivity at 1-month postpartum). Similarly, in conducting 18 semi-structured phone interviews with individuals at 1 month postpartum and analyzing the data via content analysis, we discovered participants did not perceive weight stigma (during interactions with perinatal healthcare professionals or in general) as influential on their breastfeeding outcomes. In fact, several participants described facing weight stigma from family or the media, but these individuals reported it had no bearing on their breastfeeding experience. Overall, participants had

positive interactions with perinatal healthcare professionals and viewed health and lifestyle education as imperative for a safe and healthy pregnancy. In fact, in one of our themes identified in our qualitative analysis, *"Size Doesn't Matter: They Looked Beyond the Scale,"* participants described perinatal healthcare professionals as non-weight focused. Participants noted their perinatal healthcare professionals offered breastfeeding information and assistance that did not specifically address or consider weight-related breastfeeding challenges, which was viewed positively. This contributed to participant's ability to focus on breastfeeding and prevented feelings of judgment and weight-based stigmatization.

Limited social support, not weight stigma, was perceived as a breastfeeding barrier in our sample. One of our resulting themes, *"I Was on My Own" – Limited Social Support not Weight Stigma Influenced Breastfeeding,"* suggested individuals experienced limited breastfeeding support from family and friends, which led to ambivalence toward breastfeeding or an overall negative breastfeeding experience. Limited social support as a detractor to participants' breastfeeding experience was a unique and insightful addition to our study that would not have been revealed through the quantitative data alone. The qualitative data and resulting themes (detailed in depth in Manuscript 2) provide real-world conceptualization of the way individuals perceive and experience weight stigmatization during the perinatal period and its influence on their breastfeeding behaviors.

Both quantitative and qualitative data suggest perinatal weight stigma was not influential on the breastfeeding experience of our sample population. Additionally, the quantitative and qualitative data converged to suggest racial nuances in weight stigma perception. Per our quantitative findings, we discovered significant mean differences in both prenatal and postpartum WBIS scores based on race. In fact, Black participants had lower mean weight

stigma scores (indicative of lower degree of internalized weight stigma) compared to white participants. Similarly, in conducting qualitative interviews, we discovered nuances in how Black individuals perceived and experienced perinatal weight stigma versus white – with Black individuals appearing less susceptible to experiencing or perceiving perinatal weight stigma. For instance, white interview participants more often mentioned weight stigmatization from family, friends, or the media compared to individuals who self-identified as Black. While not the focus of the current study, future work is necessary to more fully explicate racial and cultural identity's role in the weight stigma experiences and perception of pregnant and postpartum individuals.

Methodologically, our study utilized both quantitative and qualitative data to inform study design and procedures. Quantitative data (prenatal BMI, prenatal WBIS scores) were used to purposefully select individuals to interview. Doing so provided a broad summary of how our sample population experienced perinatal weight stigma and its influence on infant feeding behavior. Interview questions were tailored based on the quantitative participant characteristics to ensure breadth of understanding of our phenomenon of interest. Additionally, the racial nuances in weight stigma perception discovered via qualitative interviews informed quantitative examination into racial differences in prenatal and postpartum WBIS scores.

2.2 Study Strengths and Limitations

We recognize several limitations to the dissertation study design and methodology. The WBIS measure (measures internalized weight stigma) has not been validated among pregnant or postpartum individuals and therefore may not accurately assess the specific types of weight stigma individuals experience during pregnancy. The perinatal period and new motherhood is a

unique time of vulnerability for individuals due to inherent weight fluctuations and rapidly changing perceptions about weight and mood (Silveira, Ertel, Dole, & Chasan-Taber, 2015). Additionally, societal views of an "ideal" postpartum body image and pressure to lose pregnancy weight (Watson, Fuller-Tyszkiewicz, Broadbent, & Skouteris, 2015) further compound this transitional time and pose unique opportunities for weight stigma to perpetuate. Therefore, our future research seeks to develop a weight stigma scale for use in the obstetric setting to accurately capture the way pregnant and postpartum individuals experience and perceive weight stigma. Additionally, this single-site study recruited participants from a limited geographic area with limited diversity in socio-economic status and ethnicity. Another limitation is lack of variance in BMI due to the exclusion of individuals with BMI <25. While our target population for this investigation was individuals with overweight or obesity, the limited variance in BMI may have attenuated shared variance and constricted coefficient estimates. Additionally, the WBIS may not be sensitive to detect gradations of internalized weight stigma among overweight and obese lactating parents. There was also a lack of representation from Black community members among the study team. The absence of Black study team members could have led to results and interpretations that do not fully consider the Black perspective. However, we invited all interview participants to review the qualitative findings prior to publication. Future efforts will be made to collaborate with Black community members and researchers throughout the entire research process to ensure results and interpretations are applicable to Black individuals and to those from diverse backgrounds.

However, a strength of our study is the racial diversity, as two-thirds of our sample identified as Black. Black birthing individuals have been historically and systematically excluded from research in general and during pregnancy. In fact, a recent systematic review to evaluate the

evidence of weight bias internalization and health outcomes found that over 60% of the included studies were limited in racial and ethnic diversity, with three quarters of studies cross-sectional in design (Pearl & Puhl, 2018). Thus, with our predominantly Black sample and longitudinal design, our study provides a novel and timely addition the nascent body of literature exploring the influence of perceived and internalized weight stigma and health outcomes.

2.3 Future Studies and Implications for Nursing

Future work in weight stigma's influence on maternal and infant health is needed. This exploratory study offers essential preliminary data on weight stigma in relation to breastfeeding outcomes. However, additional research is needed to create a validated weight stigma measure specific for the obstetric and perinatal context as no prior work has assessed the validity of WBIS specific to perinatal individuals. The WBIS was validated in the general population of individuals with overweight obesity. Additional investigation is necessary to determine how sensitive the WBIS is for gradations of weight stigma across BMI categories. Due to our documented racial differences in WBIS scores, additional validation focused on racial differences is needed (e.g., is weight stigma perceived in the same way for white and Black individuals, are there race-based differential item response patterns, is the factor structure for WBIS consistent between Black and white individuals)? Furthermore, the intersectionality of race and weight stigmatization on infant feeding behaviors should be explicated due to lower breastfeeding rates observed among Black versus white parents with overweight or obesity (Krause, Lovelady, & Ostbye, 2011). Additionally, future qualitative work is necessary to investigate potential nuances in how Black individuals perceive and experience weight

stigmatization during the perinatal period. It is known Black individuals are less likely to subscribe to cultural ideals favoriting thin body shapes and stringent body weight goals (Sabik, Cole, & Ward, 2010). Therefore, future inquiries into how cultural weight and body image ideals buffer or predispose one to weight stigmatization during the perinatal period is justified. These future investigations must include culturally-responsive questions and methods (including community members) and racially representative study teams to maximize validity and utility of findings.

Future research in health outcomes related to perinatal weight stigma should consider physiological correlates of stress and weight stigma. For example, cortisol (an obesogenic stress hormone) is associated with experienced weight stigma and presents unique risk to pregnant individuals due to the known relationship between maternal cortisol levels and preterm birth and low birth weight (Stewart et al., 2015). Furthermore, maternal cortisol concentrations are transferred from plasma to breast milk, suggesting maternal cortisol levels directly influence breast milk composition and offspring (Hamosh, 2001). Several studies have discovered an association between breast milk cortisol concentration and infant behavior including increased temperamental negativity such as sadness and fear (Grey, Davis, Sandman, & Glynn, 2013). This emotional distress may lead to neonates who are difficult to settle and less likely to successfully latch when attempting to breastfeed (Nolvi et al., 2018). Maternal distress and hair cortisol concentrations were also positively associated with delayed onset of lactogenesis (mature milk production), suggesting maternal perceived and biophysical stress (cortisol) are related to delayed milk production in postpartum individuals (Caparros-Gonzalez et al., 2019). This is a particularly important concern for heavier parents, who are already at higher risk of delayed onset of lactogenesis independent of maternal biopsychosocial stress (Nommsen-Rivers,

Chantry, Peerson, Cohen, & Dewey, 2010). However, cortisol levels have yet to be examined as a potential factor influencing the relationship between pregnancy-specific weight stigma and subsequent maternal infant feeding behaviors. Further investigation is necessary to explore the biopsychosocial stress mechanisms that may influence perceived and experienced weight stigma and breastfeeding behavior. Our future work will also expand beyond breastfeeding and explore weight stigma's influence on other pregnancy-related health promotion behaviors including gestational weight gain, physical activity, nutrition, prenatal care seeking behavior and postpartum mood disorders.

The long-term influence of physiologic stress on offspring is also understudied. Considering obesity is an intergenerational disease, the role of obesogenic stress hormones on childhood obesity should be examined.

