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A Moderated Mediation Model of Maternal Perinatal Stress,

Anxiety, Infant Perceptions, and Breastfeeding

by

Jessica Petrányi Riedstra

A thesis

submitted in partial fulfillment

of the requirements for the degree of

Master of Science in the Department of Clinical Psychology

Idaho State University

Spring 2018

To the Graduate Faculty:

The members of the committee appointed to examine the thesis of Jessica Petrányi Riedstra find it satisfactory and recommend that it be accepted.

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February 9, 2018

Nicki Aubuchon-Endsley, PhD
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RE: Your application dated 2/5/2018 regarding protocol number 4191: Infant Development and Healthy Outcomes in Mothers (Idaho Mom Study)

Dear Dr. Aubuchon-Endsley:

Your request for renewal of the protocol listed above was reviewed 4/12/2016 meeting of the Idaho State University Human Subjects Committee.

This is to confirm that your request for renewal is approved. Your request to modify the protocol by modifying data storage procedures and adding assistants Joe Neal, Jessica Riedstra, Jason Gibbs, Taylor Ramos, Anika Lovgren, Nicole Douthit, Abby Prow, Hailey Wilcox, Sierra Clayson, Reilly Sasaki, and Jennifer Hambleton has been approved via Expedited Review.

You are free to proceed with your protocol as described effective immediately. The protocol is next subject to renewal on or before 2/9/2019, unless closed before that date.

As with the initial approval, changes to the study must be promptly reported and approved. Contact Tom Bailey (208-282-2179; fax 208-282-4723; email: humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

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A Moderated Mediation Model of Maternal Perinatal Stress,

Anxiety, Infant Perceptions, and Breastfeeding

Thesis Abstract-Idaho State University (2018)

Research suggests that United States (U.S.) mothers are not meeting recommended breastfeeding standards. The present study examines maternal perinatal stress, anxiety, breastfeeding difficulties, and misperceptions of infant crying as possible explanations. It was hypothesized that more breastfeeding difficulties would mediate the relationship between greater prenatal stress/anxiety and shorter breastfeeding duration, and perceptions of response to infant crying as spoiling would moderate the relationship between more breastfeeding difficulties and reduced breastfeeding duration. Furthermore, participants who breastfed through 6 months would demonstrate lower levels of postnatal stress/anxiety than those who discontinued breastfeeding. Among women who breastfed through 6 months there would be a positive relationship between fewer breastfeeding difficulties and lower levels of postnatal stress/anxiety. Participants included 94 expectant mothers at 33-37 weeks gestation and 6 months (±2 weeks) postpartum. Data analysis utilized SPSS and Hayes' PROCESS macro v2.16, model 14. Neither of the hypothesized moderated mediation models were statistically significant, nor were the postnatal analyses. Within one mediation model there was a significant direct effect of prenatal maternal anxiety on breastfeeding duration, such that greater prenatal anxiety was associated with a shorter breastfeeding duration (b=-25.253, t[93]=-2.325, SE=10.860, p=0.022). Prenatal maternal anxiety may be a target for prevention/intervention to increase breastfeeding duration.

Key Words: perinatal, stress, anxiety, infant crying, breastfeeding

A Moderated Mediation Model of Maternal Perinatal Stress, Anxiety, Infant Perceptions, and Breastfeeding

The present study aims to investigate the relationship between maternal perinatal stress and anxiety and breastfeeding behaviors, as well as the influence of breastfeeding difficulties and perceptions of infant crying on breastfeeding behaviors. In order to establish a basis for the present study, literature on breastfeeding policy and promotion, maternal stress and anxiety, biological, psychological, social, and cultural underpinnings of breastfeeding, and breastfeeding difficulties will be examined. The purpose of this project is to explore factors that influence breastfeeding behaviors so as to determine breastfeeding barriers and inform prospective interventions.

Breastfeeding Policy and Promotion

Scientific literature has established that breastfeeding results in a multitude of health benefits for both mother and child (Binns, Lee, & Low, 2016). The World Health Organization (WHO) recommends exclusive breastfeeding for the first 6 months of an infant's life, and continued breastfeeding through the age of 2 (World Health Organization, 2015). Furthermore, in 2011 the United States (U.S.) Surgeon General, Dr. Regina M. Benjamin, published *The Surgeon General's Call to Action to Support Breastfeeding*, calling for increased support for breastfeeding from, "families, friends, communities, clinicians, health care leaders, employers and policymakers" (U.S. Department of Health and Human Services, 2011, p. 1). According to the Centers for Disease Control and Prevention's (CDC) National Center for Chronic Disease Prevention and Health Promotion, breastfeeding rates have continued to rise in the United States, with 81% of infants beginning breastfeeding at birth, 52% breastfeeding at 6 months of age, and 31% breastfeeding at 12 months (Breastfeeding Report Card, 2016). In response to the Surgeon

General's call to action, the CDC outlined several steps to increase support for breastfeeding mothers, including increased education, personal support, and professional support including additional workplace resources (McGuire, 2014). Increasing breastfeeding rates may be attributed to breastfeeding education programs for pregnant women, especially those that include pre- and post-pregnancy interventions and lay support (Chung, Raman, Trikalinos, Lau, & Ip, 2008; Dennis, 2002). There has also been an increased emphasis on clinician, physician, and nurse breastfeeding education, so as to increase the quality of the support and resources available to lactating mothers (Deloian, Lewin, & O'Connor, 2015; Edwards et al., 2015). Researchers have found that breastfeeding promotion interventions are most effective when delivered in a variety of settings, including health, home, community, work, and policy environments (Sinha et al., 2015).

Beyond breastfeeding education and promotion interventions, several other community support programs have been created to assist breastfeeding mothers, including lactation consultants. The number of international board certified lactation consultants (IBCLCs) has steadily increased since 2011 (International Board of Lactation Consultant Examiners, 2016). Research has demonstrated the effectiveness of IBCLCs in providing increased support for mothers who have difficulty breastfeeding (Patel & Patel, 2016). Other assistance programs and policies include La Leche League International (LLLI) and The Baby-Friendly Hospital Initiative (BFHI; International Board of Lactation Consultant Examiners, 2016). LLLI was established 60 years ago to address the rapid decline in breastfeeding rates among U.S. women. The mission of LLLI is “to help mothers worldwide to breastfeed through mother-to-mother support, encouragement, information and education, and to promote a better understanding of breastfeeding as an important element in the healthy development of the baby and mother” (La

Leche League International, 2016, para. 1). LLLI provides online resources in nearly every language as well as local leaders in approximately 72 countries worldwide and at least one leader in each of the 50 U.S. states. Resources include forums to connect with other parents and local leaders, and podcasts, publications, and conferences where mothers can learn about best breastfeeding practices (La Leche League International, 2016). BFHI is also a global program, designed by the WHO/United Nations International Children's Emergency Fund (UNICEF) in response to *The Surgeon General's Call to Action to Support Breastfeeding* (U.S. Department of Health and Human Services, 2011). BFHI encourages hospitals and birthing centers to improve maternal-infant care, support, and access to resources, and increase healthcare providers' competence (Howe-Heyman & Lutenbacher, 2016). While the information and support that programs such as LLLI and BFHI provide address a multitude of a breastfeeding mother's needs, it is apparent that barriers still exist that discourage or prevent mothers from meeting breastfeeding recommendations, highlighting the importance of further research in this area.

Resources in Southeastern Idaho. Idaho boasts higher breastfeeding rates than the national average, with 93% of women breastfeeding ever and 65% breastfeeding at 6 months postpartum (Breastfeeding Report Card, 2016). However, women in rural areas, such as Southeastern Idaho, appear to have less access to breastfeeding supports than those in metropolitan areas. The largest supporter of pregnant women and new mothers in rural Idaho appears to be the United States Department of Agriculture (USDA)'s Women, Infant, and Children (WIC) organization, providing a variety of nutrition based programs, including breastfeeding pumps. Southeastern Idaho's hospitals have lactation consultants and lactation trained nurses, however, outpatient consultations are costly ($25/hour). Currently, Idaho is the only state in the U.S. that does not have a law protecting mothers who wish to breastfeed in

public or at work. Unfortunately, Idaho's only law protecting breastfeeding women is exemption from jury duty (Idaho Breastfeeding Laws, 2017). Furthermore, Idaho does not offer any supplements to the Family Medical Leave Act (FMLA), providing expecting parents with only 12 weeks of unpaid leave. Regarding community based support, LLLI has been inactive in two of Southeast Idaho's largest cities (Pocatello and Idaho Falls) since 2013. Southeastern Idaho university campuses also do not provide protections for mothers who wish to breastfeed in public. To date, Idaho has only one Baby Friendly hospital in the northern city of Coeur d'Alene. Nonetheless, Southeastern Idaho appears to be making some progress.

In 2017, Boise hosted the first annual Idaho Breastfeeding Summit, a community and professional conference providing presentations on breastfeeding topics by healthcare and research professionals, as well as hands-on, skills-building workshops for breastfeeding mothers. Furthermore, Eastern Idaho Regional Medical Center earned the 2016 Care Award from the International Lactation Consultant Association. Although these are promising steps toward increased breastfeeding competence and support in the region, rural areas such as Southeastern Idaho continue to demonstrate room for further growth. The present project seeks to examine this understudied population, so as to better understand the potential role of perinatal mental health in breastfeeding behaviors, particularly given that rural women are at greater risk for delayed initiation of prenatal care and diagnosis of mental or behavioral disorders (American College of Obstetricians and Gynecologists, 2014; Robinson et al., 2017). Exploring risk and resiliency factors that contribute to Idaho's greater than national average breastfeeding rate may help explain the mechanisms by which mothers thrive in a state with fewer than average maternal supports.

Breastfeeding Behaviors and Maternal Anxiety/Stress

Definitions. While attempts to improve breastfeeding rates have been fruitful, it remains that about half of mothers discontinue breastfeeding by 6 months of age, as well as two-thirds by 12 months (Breastfeeding Report Card, 2016). Possible explanations for the variability in breastfeeding behaviors such as initiation, frequency, and duration, is maternal perinatal stress and anxiety. Within the context of breastfeeding, initiation refers to the temporal beginning or establishment of breastfeeding, while frequency refers to rate of occurrence of breastfeeding, and duration refers to the time span for which a mother breastfeeds.