3.0 Manuscript Dissertation

3.1 Manuscript #1 (Quantitative Aims)

3.1.1 Introduction

Despite the increasing prevalence within the general United States adult population (U.S. Department of Health and Human Services, 2020), individuals with overweight and obesity remain stigmatized in our society. Childbearing individuals are no exception, with over half of individuals giving birth having overweight or obesity prior to pregnancy (Bever Babendure et al., 2015; Branum, Kirmeyer, & Gregory, 2016). In the obstetric setting, subtle forms of weight discrimination including accusatorial communication from healthcare professionals, and overt discrimination, such as verbal remarks and refusal to treat overweight and obese individuals seeking pregnancy care (Bombak, McPhail, & Ward, 2016; Furness et al., 2011; Puhl & Heuer, 2009; Wear, Aultman, Varley, & Zarconi, 2006) exist. Internalized weight stigma has great potential to influence mental and physical health as it involves reduction of one's self-worth due to applying negative weight-based stereotypes to oneself (Durso & Latner, 2008).

Weight stigma in the perinatal period (including internalized) has health behavior consequences, one of which may include a lowered probability of meeting one's own breastfeeding goals or national benchmarks for breastfeeding success. Parents with pre-pregnancy overweight and obesity are less likely to initiate breastfeeding and continue breastfeeding, and are more likely to supplement breast milk feeds with complementary foods sooner than those of normal weight (Grube et al., 2016; Guelinckx et al., 2012; Makela et al.,

2014; Verret-Chalifour et al., 2015). Both internalized and general weight stigmatization may directly and indirectly deter breastfeeding efforts through several mechanisms. These include stigmatizing and suboptimal communication with perinatal providers that does not address weight-related breastfeeding challenges (Dieterich & Demirci, 2020; Garner, McKenzie, Devine, Thornburg, & Rasmussen, 2017), and body image concerns impacting comfort with breast exposure (Zimmerman et al., 2018). In fact, in one retrospective questionnaire-based study, body image dissatisfaction was associated with lower odds of maintaining any breastfeeding at 6-8 weeks postpartum (Swanson et al., 2017). Obese lactating parents are also less likely to be exposed to pro-breastfeeding practices (lower odds of receiving breastfeeding information, higher odds of pacifier use) during the postpartum hospitalization (Kair & Colaizy, 2016).

Another potential way weight stigma may undermine parents' breastfeeding goals and efforts is a potential relationship with perinatal mood disorders. Among pregnant individuals, experienced weight stigma was associated with postpartum depressive symptoms one month after delivery (A. C. Incollingo Rodriguez et al., 2019). In turn, postpartum depression symptomology is associated with higher likelihood of breastfeeding cessation at four and eight weeks postpartum and lower breastfeeding self-efficacy (Dennis & McQueen, 2007); low breastfeeding self-efficacy is itself associated with reduced rates of breastfeeding initiation (Bigman, Wilkinson, Homedes, & Perez, 2018) and shorter duration of any and exclusive breastfeeding (de Jager, Broadbent, Fuller-Tyszkiewicz, & Skouteris, 2014).

To date, no researchers have directly studied the relationship between internalized weight stigma and breastfeeding outcomes. Perinatal weight stigma itself is an understudied topic, with limited to no research exploring its occurrence, trajectory throughout pregnancy and postpartum, nor how it impacts pregnancy-related health outcomes - including breastfeeding.

The primary aim of this analysis was to examine the relationship between internalized weight stigma during pregnancy and breastfeeding outcomes at one month postpartum among individuals with pre-pregnancy overweight or obesity. Secondarily, we examined the temporal stability of internalized weight stigma from the third trimester of pregnancy to one month postpartum as measured by the Weight Bias Internalization Scale (WBIS) (Durso & Latner, 2008).

3.1.2 Methods

Design: Within this prospective cohort pilot study, individuals with pre-pregnancy overweight or obesity were enrolled in their third trimester of pregnancy and followed to one month postpartum. This study was approved by the University of Pittsburgh Institutional Review Board (IRB). Written informed consent was obtained from each participant.

Setting and Sample: Participants were recruited from November 2019 to March 2020 within a prenatal clinic within a hospital in Southwestern Pennsylvania and via a university-based research registry website. The prenatal clinic serves a primarily low socio-economic, urban population in an outpatient setting. Eligible participants were: 1) ≥18 years; 2) 28-40+ weeks pregnant according to the electronic medical record and based on last menstrual period; 3) overweight or obese (BMI≥25) immediately prior to their pregnancy; 4) planning to breastfeed or express breast milk for their infant; 5) able to speak and read English fluently and independently complete the WBIS. Pre-pregnancy BMI was measured by documented BMI at first prenatal visit. If BMI was unavailable in the medical record or if the first prenatal visit occurred beyond 12 weeks of pregnancy, BMI was calculated using self-reported pre-pregnancy height and weight.

Data Collection: Study participants completed online surveys through REDCap electronic data capture tools hosted at University of Pittsburgh (Harris et al., 2009) at enrollment (28-40 weeks gestation) and at one month postpartum. The enrollment survey included demographic items and the WBIS. The WBIS (unidimensional measure) is an 11-item instrument using a 7-point Likert scale to measure internalized weight stigma (i.e., the degree to which an individual believes negative statements and stereotypes about overweight or obese individuals applies to oneself). Scores range from 11 to 77, with no published cut-scores indicating high versus low degrees of internalized weight stigma. However, higher scores on the WBIS indicate a higher degree of internalized weight stigma. The WBIS has high internal consistency ($\alpha = 0.90$) among adults with a BMI ≥ 25 (Durso & Latner, 2008). In a study examining population norms and psychometric properties of the WBIS using a large community sample of German adults (N=1128), good internal consistency ($\alpha = 0.87$) resulted (Hilbert et al., 2014). The WBIS has also been validated in a population of German adolescents with overweight or obesity (Ciupitu-Plath, Wiegand, & Babitsch, 2018) , but psychometric properties of the WBIS have not been previously assessed in pregnant or postpartum individuals.

The second survey administered at one month postpartum included the WBIS and an investigator-created survey addressing participant breastfeeding behaviors. Breastfeeding items on this survey were drawn from items within the Infant Feeding Practices Study (IFPS)- II [25] and modified to specifically measure our outcomes of interest. We defined breastfeeding as provision of participant's own milk to the infant, regardless of feeding method (e.g., at-breast, bottle-feeding expressed milk, etc.). To assess breastfeeding initiation, participants were asked, "Did you ever place your baby at breast or did your baby ever receive your breast milk?" with response options "yes" or "no." To assess breastfeeding continuation, participants were asked,

"Are you currently providing your baby with any of your own breast milk" with response options "yes" or "no." To assess breastfeeding exclusivity, participants were asked, "Are you currently providing your baby with 100% of your own breast milk?" with response options "yes" and "no." Additional postpartum hospitalization data extracted from the electronic medical record (EMR) included delivery method, any and volume of formula use in hospital, infant admission to the NICU, gestational age at delivery, and maternal morbidities and obstetric complications (Colombo et al., 2018; Jones, Kogan, Singh, Dee, & Grummer-Strawn, 2011). Study data were collected and managed through REDCap (Harris et al., 2009). Participants were compensated with a $25 gift card at the time of completing the one month postpartum follow up survey.

Analysis: Analyses were conducted using SPSS v. 25 (IBM Corp., 2017). Data were screened for accuracy, outliers, and missing values. A missing value analysis determined our data were missing at random. Imputation methods were not used due to limited missing data.

Reliability

We used a paired-T test to assess temporal stability in WBIS scores from prenatal to one month postpartum (with α=0.05). As a robustness check, we also conducted a Wilcoxon Signed Ranks test, which yielded consistent results as the t-test. Cronbach's alpha was reported to illustrate internal consistency of WBIS relative to our sample.

Prenatal WBIS Scores in Predicting Breastfeeding Outcomes at One Month Postpartum

We used binomial logistic regression to explore the prediction of breastfeeding outcomes from prenatal WBIS scores and other covariates. After verifying that assumptions were met, we ran three separate logistic regression models for the dichotomized outcomes of breastfeeding initiation, continuation and exclusivity. We ran both unadjusted and adjusted regression models for each dichotomized breastfeeding outcome. We performed a forward selection procedure

(with $p<0.05$ from Likelihood Ratio test as criteria for entry) to select important covariates for predicting our breastfeeding outcomes. In addition to reporting models adjusted from the forward selected models, we also report full model results with all covariates entered into the model simultaneously (see Table 1).

3.1.3 Results

Out of 103 participants enrolled, 95 completed the one month follow up survey (Figure 1). Power analysis indicated that 95 subjects will be sufficient to detect an odds ratio (effect size) as small as 0.41 at 90% power (α=.05). The sample was comprised of predominately non-Hispanic Black, multiparous, non-married individuals (Table 1). The average pre-pregnancy BMI was 33.53 ± 7.17 (range: 25.4 – 62). Collectively, the sample did not score high on the prenatal WBIS (M=25.95±11.83) with scores ranging from 11 to 58. There were no demographic differences between individuals who completed (n=95) versus those who did not (n=8) complete the one month survey.