Perinatal mental health. According to the WHO, "worldwide about 10% of pregnant women and 13% of women who have just given birth experience a mental disorder [and] in developing countries this is even higher, i.e. 16% during pregnancy and 20% after child birth" (WHO, 2017, para. 1). Furthermore, the most common mental health concerns for perinatal women are depression and anxiety (WHO, 2017). Leight, Fitelson, Weston, and Wisner's review (2010) suggests that up to 5% of perinatal women experience major depression and 16% or more experience depressive symptoms. Gavin and colleague's systematic review (2005) of the literature surrounding perinatal depression found that 7-13% of women experience depression during pregnancy or the postpartum period. Ko, Rockhill, Tong, Morrow, and Farr (2017) found that in 2012, the overall postpartum depressive symptomology for 27 U.S. states was 12%. Miller (2002) reports even higher rates, noting that about 50% of new mothers experience postpartum "blues" and 10-12% of mothers experience postpartum non-psychotic depression within 6 months of giving birth. According to the 2015 Idaho Pregnancy and Risk Assessment Tracking System's (PRATS) annual report, 18% of Idaho mothers reported experiencing moderate to severe levels of postpartum depression (PRATS, 2017).

Fallon, Groves, Halford, Bennett, and Harrold (2016) cite the "shadowing effect" of postpartum depression as the reason why perinatal anxiety continues to be overlooked. While perinatal depression is heavily researched, stress and anxiety in the perinatal period receives considerably less attention and remains less understood than depression (Dunkel Schetter & Tanner, 2012; Leach, Poyser, & Fairweather-Schmidt, 2017; Leight et al., 2010; O'Hara & Wisner, 2013). Therefore, the present project will explore stress and anxiety as understudied mental health variables, among an understudied sample of rural women.

Regarding anxiety, worldwide rates since 2005 include between 7-60% and 5-33% of women who experience high levels of general anxiety during pregnancy, and the postpartum period, respectively. Furthermore, 3-39% of women experience an anxiety disorder, as do 4-20% of women during the postpartum period (Leach, Poyser, & Fairweather-Schmidt, 2017). The 2015 PRATS annual report found 17% of Idaho women experience some form of anxiety 3 months prior to pregnancy, however, no further statistics regarding anxiety during pregnancy was reported (PRATS, 2017). Research regarding the prevalence of psychosocial stress during pregnancy is also limited (Woods, Melville, Guo, Fan, & Gavin, 2010). Woods and colleagues (2010) found that during the antenatal period, 6% of women reported high stress, 78% low to moderate stress, and only 16% reported no stress. Burns, Farr, and Howards (2015) examined data collected by the CDC Pregnancy Risk Assessment Monitoring System (PRAMS) from 2000-2010 and found that on average in 2010, 70% of women reported a stressful life event within the year prior to their infant's birth. With regard to Idaho women, 21% described experiencing high prenatal stress, defined as three or more stressful life events in the 12 months prior to delivery (PRATS, 2017).

According to the American Psychological Association (APA), feelings of stress and anxiety can be defined as two separate, though similar, constructs. Stress, either acute or chronic, is generally described as a reaction to a stressor, such as changes in relationships, trauma, or financial challenges (APA, Stress Fact Sheet, 2013). Anxiety is an emotion characterized by worry, fear, feelings of tension, and reoccurring intrusive thoughts or concerns that are not necessarily tied to a specific event or stressor. Both stress and anxiety can be characterized by physiological responses as well, including dizziness, sweating, and fatigue, as well as more chronic health problems (APA, n.d., adapted from *Encyclopedia of Psychology*). Although stress and anxiety are related constructs, the research that follows demonstrates that a woman may experience one, the other, or both. Thus, it is important to acknowledge the difference between stress and anxiety and measure them as separate experiences. The literature on stress and anxiety in the peripartum period varies in the ways in which stress and anxiety is operationally defined and measured. For the present literature review and project, subjective measures of stress and anxiety were chosen. The present study is interested in exploring women's subjective experiences of stress and anxiety because these perceptions and experiences could be targeted by psychological prevention and intervention. Furthermore, it has been established that physiological stress is elevated during the perinatal period due to the biological changes associated with pregnancy, labor, and delivery. The present study sought to avoid a marker of stress that is impacted by general physiological changes to a woman's body throughout the perinatal period. To date, most research regarding the correlation between psychosocial and physiological measures of stress in the perinatal period have resulted in mixed findings, and many studies have demonstrated no significant correlation between subjective, psychosocial measures, and physiological measures of stress (i.e., cortisol; Braig et al., 2016; Elysia & Curt,

2010; Harville, Savitz, Dole, Herring, & Thorp, 2009; Rothenberger, Moehler, Reck, & Resch, 2011; Voegtline et al., 2013). In the following studies, stress and anxiety are measured subjectively unless otherwise noted. A review of the cross-cultural literature was conducted due to the limited number of published studies on perinatal stress/anxiety and breastfeeding behaviors within U.S. samples, as well as to better understand risk and resiliency factors that may vary across culture (e.g., employment and social support).