Reliability

We found no difference in mean prenatal and postpartum scores (M=25.95, SD= 11.83; M=26.86, SD= 13.03, respectively; t(94) = -.83, p= .41), evidencing temporal stability in the WBIS scores from pre- to post-partum. WBIS scores both in pregnancy and at the postpartum follow-up exhibited high internal consistency reliability, with Cronbach's alpha .808 and .814, respectively.

Prenatal WBIS Scores in Predicting Breastfeeding Outcomes at One Month Postpartum

At one month postpartum, 91% of participants (n=86/95) reported initiating breastfeeding, 66% (n=63/95) reported current breastfeeding, and 17% (n=16/95) reported

current exclusive breastfeeding. Prenatal WBIS scores did not predict breastfeeding initiation, continuation, or exclusivity at one month postpartum in either unadjusted or adjusted models (Table 2).

We controlled for pre-pregnancy BMI, maternal age and all categorical variables in Table 1 when conducting each logistic regression model (initiation, continuation and exclusivity).

Based on the final forward selection model, individuals working the same hours in their third trimester as before pregnancy were less likely to initiate breastfeeding compared to those not working in their third trimester (p=.025, Exp(B) = .82, 95% CI (.00, .199)). Higher maternal age was associated with 96% lower odds of initiating breastfeeding (p=.019, Exp(B) = .042, 95% CI (.003, .599)). No other significant predictors were found.

For breastfeeding continuation to one month postpartum, based on the final model using forward selection we found individuals with prior breastfeeding experience had 4.6 times higher odds of any breastfeeding at one month postpartum compared to those with no breastfeeding experience (p=.004, Exp(B)= 4.63, 95% CI (1.62, 13.23)). As age increased, there was 35% lower odds of continuing any breastfeeding at one month postpartum (p=.047, Exp(B) = .653, 95% CI (.429, .994)). No other significant predictors were found.

For breastfeeding exclusivity, we found that individuals enrolled in WIC had 83% lower odds of exclusive breastfeeding at one month postpartum compared to those not enrolled in WIC (p=.004, Exp(B)= .168, 95% CI (.05, .565)). Additionally, infants fed formula during the postpartum hospitalization had 76% lower odds of exclusive breastfeeding at one month postpartum compared to infants exclusively breastfed during the postpartum hospitalization (p=.039, Exp(B)= .244, 95% CI (.064, .931)). No other significant predictors were found.

3.1.4 Discussion

In this prospective cohort study of individuals with pre-pregnancy overweight or obesity who intended to breastfeed we examined the relationship between internalized weight stigma and breastfeeding outcomes at one month postpartum and the temporal stability of internalized weight stigma from the third trimester to one month postpartum using the WBIS. To our knowledge this is the first time the WBIS has been used with individuals who are pregnant. We found WBIS scores exhibited high levels of temporal stability from the third pregnancy trimester to one month postpartum, as well as high internal consistency reliability at both measurement points. These data would suggest that WBIS is a reliable and valid tool to measure internalized weight stigma in pregnant and postpartum individuals. However, we also found that third trimester WBIS scores were not predictive of breastfeeding initiation, continuation and exclusivity at one month postpartum.

The temporal stability of WBIS scores we observed in this analysis is supported by qualitative and retrospective, cross-sectional research indicating overweight and obese pregnant (Lindhardt et al., 2013) and postpartum (Mulherin, Miller, Barlow, Diedrichs, & Thompson, 2013) individuals report weight stigmatization. This finding is reflected in our findings which demonstrated consistent internalized weight stigma scores among prenatal and postpartum individuals. Specifically, internalized weight stigma is characterized by the acceptance and incorporation of society's negative stereotypes about weight into ones sense of self and personal value system (Livingston & Boyd, 2010). Thus, the integration of negative weight-based stereotypes into one's personal value system suggests weight bias internalization is likely expressed as a long-term versus transient quality among perinatal individuals.

Yet, other research suggests individuals experience and perceive varying levels of weight stigmatization throughout the perinatal period. A systematic review addressing individual's experiences of pregnancy and postpartum body image revealed pregnant individuals legitimized and accepted weight gain and heavier body size due to the functional and "mothering" role of pregnancy. After birth, however, individuals perceived social pressure to reclaim a "non-pregnant" body and held unrealistic weight or body image expectations (Hodgkinson, Smith, & Wittkowski, 2014). This finding suggests individuals may be more susceptible to weight stigmatization during the postpartum period, at which time perceived pressure to lose pregnancy weight is increased (Clark, Skouteris, Wertheim, Paxton, & Milgrom, 2009). Our study did not detect significant mean differences in prenatal and postpartum internalized weight stigma scores. However, nuances in how individuals experience and perceive internalized weight stigma throughout pregnancy and postpartum may exist. For instance, internalized weight stigma may be less variable for individuals with pre-pregnancy overweight or obesity but more variable among individuals without. Research examining body image changes from pregnancy to postpartum have yet to explore trajectories of perinatal body image based on pre-pregnancy BMI (Fuller-Tyszkiewicz, Skouteris, Watson, & Hill, 2013; Hodgkinson et al., 2014), representing a gap in the literature that deserves future investigation.

In this analysis, we found no association between prenatal WBIS scores and breastfeeding initiation, continuation, or exclusivity at one month postpartum. This is contrary to the literature which suggests individuals with increased BMI experience disparate breastfeeding support from healthcare professionals, which has potential to influence breastfeeding behavior and outcomes. Healthcare professionals (nurses, lactation consultants, physicians, midwives) are less likely to provide breastfeeding information to obese individuals (Kair & Colaizy, 2016) and

only 2% of patients with obesity reported being counseled about weight-related breastfeeding challenges by their healthcare professional (Hawkins et al., 2019). Also, healthcare professionals have viewed offering postpartum breastfeeding care to obese individuals as more challenging, time consuming and physically demanding compared to postpartum people of normal weight (Garner et al., 2014).

While not addressed in the current study, internalized weight stigma during pregnancy may indirectly influence breastfeeding outcomes via biophysical stress mechanisms. Research demonstrates weight stigmatization, including internalized weight stigma, is a physiologically stressful experience that results in elevated cortisol concentrations (Tomiyama et al., 2014). Maternal cortisol concentrations are transferred from plasma to breast milk, suggesting maternal cortisol levels directly influence breast milk composition (Hamosh, 2001). Several studies have discovered an association between breast milk cortisol concentration and infant behavior including increased temperamental negativity such as sadness and fear (Grey et al., 2013). This emotional distress may lead to infants who are irritable and restless and less likely to successfully latch when attempting to breastfeed (Nolvi et al., 2018). Maternal distress and hair cortisol concentrations were also positively associated with delayed onset of lactogenesis (mature milk production), suggesting perceived and biophysical stress (cortisol) are related to delayed milk production in postpartum individuals (Caparros-Gonzalez et al., 2019). This is particularly concerning for individuals with higher BMIs, who are already at increased risk of delayed onset of lactogenesis independent of maternal biopsychosocial stress (Nommsen-Rivers et al., 2010). However, cortisol levels have yet to be examined as a potential factor influencing the relationship between internalized weight stigma and subsequent infant feeding behaviors. Future research should consider potentially moderating biological correlates of internalized

weight stigma (cortisol) to more fully explore weight stigma's influence on breastfeeding behavior.

Interestingly, our finding that older participants had lower odds of breastfeeding initiation and continuation at one month postpartum is at odds with most research finding that older parents tend to have better breastfeeding outcomes (Silva et al., 2019). A nationally-representative cross-sectional study conducted in the United States discovered a positive relationship between higher maternal age and breastfeeding outcomes including initiation, duration and exclusivity (Jones et al., 2011). However, an Italian prospective, observational study examining determinants of breastfeeding among 640 healthy mother-baby dyads found older individuals were less likely to breastfeed at 3 months postpartum (Colombo et al., 2018), which may explain our findings as over a third (35%) of our sample was age 30 or above. Additionally, our sample was primarily multiparous individuals with almost half (48%) reporting prior breastfeeding experience. Research indicates individuals are less likely to initiate or continue breastfeeding if they had prior negative breastfeeding experiences (Schafer, Campo, Colaizy, Mulder, & Ashida, 2017). Therefore, individuals in our sample may have experienced previous breastfeeding challenges which negatively influenced their initiation and continuation rates.

Another important consideration in this analysis is that the sample was comprised of a majority of Black participants (66%). Nuances may exist how individuals of varying racial and ethnic identities and backgrounds experience and perceive weight stigma. Some research suggests that Black men and women report less weight bias internalization compared to white men and women (Himmelstein, Puhl, & Quinn, 2017). Additionally, there are documented differences in body image and beauty ideals among Black and white individuals (Dorsey,

Eberhardt, & Ogden, 2009; Grabe & Hyde, 2006; Hebl, King, & Perkins, 2009). These differences were supported in our data, with lower mean WBIS scores for Black compared to white participants.

This analysis has several limitations. Less than 10% of study participants did not initiate breastfeeding. This was not unexpected, as our eligibility criteria specified an intention to breastfeed during pregnancy—which is consistently one of the strongest predictors of breastfeeding initiation (Linares, Rayens, Gomez, Gokun, & Dignan, 2015; O Lutsiv et al., 2013). Small cell size for the breastfeeding initiation variable led to a large odds ratio and wide confidence interval suggesting low precision in outcome prediction. Thus, future research should examine the relationship between weight stigma and breastfeeding intention and initiation for those who express more ambivalence toward breastfeeding. Another limitation was our small sample size (N=95), reducing our ability to detect statistical signifance for our outcomes of interest. We also had a relatively short, single follow-up point of one month postpartum and did not examine reasons for breastfeeding cessation or formula introduction. It remains unknown whether internalized weight stigma exerts an impact on breastfeeding outcomes later in the postpartum trajectory, how it affects different groups of pregnant or postpartum individuals, or whether the WBIS fully captures varying degrees and experiences of internalized weight stigma.

To the last point, while validated among adults (Durso & Latner, 2008) and adolescents (Ciupitu-Plath et al., 2018) with overweight or obesity, the WBIS has not been validated amongst pregnant or postpartum individuals and therefore may not accurately assess the specific types of weight stigma experienced in the perinatal period. The transition to motherhood, whether for the first time or for subsequent children, is a unique time of vulnerability due to inherent weight fluctuations and rapidly changing perceptions about weight and mood (Silveira

et al., 2015). Additionally, societal views of an “ideal” postpartum body image and pressure to lose pregnancy weight (Watson et al., 2015) further compound this transitional time and pose unique opportunities for weight stigma to perpetuate. Therefore, a perinatal-specific weight stigma inventory may be needed to most precisely capture the weight stigma experience of perinatal individuals.

3.1.5 Conclusion

In this prospective longitudinal study among individuals with pre-pregnancy overweight or obesity intending to breastfeed, we found no change in internalized weight stigma scores as measured by the WBIS from the third trimester of pregnancy to one month postpartum. We did not find prenatal internalized weight stigma predictive of breastfeeding initiation, continuation, or exclusivity. Future research is needed to explore the influence of pregnancy-specific weight stigma on infant feeding behavior and potential moderating biopsychosocial correlates of internalized weight stigma

3.2 Manuscript #2 (Qualitative Aim)

3.2.1 Introduction

Individuals with pre-pregnancy overweight and obesity are uniquely susceptible to weight stigmatization during interactions with perinatal healthcare professionals (Dieterich & Demirci, 2020; Furness et al., 2011). This risk is especially probable considering that the perinatal period is marked by an increased frequency of interactions with the healthcare system and is a time of increased body image and weight-related sensitivity, and mood fluctuations (Silveira et al., 2015).

Weight stigmatization has been demonstrated when healthcare providers engage in less patient-centered communication and rapport-building during interactions with heavier pregnant patients as compared to those without overweight or obesity (Washington Cole et al., 2017). When asked about their views regarding obesity management strategies in pregnancy care, individuals reported “fat phobic” encounters with healthcare professionals and felt singled out because of their weight. These participants also described feeling shamed by their healthcare professionals based on development of weight-related obstetric complications (Parker, 2017). Other pregnant individuals reported feeling stigmatized for their weight during interactions with the media, strangers, family members, and society in general (Angela C. Incollingo Rodriguez, Dunkel Schetter, & Tomiyama, 2020).

The consequences of weight stigma have the potential to influence parental breastfeeding behaviors. Individuals who experience weight stigmatization are at increased risk for emotional and psychological distress including low self-esteem, body image dissatisfaction, depression and anxiety (Friedman et al., 2005; Wu & Berry, 2018). The negative sequelae of weight stigma have potential to influence breastfeeding in that postpartum depression symptomology at one week postpartum is associated with higher likelihood of breastfeeding cessation at four and eight weeks postpartum, and lower breastfeeding self-efficacy (Dennis & McQueen, 2007). Among individuals with obesity, higher body image dissatisfaction scores were associated with suboptimal breastfeeding outcomes, including lower odds of maintaining any breastfeeding at 6-8 weeks postpartum compared to individuals with lower scores (Swanson et al., 2017). Lower breastfeeding rates among individuals with overweight or obesity are problematic considering breastfeeding's unique benefits for this population including well-documented cardio-metabolic protective effects (Gunderson et al., 2015; Natland Fagerhaug et al., 2013) and role in reducing gestational weight gain retention (Sharma et al., 2014).

The association between elevated body mass index (BMI) and low breastfeeding rates have been established. However, the experience of pregnant and postpartum individuals with overweight or obesity and their view of weight stigmatization in perinatal care as it relates to their breastfeeding experiences has not been previously explored. Such data has the potential to add to the state of the science on lactation support for individuals across the BMI continuum. Our study objective was to solicit experiences, perspectives, and concerns from obese and overweight postpartum individuals who intended to breastfeed and explore if and how they perceived weight stigma impacted their breastfeeding counseling, decisions, and experiences.

3.2.2 Methods

Design Overview

We used a qualitative descriptive approach to explore postpartum individuals' experiences of weight stigma during interactions with perinatal healthcare professionals and its perceived influence on their breastfeeding experiences. Participants were purposively selected from a larger mixed methods study examining the relationship between weight stigma and breastfeeding outcomes among individuals with pre-pregnancy overweight or obesity (N=103). Qualitative description provides a comprehensive summary of a phenomenon of interest and stays close to the data, allowing participant's words to be self-evident (Sandelowski, 2000). By not forming a priori hypotheses, this method reduces investigator biases by preventing expected findings from influencing the data collection and analysis process (Patton, 2015).

Recruitment and Setting

Participants were recruited from a university-based research registry website and a single prenatal clinic within a hospital in Southwestern Pennsylvania from November 2019 to March 2020. Eligible participants met the following criteria: 1) ≥18 years of age, 2) 28-40+ weeks pregnant, 3) pre-pregnancy BMI ≥ 25, 4) planning to breastfeed or express milk for their infant, and 5) able to speak and read English fluently. Pre-pregnancy BMI documented in the medical record at first prenatal visit was used. If BMI was unavailable in the medical record or if the first prenatal visit occurred beyond 12 weeks of pregnancy, BMI was calculated using self-reported pre-pregnancy height and weight. Participants were compensated with a $25 gift card upon completion of the overall study. This study was approved by the University of Pittsburgh Institutional Review Board (IRB). Written informed consent was obtained from each participant.

Interview participants were purposively selected from the larger study using maximum variation sampling, a form of purposeful sampling that emphasizes breadth of understanding in relation to a concept of interest (Palinkas et al., 2015). Participant characteristics we considered pursuant to achieving maximum variation included prenatal BMI, third-trimester perceived weight stigma scores generated from the Weight Bias Internalization Scale (WBIS), and demographics associated with breastfeeding practices (education level, race). The intent of this study was not to obtain thematic saturation within WBIS score ranges, demographic categories, or across BMI ranges, but rather to provide a broad summary of how individuals experienced perinatal weight stigma and its influence on breastfeeding. The WBIS measures internalized weight stigma – the degree to which an individual believes negative weight-based stereotypes applies to oneself (Durso & Latner, 2008). Participants completed the WBIS within four months prior to the phone interview.

Data Collection

A semi-structured interview guide was developed in conjunction with co-authors as respective experts in obstetrics, lactation, health communication, and qualitative research methods. The interview guide was piloted with several colleagues who self-identified as having overweight or obesity and breastfeeding experience and modified based on feedback obtained. It was further updated throughout the data collection process to establish consensus and divergence in topics broached by participants and in themes emerging on preliminary review. During the interview participants were queried on perceptions of their weight and weight stigma (in general and during perinatal period) and its relationship with their breastfeeding experience or behaviors. See supplementary file for final interview guide. All interviews were conducted via telephone at 1-2 months postpartum. This timepoint was chosen to minimize recall bias regarding events and

interactions that occurred during pregnancy and early postpartum which may have impacted breastfeeding initiation. Interviews were conducted from January 2020 to June 2020 and were completed by the first author, a doctoral candidate with clinical obstetric experience and extensive training and practice on interviewing strategy.