Cross-cultural findings. Early in the postpartum period, breastfeeding concerns or perceptions, such as difficulty latching or low milk supply, are a significant source of maternal stress (Henshaw, Fried, Siskind, Newhouse, & Cooper, 2015). Generally speaking, psychological factors have been found to be more predictive of breastfeeding behaviors than sociodemographic characteristics. Research conducted with Australian samples has demonstrated that among factors such as breastfeeding self-efficacy and planned breastfeeding duration, anxiety is associated with early weaning and shorter breastfeeding duration (O'Brien, Buikstra, & Hegney, 2008; Papinczak & Turner, 2000). However, O'Brien, Buikstra, and Hegney (2008) did not find stress to be associated with breastfeeding behaviors. Conversely, in another Australian sample, Li, Henderson, Landsborough, and Oddy (2008) found that severe life stressors during pregnancy, such as separation or divorce, residential move, financial problems, or traumatic events, also increase the likelihood for delayed onset of breastfeeding and early breastfeeding cessation. Zhu, Jiang, Huang, and Tao (2013) reported similar findings among a Chinese sample. Furthermore, researchers in Greece found that post-delivery psychological stress is negatively related to breastfeeding initiation, milk volume, the frequency of feedings, and a short duration of first feeding, which may result in delayed onset and poor establishment of breastfeeding. However, this study did not find an association between stress measured via cortisol and

lactation parameters (Doulougeri, Panagopoulou, & Montgomery, 2013).

Alongside depression in pregnancy, perceived stress and anxiety are both associated with a lower intention to breastfeed among Hispanic women. In early pregnancy, women with the highest levels of perceived stress were 23% less likely to breastfeed than women with the least stress. Findings were similar during mid-pregnancy, but were not statistically significant. Furthermore, women with the highest levels of trait anxiety in early and mid-pregnancy were 34% less likely to breastfeed than those with the lowest levels of anxiety (Insaf et al., 2011). Among Canadian mothers, those with anxiety during pregnancy were prone to early lactation cessation. Kehler, Chaput, and Tough (2009) found that 13% of their participants experienced symptoms of anxiety during pregnancy, of which 37% breastfed for less than 6 months. Mothers with anxiety are also less likely to breastfeed following delivery and more likely to feed their infants formula. Furthermore, highly anxious mothers are less likely to practice exclusive breastfeeding and more likely to end breastfeeding at 1 month than mothers with low anxiety (Britton, 2007). Among Norwegian mothers, early breastfeeding cessation is related to increased risk of postpartum anxiety and depression symptoms (Ystrom, 2012). While these cross-cultural findings suggest a relationship between maternal mental health and breastfeeding behaviors, few if any, studies have examined this relationship in U.S. samples. Thus, the current project seeks to fill this gap in the broader literature.

Maternal health benefits. Research has also revealed benefits for mothers who choose to breastfeed, underscoring the importance of further research on the barriers to breastfeeding behaviors. Specifically, breastfeeding has been linked to lower levels of maternal stress. Tu, Lupien, and Walker (2006) found that when multiparous, breastfeeding mothers were shown an emotional film and put through the Trier Social Stress Test, they demonstrated dampened

cortisol responses in relation to their non-breastfeeding counterparts. Mezzacappa (2004) provides an excellent review of the literature surrounding breastfeeding and physiological and psychological stress in rat and human samples. She concluded that breastfeeding was associated with blunted neuroendocrine responses, reduced cardiovascular responses to stress, lower levels of perceived stress, improved immune function, and improved maternal psychological health (Mezzacappa, 2004). Based on these findings, understanding risk factors to decreased breastfeeding behaviors would prove beneficial for not only infants, but mothers as well. However, this pursuit has been complicated by mixed findings within the literature.

Mixed findings. Specifically, the literature surrounding relationships among stress, anxiety and breastfeeding has revealed mixed results. While women with high pregnancy-related anxiety are more likely to intend to formula feed, anxiety is not related to a failure to initiate breastfeeding (Fairlie, Gillman, & Rich-Edwards, 2009). In a sample of Turkish women, Akman and colleagues (2008) found that anxiety did not influence women's decisions to continue or discontinue exclusive breastfeeding. In a review of the literature surrounding prenatal anxiety and breastfeeding, it was found that while there are no associations between prenatal anxiety and breastfeeding initiation, a relationship does exist between high levels of prenatal anxiety and a decrease in breastfeeding intention and exclusivity (Fallon, Bennett, & Harrold, 2016). This review concluded that the relationship between prenatal anxiety and breastfeeding is unclear, poorly understood, and requires further research (Fallon, Bennett, & Harrold, 2016). Fallon, Groves, Halford, Bennett, and Harrold (2016) also completed a review of the literature surrounding postpartum anxiety and breastfeeding behaviors. They found that women who experience postpartum anxiety are less likely to breastfeed exclusively and demonstrate a shorter breastfeeding duration. Some of the studies reviewed also suggested that postpartum anxiety is

linked to a lower likelihood of breastfeeding initiation and an increased likelihood of formula supplementation. Rondó and Souza (2007) found that Brazilian mothers' general stress and anxiety was not related to intended breastfeeding duration, and noted that this was likely because the questionnaires they used did not measure stress or anxiety specific to breastfeeding.

Variability in the aforementioned studies may be due to the wide variety of cultures sampled as well as the inconsistent ways in which perinatal stress and anxiety are measured. For example, Fallon, Bennet, and Harrold (2016) and Fallon, Groves, Halford, Bennett, and Harrold, (2016) note in their literature reviews that meta-analyses were not possible due to heterogeneity in the outcome variables, timing of measurement of the outcome variables, sample demographics, and methodologies. The brief literature review presented above demonstrates similar variability across studies of stress and anxiety (see Appendix A). Additionally, most research to date has focused on either stress or anxiety and has not compared the differences between these constructs and breastfeeding behavior. Studies that have examined both constructs have resulted in mixed findings. Understanding whether stress and anxiety or only stress or anxiety contribute to a decrease in breastfeeding behaviors may help inform future targets for intervention.

Several of the preceding studies have called for a further investigation of perinatal stressors and anxiety and their impact on breastfeeding behaviors. Establishing a relationship, particularly that perinatal stress and/or anxiety is predictive of breastfeeding behaviors, could lead to important implications for possible interventions targeting maternal stress and anxiety so as to increase the initiation, frequency and duration of breastfeeding, and increase mental and physical benefits for mothers and children. The present study fills some of these gaps in the literature through exploring both stress and anxiety at prenatal and postnatal time points, via

psychometrically sound measures, among understudied and underserved women in Southeastern Idaho. In order to better understand potential mechanisms by which stress, anxiety, and breastfeeding behaviors may be related, biological, psychological, and social/cultural risk and resiliency factors are reviewed below.

Biological Underpinnings

From a biopsychosocial perspective, stress and breastfeeding are related in a multitude of ways for a new mother. Biologically, breastfeeding impacts women's hormone regulation. Women who breastfeed exclusively have reduced sympathetic nervous system responses and any breastfeeding is associated with increased parasympathetic nervous system regulation and vascular response to certain stressors. Women who bottle feed experience the opposite responses. Furthermore, breastfeeding reduces the neuroendocrine response to stressors and leads to decreased negative mood. In general, breastfeeding is associated with better physical and mental health. Specifically, breastfeeding is linked to reduced cardiovascular responses to stress and improved immune function (Mezzacappa, 2004). It has also been well established that breastfeeding leads to the release of oxytocin, and oxytocin in turn can inhibit the release of the stress hormones cortisol and adrenocorticotrophic hormone (ACTH) in the hypothalamic-pituitary adrenal (HPA) axis (Uvnäs Moberg & Prime, 2013). However, when women experience stress or anxiety, oxytocin is released at a lower rate during breastfeeding, which may reduce the chance for oxytocin to inhibit the release of stress hormones (Stuebe, Grewen, & Meltzer-Brody, 2013; Ueda, Yokoyama, Irahara, & Aono, 1994). Finally, prolactin works similarly to oxytocin to inhibit stress hormones via the HPA axis. Research on animal and human samples has identified heightened prolactin levels in breastfeeding mothers, which may result in lower levels of cortisol responses to stressors than non-lactating mammals (Cook, 1997;

Freeman, Kanyicska, Lerant, & Nagy, 2000; Heinrichs, Neumann, & Ehlert, 2002).

Taken together, these findings suggest that breastfeeding serves a beneficial role in combating maternal stress. When examining the psychological correlates of breastfeeding behaviors, controlling for the many possible biological confounds is important. Therefore, the present study will consider several health-related variables as potential covariates. Moreover, we will examine whether there is a difference in postnatal stress and anxiety between mothers who are/are not breastfeeding through 6 months postpartum, which may be partially due to the above mentioned biological pathways which support associations between breastfeeding behavior and maternal postnatal mental health.

Maternal-Infant Relationship

Within a psychological framework, mothers who breastfeed may experience a sense of bonding and attachment to their infant, via skin-to-skin contact and the release of oxytocin (Johnson, 2013; Uvnäs Moberg & Prime, 2013). The mother-infant bond and oxytocin's stress-reducing properties may serve to reinforce breastfeeding. Mothers describe several reasons for which breastfeeding is personally reinforcing, including: breastfeeding provides a harmonious connection with their infant, the ability and desire to share their body with their child, pleasurable physical feelings, feelings of being needed, and an intimate connection that only a mother can provide (Phillips, 2011; Schmied & Barclay, 1999). More recent qualitative literature suggests that women continue to value feelings of bonding in the breastfeeding experience (Prendergast & James, 2016). Women have also reported breastfeeding as an “empowering and exhilarating experience,” despite challenges (Phillips, 2011, p. 17). Women also mention more socially-driven motivators such as the belief that breastfeeding is “natural” and represents “good” mothering (Prendergast & James, 2016; Schmied & Barclay, 1999, p. 328).

However, Schmeid and Barclay (1999) note that only 35% of the women they studied described breastfeeding in such positive language. Most mothers have mixed or even negative feelings surrounding their breastfeeding experiences, and their expectations may be "idealistic rather than realistic" (Phillips, 2011, p. 19).Therefore, while breastfeeding may prove to be a pleasurable and bonding experience for some mothers, many others experience negative feelings including loss of autonomy, dissatisfaction with changes in the physical appearance of their breasts, and perhaps most notably, severe physical pain and discomfort (Phillips, 2011; Schmied & Barclay, 1999). Importantly, some mothers who had these negative experiences "persevered" through them until they were able to reach the connection with their infant that they desired (Phillips, 2011; Schmied & Barclay, 1999, p. 332). It is possible that the desire to persevere through distress is a function of social and cultural motivators and expectations.