Interviews were audio-recorded and transcribed verbatim using NVivo's online transcription platform (QSR International, 1999). During the interviews, probing and summarizing were used to generate further explanation from participants and to confirm mutual understanding during conversation, respectively. Throughout data collection and analysis, the interviewer kept a reflexive journal to track methodological decisions and rationale and to minimize personal biases possibly influencing data collection and analytical decisions. The reflexive journal was used during team discussions to inform sampling decisions, coding, and theme development.

Analysis

We performed content analysis following six phases: familiarizing oneself with the data, initial code development, searching for themes, reviewing themes, defining and naming themes, and reporting analysis of findings. Qualitative content analysis is the strategy of choice for qualitative descriptive studies (Sandelowski, 2000), lends itself to varying depths of interpretation (Graneheim & Lundman, 2004) and examines both manifest and latent content (Downe-Wamboldt, 1992). Data analysis and collection occurred concurrently and iteratively. Interviews were conducted until informational redundancy in interviews was reached, additional data did not generate novel themes and linkages between categories were fully developed (Saunders et al., 2018).

Raw interview data were coded by the first author (RD) and a trained research assistant (CW) using NVivo 12 qualitative analysis software (QSR International, 1999). The first five transcripts were coded separately to develop the initial coding schema. This initial coding included line-by-line review for content broadly pertaining to experiences of weight stigmatization, breastfeeding, and the relationship between the two (Bengtsson, 2016). Memos were used by both coders throughout the initial coding process regarding evolving impressions related to preliminary findings. After the initial coding schema was developed, the coding was refined based on data from subsequent interviews.

RD then selectively coded all transcripts with CW coding a random 50% sample. RD and CW met twice per month during the selective coding phase to settle coding discrepancies, refine codes, and discuss emerging themes. Additional formal and informal debriefing meetings were held with senior authors during data collection and analysis to discuss sampling decisions, interview guide modifications, and theme development.

In developing themes, codes were sorted into broad topical categories (Hsieh & Shannon, 2005) and the relationships among codes using the subsumed codes and supporting quotes were explored. In the final phase of analysis, themes were woven into a succinct story reflective of participants' experiences.

To enhance trustworthiness during data analysis, an audit trail was maintained to explain decision rules and justifications related to the coding schema, as well as theme refinement and finalization. To preserve participants' voices and the authenticity of their original interpretations, we sought to use participants' words in coding, theme development, and in supporting quotes for each theme wherever possible (Guba & Lincoln, 2001; Sandelowski, 2000). Three interview

participants were re-contacted to review study results and conclusions. All participants concurred with our interpretation of findings and did not have substantive additions.

3.2.3 Results

We interviewed 18 participants at 1-2 months postpartum. Interviews ranged from 25 to 40 minutes long. The sample consisted primarily of Black, single, multiparous individuals. Participants interviewed had prenatal WBIS scores ranging from 11 to 56.

Three themes emerged that encompassed participants' perceptions of weight stigma during interactions with healthcare professionals during pregnancy and postpartum and its influence on their breastfeeding experiences: 1) *"Size Doesn't Matter: They Looked Beyond the Scale"*, 2) *"My Self-Confidence and Desire to Breastfeed is More Important than Weight"* and 3) *"I Was on My Own" – Limited Social Support not Weight Stigma Influenced Breastfeeding*

"Size Doesn't Matter: They Looked Beyond the Scale"

Participants felt obstetric and postpartum healthcare professionals genuinely cared about the health and wellbeing of them and their infants. When asked about experiences communicating with perinatal healthcare professionals in relation to weight, participants specified they did not feel "personally attacked" or "judged" based on weight. Participants felt weight gain monitoring during prenatal visits and discussions about weight, nutrition or exercise were positive, necessary aspects of their prenatal care. As one participant stated, "I didn't feel discouraged or talked down to when they mentioned weight gain [gestational] because I knew they wanted what's best for me and baby…it was because they want to keep me and baby safe, so I didn't mind it."

Participants described healthcare professionals (nurses, obstetricians, pediatricians, lactation consultants) as less concerned about numerical weight or BMI and more focused on other health indicators when delivering prenatal education including nutrition status, physical activity, engagement with routine perinatal testing, mental wellbeing, and social support systems. Ultimately, this engendered a sense of trust that providers were competent and well-intentioned. In at least one case, the capacity to look beyond pregnancy and plan for future health promoting activities, including breastfeeding was described:

> It made me feel comfortable and less worried or stressed about having the baby so I think that might have helped me to focus on breastfeeding and just being more patient and being able to go with the flow. Knowing they had my and the baby's best interests in mind helped me relax more, helped me not be so anxious about having the baby…learning to breastfeed.

Participants also felt that perinatal healthcare professionals provided education and care, including breastfeeding support, that did not expressly incorporate weight-specific considerations. This was viewed positively:

> The breastfeeding lady didn't see my weight, she saw me, a mom who needed help breastfeeding to get her baby to eat better. I don't feel they should be aware of - I mean that sort of thing [my size]. The only thing they were concerned about me with the breastfeeding was my medication. And I think that's a good thing.

Participants contrasted their generally positive experiences around weight and weight-related discussions involving perinatal providers with stigmatizing encounters they experienced

in other healthcare settings. In these settings, (primary care, specialists) participants recounted feeling "talked down to," being told "what to do," and judged. As one participant described:

> I went to a doctor one time, I guess he was an orthopedic or something like that. It was about my back hurting, I was in a car accident. And I went in about my back hurting and they put a lot of emphasis on saying it's because of my weight…they shouldn't be looking at my body, you know for my symptoms. They shouldn't use my appearance as a reason to blame me for my symptoms or health issues.

Another participant similarly shared dislike of how a primary care provider had addressed weight by highlighting BMI:

> [My primary care office] prints out these reports and it tells you your BMI on it. And its like, how is that number even relevant to my health care and the reason for my visit. That number, BMI, is almost like a standardized test in high school or something, where the visit just becomes all about this number."

"My Self-Confidence and Desire to Breastfeed is More Important than Weight"

In general, participants described themselves as having high self-confidence, especially in relation to weight and body image. They felt weight was not a defining feature of their personal identity. One participant explains the importance of this confidence:

> It would be hard for someone to take me down because of my size or looks, since I am generally confident about myself that way. I feel good and I think I look just fine, even if I would like, decide to lose a few pounds, I think I would still be just as happy with myself as I am now.

Individuals were more concerned with obtaining necessary breastfeeding information and support from perinatal healthcare providers, versus any potential for weight stigmatizing encounters with the same providers. When asked to imagine interacting with a healthcare professional who engaged in weight-stigmatizing behaviors, participants predicted that such behaviors would have negligible or no impact on breastfeeding behaviors. Participants exhibited self-advocacy in relation to obtaining and accepting breastfeeding support to meet personal breastfeeding goals:

> I would probably call [the healthcare professional] out for saying something rude or whatever [about my weight or size] but I wouldn't pay it any mind. Generally, people can't say or do things to make me feel bad about myself. So, I would still ask whatever breastfeeding type question I had, since if I need the help, I am gonna make sure I get it. Since I am here for my baby, and if I have breastfeeding issues or a question then I would still ask to make sure I get the breastfeeding info I need to help my baby and keep her healthy.

Participants who expressed more discomfort or ambivalence about their body size, however, were not as willing to self-advocate for breastfeeding needs in a hypothetical scenario where a healthcare professional made them feel stigmatized. Rather, participants imagined weight-stigmatizing comments or attitudes from healthcare professionals would lead to an aversion and reluctance to communicate: "I would never ask for help. If they [healthcare professional] made me feel uncomfortable because of my weight or judged me because of my weight, whatever, I wouldn't ask for help with the breastfeeding stuff. I wouldn't."

"I Was on My Own" – Limited Social Support not Weight Stigma Influenced Breastfeeding

When asked to explain what weight stigma meant to them in terms of breastfeeding, participants recognized the existence of weight stigma and weight discrimination in society, but denied that it had any bearing on their breastfeeding experiences. One participant explained:

> [Weight stigma is] just like fat phobia in general, which I think comes from society itself. What society thinks is acceptable or desirable. The media seems to prefer smaller women, and people who are fit and in shape. And because weight stigma is on systemic level I think it's there internally in people within their self-talk and in their families…but that [prior weight stigmatization from family] hasn't stopped me from wanting to breastfeed. Hasn't gotten in the way of me getting the breastfeeding help I needed.

While current or previous weight stigmatization from family, society, and healthcare professionals did not appear to influence participants' breastfeeding experiences, participants described lack of social support as a major detractor to their morale to begin and/or continue breastfeeding. Limited breastfeeding support from family members was a recurrent issue for some participants, which led to ambivalence and uncertainty about their initial intention to breastfeed. This participant detailed this negative pressure from others: "People [family] telling me I should not breastfeed since it's too time consuming, I heard that like a lot. And then people telling me, if you gonna work, you shouldn't breastfeed…That its [breastfeeding] not for everybody."