Overall, this literature indicates that mothers experience psychological benefits as well as psychological and physical challenges during breastfeeding. The present study examines the role of maternal beliefs surrounding breastfeeding through measures of breastfeeding difficulties and perceptions of infant crying. Specifically, we explore whether greater breastfeeding difficulties mediate the relationship between greater prenatal stress/anxiety and shorter breastfeeding duration, and whether perceptions of response to infant crying as spoiling moderate the relationship between more breastfeeding difficulties and reduced breastfeeding duration. Additionally, we examine the relationship between breastfeeding difficulties and postnatal stress/anxiety among women breastfeeding through the 6-month follow-up visit.

Social and Cultural Factors

Alongside biological and psychological factors that influence breastfeeding behaviors, social and cultural expectations and pressures may also shape a mother's decision to initiate and

continue breastfeeding. Currently in the U.S., there is somewhat of a cultural divide regarding attitudes surrounding breastfeeding behaviors. While many, including healthcare providers, are proponents of rhetoric such as “breast is best,” others find issue with demonstrations of breastfeeding pride, such as public feeding. Independent studies, reports, and initiatives from entities such as the CDC, WHO, and the Surgeon General, as well as community and healthcare-based programs and support systems, provide important resources to breastfeeding mothers. However, they also create an atmosphere of societal pressure to breastfeed, regardless of a woman's cultural or personal beliefs. The WHO, supported by educated nurses, doctors, and lactation consultants, promote breastfeeding initiation within 1 hour of birth (WHO, e-Library of Evidence for Nutrition Actions, 2016). Beyond promotion in hospital settings shortly after birth, breastfeeding education in community settings is also highly advised (Purdy, 2010). LLLI Leaders and the BFHI are just a few of the community- and hospital- based support systems available to breastfeeding mothers (International Board of Lactation Consultant Examiners, 2016).

Hunt and Thomson (2016) explored the mixed feelings and messages women receive about breastfeeding in the United Kingdom. Women report the following: perceived pressure to breastfeed without having access to adequate support, feelings of self-blame, moral judgment, or failure in the presence of breastfeeding difficulties, as well as avoiding breastfeeding because of the rule-based approach adopted by healthcare professionals (i.e., there is only one right way to breastfeed; Hunt & Thomson, 2016). This evidence may indicate that while breastfeeding promotion is important to the health of mother and child, the extent to which society pressures women to engage in specific breastfeeding behaviors may impose undue stress and pressure on mothers, driving them away from breastfeeding.

While the present project did not explore maternal perceptions of broad social and cultural factors (i.e., public policy and stigma), it contributes to the larger perinatal literature by researching an understudied rural sample influenced by unique sociodemographic characteristics (i.e., religious affiliation and education level). Not only do we define and quantify these characteristics in the current sample, but we investigate these factors in relation to prenatal maternal anxiety to follow-up on significant relationships between prenatal maternal anxiety and breastfeeding duration.

Breastfeeding Difficulties

While there may be a relationship between perinatal stress and anxiety and breastfeeding behaviors, it also appears that breastfeeding difficulties may play a role in breastfeeding initiation, frequency, and duration. The CDC Pregnancy Risk Assessment Monitoring System (PRAMS) includes several questionnaires that ask U.S. women about a variety of experiences that they may have during the perinatal period. In the Phase 7 Standard Questions, PRAMS asks mothers about reasons for choosing not to breastfeed and possible reasons for discontinuing. Some of the obstacles listed, include: difficulties for the mother such as, “My nipples were sore, cracked, or bleeding,” “I thought I was not producing enough milk, or my milk dried up,” and “It was too hard, painful, or too time consuming;” difficulties for the infant such as, “My baby had difficulty latching or nursing;” and difficulties with time management such as, “I had too many household duties,” “I went back to work or school,” and “I had other children to take care of,” among other challenges (CDC, PRAMS, Phase 7 Standard Questions, p. 2). The present study sampled similar categories and difficulties in the 6-Month Infant Dietary Questionnaire (see Appendix B). Qualitative research conducted by Schmied and Barclay (1999) and Phillips (2011) demonstrated that women discontinued breastfeeding due to the significant physical pain

and discomfort that they experienced from cracked nipples, biting, and scratching, among other ailments such as uncertainty of milk supply and latching issues. Purdy (2010) found that mothers may struggle with personal, professional, social, and physical difficulties such as the:

> "objectification of the breast as an erotic, sexual object in our society, a related fear of breast disfigurement, negative community reaction to public breastfeeding as indecent exposure, personal inconvenience related to breast pumping for working women, dietary restrictions, and a lack of social support from health care providers, mothers, partners, and peers" (p. 365).

Furthermore, Ertem, Votto, and Leventhal (2001) found that a mother's lack of confidence regarding breastfeeding and beliefs regarding infant preferences may also lead to early breastfeeding discontinuation.

On the whole, it is clear that several breastfeeding difficulties may influence breastfeeding initiation, frequency, and duration. However, the relationship between stress and anxiety and breastfeeding difficulties remains to be explored. Thus, the present study seeks to examine the role of breastfeeding difficulties as a potential mechanism by which the relationship between stress, anxiety, and breastfeeding behaviors exists.