Another participant shared similar experiences from close support people: "There are certain people, close relatives of mine, my mom. She doesn't care for breastfeeding. It was funny because she was completely against it."

Lack of breastfeeding support became especially apparent during the COVID-19 pandemic and its associated restrictions on social interactions with family, friends, and breastfeeding support personnel. One participant described:

> Because of COVID-19, there were no lactation consultants available at the hospital. I never felt like I got the social support from others with breastfeeding because of COVID-19. Everyone is just quarantining, so I haven't been able to see anyone really or get that social support for me breastfeeding.

Another participant echoed that the impact COVID-19 attributed to isolation and decreased in-person services:

> Weight stigma didn't bother me with my breastfeeding, like even breastfeeding in public I felt comfortable with that. But I wasn't able to go to a breastfeeding group in person or to a breastfeeding center since things started closing down due to COVID-19…I felt like I was on my own. For me, the [breastfeeding] difficulty I was having with the baby, it wasn't conducive to talking to someone over the phone about it.

3.2.4 Discussion

This qualitative descriptive study explored postpartum individuals' recalled experiences of weight stigma during interactions with perinatal healthcare professionals and its perceived influence on their breastfeeding experiences. The perspectives of the 18 participants with overweight or obesity included in this study indicated that their interactions with perinatal healthcare professionals (including, nurses, physicians, lactation consultants, pediatricians) were

largely positive and did not focus on weight or BMI. Participants displayed high self-confidence and breastfeeding self-advocacy behaviors and infrequently experienced weight stigmatization during medical encounters in the pregnancy and postpartum period. Participants denied that weight stigma impacted (or had the potential to impact) their confidence in their ability to breastfeed; a lack of social support was noted as a significant barrier to initiating breastfeeding or overcoming breastfeeding challenges, however.

Our findings are in contrast to previous qualitative work suggesting that pregnant individuals with high BMI experience discriminatory and suboptimal communication with obstetric healthcare professionals (Furness et al., 2011). In a Danish study using in-depth interviews with 16 obese pregnant individuals, the participants reported being treated with a lack of respect by healthcare professionals (midwives, primary care physicians, others); participants were met with an accusatorial tone during weight or gestational weight gain conversations, and reported poor communication with healthcare professionals (Lindhardt et al., 2013). Additionally, results from a large, cross-sectional investigation into the sources and experiences of weight stigma among 2,449 individuals discovered physicians (in general) were one of the most commonly reported sources of weight stigmatization (Puhl & Brownell, 2006). Meanwhile, our interview participants did not report similar experiences when interacting with perinatal healthcare professionals. Instead, participants valued lifestyle modification information as integral to a safe and healthy pregnancy.

Participants in our study collectively voiced high self-confidence, which appeared to protect individuals from perceiving or internalizing weight stigma in both the perinatal period and generally. However, participants did acknowledge the existence of weight stigma in society. Societal normalization of weight stigma may have contributed to participants' denial of weight

stigma during interactions with perinatal healthcare professionals. For example, weight stigma experienced or observed in society may desensitize individuals to weight stigma experienced during perinatal healthcare professional interactions.

Innate differences between perinatal-related healthcare encounters and those in other healthcare contexts may exist. For example, pregnancy and the postpartum period is marked by increased frequency and exposure to the healthcare system (American College of Obstetricians and Gynecologists (ACOG), 2012). The consistency and frequency of prenatal appointments may enable perinatal healthcare professionals to foster better relationships with patients. This differs from other healthcare professionals who periodically interact with patients during annual wellness visits or unexpected medical crises. For instance, a qualitative exploration into characteristics of quality prenatal care revealed pregnant individuals reported high levels of personalization, emotional support, and reassurance from prenatal care providers, which contributed to development of meaningful relationships with their care team (Sword et al., 2012). In the current study, interview participants described perinatal healthcare professionals as non-accusatory with a holistic, non-weight centric view of health. Because of this, healthcare professionals can reinforce positive patient-provider relationships - thereby facilitating open breastfeeding-related communication and instilling confidence in lactating parents with regard to their breastfeeding abilities.

Healthcare professionals' limited focus on weight-related breastfeeding considerations was positively viewed by interview participants. However, there may be tactful ways to incorporate weight considerations that have a documented impact on breastfeeding success. Such considerations include milk supply and breast size as lactating parents with heavier BMI's are more likely to experience perceived insufficient milk supply (Bever Babendure et al., 2015) and

larger breasts can cause positioning difficulties (Garner et al., 2017). Additionally, heavier individuals are more likely to experience obstetric complications (Ramonienė et al., 2017) leading to early separation with the baby, which is known to negatively influence breastfeeding behavior (Kachoria, Moreland, Cordero, & Oza-Frank, 2015). To promote patient's best interests, perinatal healthcare professionals may benefit from educating patients on potential weight-related breastfeeding challenges. In doing so, healthcare professionals can help patients reach personal breastfeeding goals by mitigating or preventing foreseeable breastfeeding issues. However, there is no research examining the best methods to broach these conversations or whether anticipatory or post-hoc management of weight-related breastfeeding challenges is more effective.

While social support is one of the most important factors in breastfeeding behavior regardless of body weight (Carlin, Mathews, Oden, & Moon, 2019; Laugen, Islam, & Janssen, 2016), it may be particularly important for overweight and obese individuals who report limited sources of social support. In fact, according to a qualitative study using semi-structured interviews, breastfeeding parents with obesity experienced more difficulty obtaining tangible breastfeeding social support compared to those without (Garner et al., 2017). Specifically, parents of heavier weight reported fewer sources of available breastfeeding social support and requiring more physical positioning assistance. Social support is particularly important for Black postpartum individuals, like those in our study. Shorter breastfeeding duration has been associated with lack of breastfeeding role models as revealed in an ethnographic investigation describing infant feeding perceptions of Black mothers (Asiodu, Waters, Dailey, & Lyndon, 2017). Additionally, "lack of support" from family, healthcare professionals and peers

contributed to decreased breastfeeding initiation and duration as found in focus groups with 15 Black breastfeeding parents (Lewallen & Street, 2010).

The interview data and resulting themes in the present study provided evidence that the social isolation instilled by COVID-19 further complicated participants' ability to access breastfeeding support. These findings are reflected in the voices of our participants. Future research is necessary to more fully understand not only COVID-19's influence on breastfeeding outcomes and experiences (especially among individuals with overweight or obesity) but also how other instances of social isolation may influence breastfeeding practices.

Research indicates Black individuals are less likely to report weight stigmatization compared to White individuals (Himmelstein et al., 2017) and cultural differences may exist with regard to aesthetic ideals (Kelch-Oliver & Ancis, 2011; Tiggemann, 2011). This may have influenced participants' experience of weight stigmatization during the perinatal period and its influence on breastfeeding behavior. For instance, while it is known some individuals with pre-pregnancy overweight or obesity experience discomfort breastfeeding in public due to body image concerns (Zimmerman et al., 2018), this may not be a significant issue for Black individuals, such as those in our study who collectively voiced high self-confidence.

We recognize several limitations to this study. Because participants were recruited in a four-month period from a single prenatal clinic, findings may not be applicable to individuals from other cultural backgrounds, with higher socioeconomic status, or to other settings. Additionally, racial discordance between Black participants and the white interviewer may have prevented participants from sharing information as they would if the participant and interviewer shared a similar cultural identity (Shen et al., 2018). Rapport-building was limited due to the cross-sectional nature of interviews, potentially restricting disclosure of uncomfortable or painful

events. Lastly, while we interviewed participants across a wide range of weight stigma scores based on the third-trimester WBIS administration, few individuals were available who had high scores and high degrees of weight bias internalization. The current study did not seek to nor reach thematic saturation within certain WBIS score ranges. Therefore, potential nuances in weight stigma-related breastfeeding experiences and perceptions among those with high versus low internalized weight stigma remain unknown. Perceptions and experiences of perinatal weight stigma in relation to specific degrees of weight stigma or demographic characteristics requires further exploration.

3.2.5 Conclusion

While participants in this sample recognized the existence of weight stigma in other settings, they did not perceive it during encounters with perinatal healthcare professionals. Additionally, individuals did not perceive weight stigma in any setting as influential on their breastfeeding experiences or practices. Future research should explore the perception of pregnancy-related weight stigma among other cultural groups and potential care delivery approaches that mitigate weight stigmatization during perinatal healthcare professional encounters.

Table 1: Relationship between maternal and infant [categorical/continuous- level] characteristics and breastfeeding outcomes

(adjusted odds ratio based on full model with all covariates simultaneously entered)

		Initiated Breastfeeding			Any Breastfeeding at 1 Month			Exclusive Breastfeeding at 1 Month		
Demographic Categorical	Total n (%)	N (%)	uOR (95% CI)	a(OR) (95% CI)	N (%)	uOR (95% CI)	aOR (95% CI)	N (%)	uOR (95% CI)	aOR (95% CI)
Overall	103 (100)	86/95 (91)			63/95 (66)			16/95 (17)		
Ethnicity										
Hispanic	3 (3)	3 (4)	.00 (.00, N/A)	7.75 (.00, N/A)	3 (6)	.00 (.00, N/A)	139.2 (.00, N/A)	1 (6)	.395(.03,4.64)	.851 (.008, 86.8)
Non-Hispanic	100 (97)	83 (96)	1.0	1.0	59 (94)	1.0	1.0	15 (94)	1.0	1.0
Race										
White/Caucasian	23 (22.3)	21 (24)	.00 (.00, N/A)	.00 (.00, N/A)	16 (25)	.533 (.09, 3.18)	.30 (.026, 3.56)	5 (31)	.588(.12,2.80)	.763 (.034,17.06)
Black/African American	68 (66)	53 (62)	.00 (.00, N/A)	.00 (.00, N/A)	37 (59)	.308 (.06, 1.53)	.24 (.025, 2.28)	7 (44)	.259(.06,1.09)	.676 (.03, 17.06)
Other	12 (11.7)	12 (14)	1.0	1.0	10 (16)	1.0	1.0	4 (25)	1.0	1.0
Education										
Some high school	8 (7.8)	5 (5.8)	.00 (.00, N/A)	.00 (.00, N/A)	3 (4.8)	.00 (.00, N/A)	.00 (.00, N/A)	2 (12.5)	.417 (.053,3.3)	1.042 (.066, 16.44)
Graduated high school	47 (45.6)	39 (45)	.00 (.00, N/A)	.00 (.00, N/A)	27 (42.9)	.00 (.00, N/A)	.00 (.00, N/A)	3 (18.8)	**.094(.016,.55)**	.179 (.016, 2.03)
Vocational/Some college/Associates	39 (37.9)	33 (38)	.00 (.00, N/A)	.00 (.00, N/A)	24 (38.1)	.00 (.00, N/A)	.00 (.00. N/A)	7 (43.8)	.312(.066,1.5)	.387 (.045, 3.33)
Bachelors degree or above	9 9 (8.7)	9 (10.5)	1.0	1.0	9 (14.3)	1.0	1.0	4 (25)	1.0	1.0
Marital Status										
Married	17 (16.5)	14 (16)	1.52 (.164,14.1)	.000 (.000, 1.28)	13 (20)	4.55 (.93,22.31)	2.76 (.32, 24.3)	4 (25)	1.69(.44,6.56)	.172 (.009, 3.4)
Living with partner	31 (30.1)	26 (30)	.942 (.21, 4.26)	2.22 (.017, 297)	20 (32)	1.56 (.59, 4.08)	2.75 (.59,12.68)	3 (19)	.538(.13,2.17)	.05 (.002, 1.04)
Single	55 (53.4)	46 (54)	1.0	1.0	30 (48)	1.0	1.0	9 (56)	1.0	1.0
Employment status										
Working same hours as before pregnancy	26 (25.2)	20 (23)	.308 (.067,1.42)	.000 (.00, .216)	17 (27)	1.06 (.37, 3.06)	.588 (.135,2.56)	6 (37)	4.1(.925,18.2)	3.17 (.26, 38.55)
Working fewer hours as before pregnancy	16 (15.5)	15 (17)	1.15 (.11,11.98)	.004 (.00, 16.57)	9 (15)	.643 (.19, 2.09)	.263 (.048,1.45)	4 (25)	4.3(.85,22.13)	4.25 (.27, 65.97)
On leave until baby's birth	14 (13.6)	11 (13)	124.2 (.00, N/A)	2.87 (.00, N/A)	8 (13)	1.33 (.31, 5.82)	.454 (.059,3.48)	2 (12)	2.89(.42,19.9)	3.0 (.12, 75.08)
No	46 (44.7)	39 (45)	1.0	1.0	28 (45)	1.0	1.0	3 (19)	1.0	1.0
Previous breastfeeding experience										
Yes	49 (47.6)	45 (52)	.26 (.051, 1.33)	5.91 (.217, 1.61)	36 (57)	**.39 (.162, .95)**	2.63 (.71,9.71)	10 (62)	.529 (.18,1.59)	5.95 (.67, 53.04)
No	54 (52.4)	41 (48)	1.0	1.0	27 (43)	1.0	1.0	6 (38)	1.0	1.0
WIC enrollment										
Yes	84 (81.6)	69 (80)	1.97 (.23,16.85)	.013 (.000, 7.96)	48 (76)	3.02 (.81,11.34)	.622 (.10,3.87)	9 (38)	**4.81 (1.5,15.6)**	.073 (.005, 1.09)
No	19 (18.4)	17 (20)	1.0	1.0	15 (24)	1.0	1.0	7 (62)	1.0	1.0
Delivery type										
Vaginal	70 (68)	61 (71)	.512 (.13, 2.07)	432 (.42, 4479)	46 (73)	.616 (.25, 1.53)	.532 (.206,2.68)	11 (69)	1.04 (.33,3.33)	.886 (.113, 6.94)
Cesarean section	33 (32)	25 (29)	1.0	1.0	17 (27)	1.0	1.0	5 (31)	1.0	1.0
NICU admission										

Yes No	9 (8.7) 94 (91.3)	5 (6) 81 (94)	2.02 (.21,19.53) 1.0	.000 (.00, 21.22) 1.0	5 (8) 58 (92)	.374 (.04, 3.35) 1.0	1.49 (.13,17.07) 1.0	2 (12) 14 (88)	.373 (.06,2.24) 1.0	**39.41 (1.20, 1288)** 1.0
Documented formula in hospital Yes No	 84 (81.6) 19 (18.4)	 68 (79) 18 (21)	 213 (.00, N/A) 1.0	 .000 (.00, N/A) 1.0	 45 (71) 18 (29)	 114.8 (.00, N/A) 1.0	 .000 (.00, N/A) 1.0	 9 (38) 7 (62)	 **4.81(1.5,15.6)** 1.0	 .179 (.014, 2.27) 1.0
*Maternal complications (pre-existing and obstetric) Yes No	 35 (34) 68 (66)	 28 (33) 58 (67)	 .603 (.15, 2.42) 1.0	 .597 (.139, 2.56) 1.0	 21 (33) 42 (67)	 .955 (.39, 2.34) 1.0	 .819 (.25, 2.68) 1.0	 1 (6) 15 (94)	 **.103 (.01,.821)** 1.0	 11.81 (.62, 225) 1.0

**** P-value based on Wald statistic; BMI = body mass index; WBIS = weight bias internalization scale; OR= odds ratio**; Adjusted for ethnicity, race, maternal age, education level, employment status, marital status, WIC enrollment, prenatal BMI, previous breastfeeding experience, NICU admission, formula use in hospital, delivery type, and maternal complications.*

Footnote: Maternal complications include prediabetes, gestational diabetes, type I DM, type II DM, chronic hypertension, gestational hypertension, pre-eclampsia, breast augmentation or other surgery, placenta previa, PPROM, IUGR, preterm labor, suspected or confirmed chorioamnionitis, vacuum or forceps use, infant demise*; **Bold text indicates significant at α = .05

Table 2. Continuous Covariates by unadjusted and adjusted odds ratio in predicting breastfeeding outcomes (full model)

	Breastfeeding Initiation		Breastfeeding Continuation		Breastfeeding Exclusivity	
Prenatal WBIS	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR (95% CI)	uOR (95% CI)	aOR(95% CI)
	.839 (.674, 1.04) p=.117	989 (.935, 1.047) p=.704	.948 (.889,1.01) p=.09	.986 (.951, 1.023) p=.45	.962 (.908, 1.02) p=.181	.984 (.882, 1.09) P=.767
Prenatal BMI	1.02 (.914, 1.13) p=.758	6.79 (.00, N/A) p=.99	.954 (.897, 1.01) p=.126	.960 (.887, 1.04) p=.315	.892 (.791, 1.00) p=.061	.825 (.648, 1.05) p=.119
Maternal Age	.766 (.44, 1.32) p=.338	.00 (.00, N/A) p=.98	.963 (.69, 1.32) p=.82	**.538 (.306, .947) p=.032**	1.33 (.867, 1.33) p=.191	.1.69 (.633, 4.52) p=.294