Infant Crying

Considering the potential relationship between breastfeeding difficulties and breastfeeding behaviors, perceptions of infant crying may serve as a moderating factor. Specifically, perceptions of responding to infant crying cues with breastfeeding as spoiling may serve to strengthen the potential relationship between increased breastfeeding difficulties and decreased breastfeeding behaviors. In order to understand how and why mothers may misperceive infant crying, a brief review of infant crying in general was conducted. According to

the Mayo Clinic (2015), infants cry for a number of reasons including hunger, the desire to suckle, loneliness, tiredness, the need for a changed diaper, the desire to move, the desire to be bundled, feeling too hot or cold, and overstimulation of the environment. The Mayo Clinic (2015) also distinguishes between fussiness and colic, or excessive crying for more than 3 hours per day, 3 days per week, for 3 weeks or longer in an otherwise healthy infant. Infants with colic are often inconsolable and will cry for no identifiable reason (Mayo Clinic, 2015).

Long and Johnson (2001) qualitatively explored the ways in which excessive infant crying can be disruptive and challenging for families, including experiencing guilt, stress, frustration, social isolation, and strained relationships. Researchers have found that many mothers use breastfeeding as a method to console crying infants, and that breastfeeding to comfort is a strong predictor of longer partial breastfeeding duration (Howard, Lanphear, Lanphear, Eberly, & Lawrence, 2006). It makes sense that breastfeeding would be attempted, as hunger is one of the many reasons an infant may cry (Mayo Clinic, 2015). Furthermore, in response to the sound of infant crying, mothers begin to lactate from their breasts, and may interpret this as a cue to feed their infant. However, research has demonstrated that mothers may misinterpret infant crying and believe that breastfeeding and attention to the crying will "spoil" their child or reinforce crying (Bell & Ainsworth, 1972; Mathews, Leerkes, Lovelady, & Labban, 2014). Maternal perceptions of spoiling an infant via breastfeeding to console crying behavior will be explored in the present study. Such perceptions, especially in conjunction with experiencing breastfeeding difficulties, may lead to decreased breastfeeding behaviors.

The preceding research has demonstrated that potential relationships between perinatal stress and/or anxiety, breastfeeding difficulties, perceptions of infant crying, and breastfeeding behaviors exist among diverse, and often metropolitan samples. However, little, if any, research

has focused on women from rural, U.S. populations where breastfeeding resources and support may be limited. Furthermore, few studies have examined both anxiety and stress, and their impact on specific breastfeeding behaviors during the peripartum period. To our knowledge, no research has evaluated the mechanisms by which perinatal stress, anxiety, breastfeeding difficulties, perceptions of responding to infant crying as spoiling, and breastfeeding behaviors may be related. Additionally, research to date has demonstrated variability in when and how peripartum stress and/or anxiety is measured. Thus, the present study will use psychometrically sound measures at two time points to explore whether prenatal or postnatal stress and/or anxiety is more predictive of breastfeeding behaviors. We will also quantify the unique sociodemographic characteristics of the sample and consider several prospective biopsychosocial covariates in our models. Overall, understanding risk factors to decreased breastfeeding behaviors may prove beneficial for infants and mothers. Therefore, the following model (see Figure 1) and hypotheses will be used to fill these gaps in the extant literature:

Hypotheses

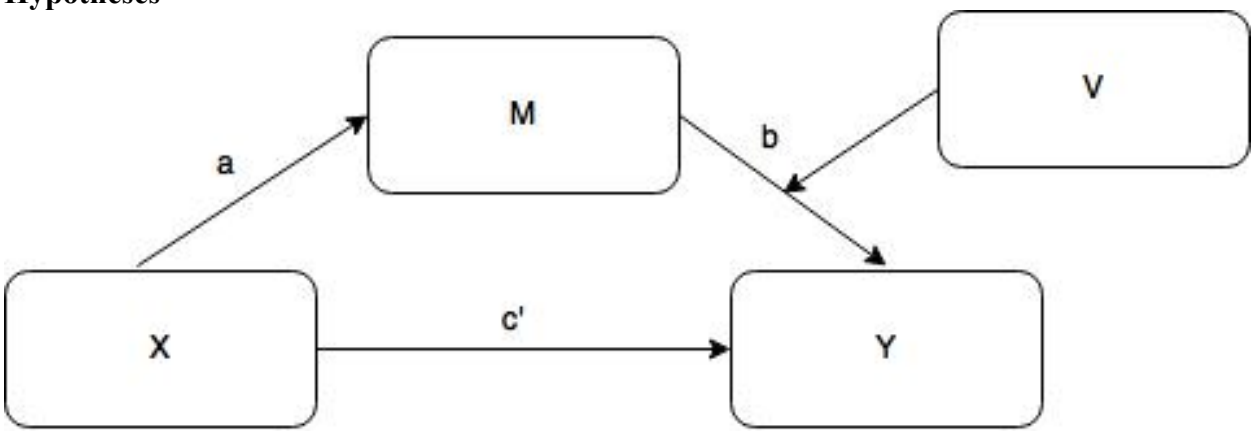

Figure 1. In this model, prenatal stress and/or anxiety is X, breastfeeding behaviors is Y, breastfeeding difficulties is M, and perceptions of infant crying is V. The relationship between X and Y represents the direct path. M is the mediator and V is the moderator in this model.