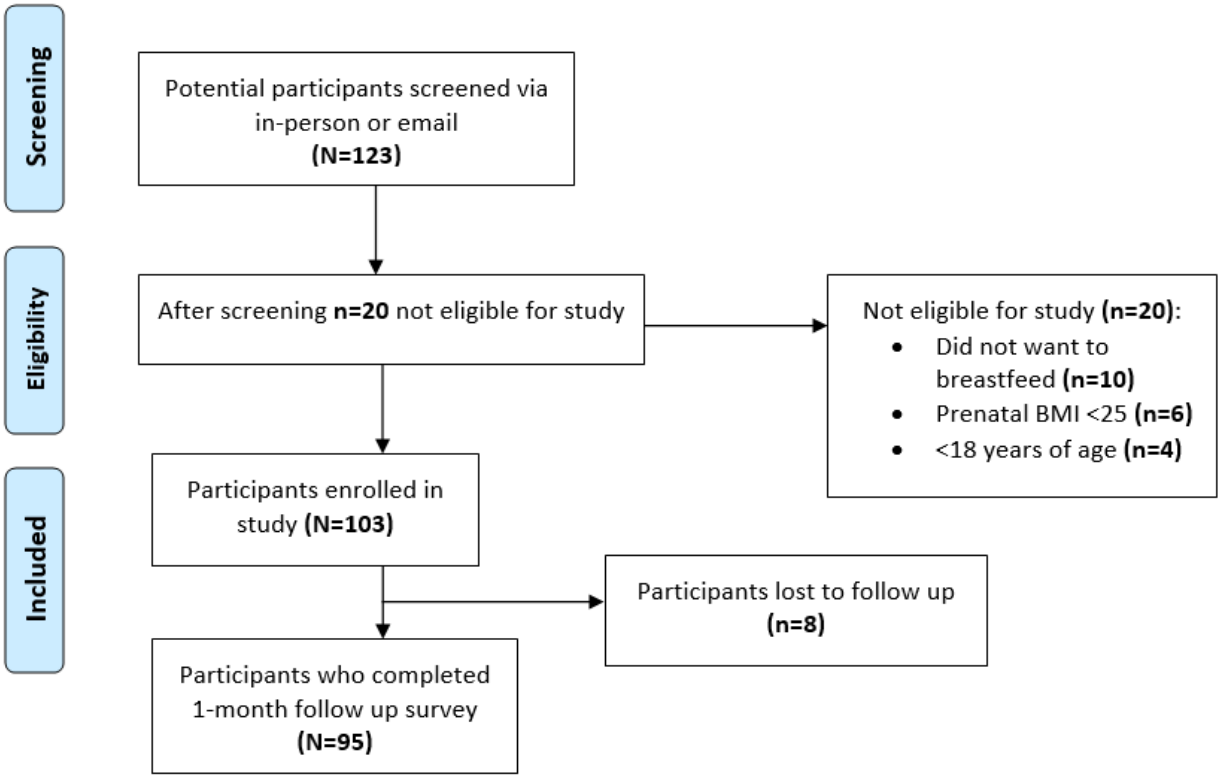
Adjusted for ethnicity, race, education level, employment status, marital status, WIC enrollment, previous breastfeeding experience, NICU admission, formula use in hospital, delivery type, and maternal complications.

Footnote: Maternal complications include prediabetes, gestational diabetes, type I DM, type II DM, chronic hypertension, gestational hypertension, pre-eclampsia, breast augmentation or other surgery, placenta previa, PPROM, IUGR, preterm labor, suspected or confirmed chorioamnionitis, vacuum or forceps use, infant demise;* **Bold text indicates significant at α = .05

Table 3. Characteristics of Interview Participants (N=18)

Categorical Characteristic	n (%)
Race	
White/Caucasian	3 (16.7)
Black/African American	13 (72.2)
Asian/Indian	1 (5.5)
Mixed-biracial	1 (5.5)
Ethnicity	
Hispanic	1 (5.6)
Non-Hispanic	17 (94.4)
Age	
18-21	2 (11.1)
22-25	6 (33.3)
26-29	3 (16.7)
30-33	3 (16.7)
34 and above	4 (22.2)
Education level	
High school degree or less	9 (50)
Some college, no degree	3 (16.7)
Associates or Vocational degree	3 (16.7)
Bachelor's Degree or above	3 (16.7)
Marital status	
Single	12 (66.7)
Married	2 (11.1)
Living with partner	4 (22.2)
Previous breastfeeding experience	
Yes	9 (50)
No	9 (50)
Delivery type	
Vaginal	12 (66.7)
C-S	6 (33.3)
Documented formula use in hospital	
Yes	13 (72.2)
No	5 (27.8)
Continuous Characteristic	M±SD (min, max)
Prenatal BMI	33.1±5.8 (25.4, 43)
Prenatal (3rd trimester) internalized weight stigma scores (WBIS)	28.4±14.4 (11, 55)
Postpartum internalized weight stigma scores (WBIS)	26.4±13.6 (11, 63)

Footnote: WBIS = Weight Bias Internalization Scale



Footnote: BMI = Body Mass Index

Figure 1**.** Study Approach and Enrollment Flow Chart

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Appendix

Interview "Guide" **Explore the impact of overweight and obese postpartum women's perceived weight stigma during patient-provider communication on their breastfeeding outcomes.**

First of all, thank you again for your time in talking with me today. So we know that women with higher BMIs don't always have positive interactions with the healthcare system. Research tells us that this can be even more common in pregnancy and in the obstetric setting, which can be a sensitive time for women. We hope to improve they way doctors, nurses, midwives etc. interact and communicate with patients – especially when providing breastfeeding information and support.

1. Can you tell me about how your healthcare providers interacted/communicated with you during and after your pregnancy (including labor and delivery)? Were there any positive or negative experiences that you remember? Helpful/unhelpful ways they interacted with you? Anything you would change about the way they interacted or communicated with you?

2. Pertaining to breastfeeding, what kind of breastfeeding support, resources, information was provided to you during and after your pregnancy? Who provided it, what was the format (class, verbal)? Was the timing of the information/support appropriate for you? Was the amount appropriate? Did you feel comfortable receiving this information/support?

3. Tell me what your ideal scenario would look like in terms of being offered breastfeeding support/information. Any info that you wish you would have gotten, but didn't?

As you know, this research as also about weight stigma.

4. When you think about the term "weight stigma", what comes to mind? What does this mean to you?

5. Conversations around weight, especially during pregnancy, can be difficult. What has been your experience with this in pregnancy? What about in other healthcare settings or after pregnancy?

How has this experience maybe influenced your conversations/relationship with your obstetric HCPs (about weight, BF, in general?)

6. How do you think weight/weight stigma and breastfeeding are related? What makes you think this way or what you experienced that makes you think this way. If you don't think they are related, why is this?

7. Lastly, explain a little about if/how your interactions with the healthcare system (doctors, midwives, nurses, etc) during and after your pregnancy (including labor and delivery) has influenced your breastfeeding practices. How do you think the way your providers talked with/interacted with you impacted your overall breastfeeding experience? Could your doctors, nurses, etc. have done anything differently to make your breastfeeding experience more positive? Or could they have done anything differently to help you achieve your breastfeeding goals?

**If they think providers are doing good job with bf help, a follow up point might be how they think their OB care compared to other care they've received in past in terms of weight stigma experienced. Do they think OB providers are better prepared, more sensitive, less sensitive, less time or more time to focus on weight issues?

**Have you experienced weight stigma in other healthcare interactions, why do you think your OB experience is different?

When you think about weight and breastfeeding, what comes to mind?

Weight Stigma in general, from society, media, etc?

University of Pittsburgh
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APPROVAL OF SUBMISSION (Expedited)

Date:	July 25, 2019
IRB:	STUDY19050061
PI:	Rachel Dieterich
Title:	Weight Stigma Related to Pregnancy and Breastfeeding Outcomes
Funding:	None

The Institutional Review Board reviewed and approved the above referenced study. The study may begin as outlined in the University of Pittsburgh approved application and documents.

Approval Documentation

Review type:	Initial Study
Approval Date:	7/25/2019

Determinations:	• Children • Pregnant women
Approved Documents:	• WBIS .docx, Category: Data Collection; • Semi-structured Interview Script , Category: Data Collection; • AWHONN Subject Screening Form_Version_1.01 (1).docx, Category: Data Collection; • AWHONN Consent Form UPDATED 7.25.19.pdf, Category: Consent Form; • AWHONN Flyer.pub, Category: Recruitment Materials; • AWHONN Subject Screening Form.docx, Category: Waiver Script; • AWHONN Telephone Screening Script _Version_0.01 (5).pdf, Category: Recruitment Materials;

As the Principal Investigator, you are responsible for the conduct of the research and to ensure accurate documentation, protocol compliance, reporting of possibly study-related adverse events and unanticipated problems involving risk to participants or others. The HRPO Reportable Events policy, Chapter 17, is available at http://www.hrpo.pitt.edu/.

Clinical research being conducted in an UPMC facility cannot begin until fiscal approval is received from the UPMC Office of Sponsored Programs and Research Support (OSPARS).

If you have any questions, please contact the University of Pittsburgh IRB Coordinator, Amy Fuhrman.

Please take a moment to complete our Satisfaction Survey as we appreciate your feedback.