Hypothesis 1: Breastfeeding difficulties will mediate the relationship between prenatal stress and reduced breastfeeding duration. In particular, greater prenatal stress will be related to

greater breastfeeding difficulties, which will predict reduced breastfeeding duration through 6 months. Perceptions of infant crying behavior will moderate the relationship between breastfeeding difficulties and breastfeeding duration in this model. Specifically, mothers who misperceive their response to an infant's crying as spoiling will have a more robust statistical relationship between more breastfeeding difficulties and reduced breastfeeding behaviors than mothers who do not view responsiveness to infant crying as spoiling.

Hypothesis 2: Breastfeeding difficulties will mediate the relationship between prenatal anxiety and reduced breastfeeding duration. In particular, greater prenatal anxiety will be related to greater breastfeeding difficulties, which will predict reduced breastfeeding duration through 6 months. The same moderation hypothesis is predicted in this model as in Hypothesis 1.

Hypothesis 3: Participants who breastfeed through 6 months will demonstrate lower levels of postnatal stress than those who discontinue breastfeeding prior to 6 months.

Hypothesis 4: Participants who breastfeed through 6 months will demonstrate lower levels of postnatal anxiety than those who discontinue breastfeeding prior to 6 months.

Hypothesis 5: Among women who breastfeed through 6 months, there will be a positive relationship between fewer breastfeeding difficulties and lower levels of postnatal stress.

Hypothesis 6: Among women who breastfeed through 6 months, there will be a positive relationship between fewer breastfeeding difficulties and lower levels of postnatal anxiety.

Methods

Participants

Data were collected as part of the larger Infant Development and Healthy Outcomes in Mothers (IDAHO Mom) Study at Idaho State University. Data have been collected for 125 prenatal participants and 96 postnatal participants at 6 months postpartum. Data collection for the

prenatal and 6-month postpartum time points was completed in June of 2017. The present study utilized data from the prenatal and 6-month postpartum time points. Based on Fritz and MacKinnon's (2007) mediation model simulations, a sample size of 71 is required to achieve a power of 0.80 in a mediation model assessed via bias-corrected bootstrapping methods, with medium effect sizes (d=0.39) for the a and b paths. GPower was used to conduct an *a priori* power analysis for the present study. Specifically, a least squares linear multiple regression with three predictors and one outcome variable and up to three covariates was conducted. This included a medium effect size (f^2=0.15) for R squared change in steps 1 and 2 (i.e., after covariates are added and after adding predictors into the model), a two-tailed p-value of 0.05, and power of 0.80. Results suggested that a sample of 85 participants was sufficient for the most complex analyses tested in Hypotheses 1 and 2. Therefore, the current n=94 was thought to be sufficient for all analyses used to test current study hypotheses.

Data was collected from adult mothers (excluded women under 18 or over 35 years of age; M_{AGE}=27.29 years, SD_{AGE}=4.02 years) during the third trimester for the prenatal session ($M_{GESTATION}$=34.25, $SD_{GESTATION}$=1.22), and at approximately 6 months postpartum for the postnatal session (M_{AGE}=6.05 months, SD_{AGE}=2.13 months). With regard to ethnicity, 94% of participants identified as White/Caucasian, 2% as Black or African American, 2% as Native Hawaiian or Other Pacific Islander, 1% as American Indian/Alaska Native, 14% as Hispanic/Latino, 1% as Asian, and 5% as other (categories were not mutually exclusive). With regard to marital status, 10% of participants identified as single/never married, 84% as married, 1% as divorced, 3% as in a committed relationship, and 2% as engaged. With regard to total annual familial income, 1% reported earning less than $5,000, 2% between $5,000 and $9,000, 15% between $10,000 and $19,999, 17% between $20,000 and $29,999, 13% between $30,000

and $39,000, 10% between $40,000 and $49,000, 29% between $50,000 and $74,999, 7% between $75,000 and $99,999, and 6% earning $100,000 or greater. With regard to highest level of education, 2% completed partial high school, 14% completed high school, 35% completed partial college, 38% completed a standard college or university degree (i.e., BS/BA), and 11% completed graduate training with a degree. Regarding employment, 60% of participants were currently employed and 40% were not currently working. Regarding parity, 30% of participants had given live birth to one other child, 13% birthed two other children, 6% birthed three other children, 3% birthed four other children, 5% birthed five other children, and 1% birthed six other children. Regarding the number of children living in the participant's home, 33% lived with one child, 13% lived with two children, 9% lived with three children, 4% lived with four children, 4% lived with 5 children, and 1% lived with 6 children. Finally, regarding religious preference, 3% of participants identified as Agnostic, 2% Assembly of God, 2% Atheist, 2% Baptist, 4% Catholic, 2% Lutheran, 1% Methodist, 62% Church of Jesus Christ of Latter-day Saints (LDS), 11% Non-denominational, 1% Pentecostal, 1% Presbyterian, 13% Other, and 10% preferred not to answer.

Data collection began for the prenatal sessions on 04/21/2015. Data collection for the postnatal sessions began on 11/16/2015. My involvement in data collection began on 10/15/2016. Of the 506 participants who were contacted to participate in the study, 71 were ruled ineligible. Mothers with more than one baby, with certain health conditions (e.g., mothers with gestational diabetes, pre-eclampsia, toxemia, etc.) that could potentially impact endocrine functioning, mothers with severe behavioral or physical health diagnoses/symptoms (e.g., Schizophrenia, Bipolar Disorder, HIV, AIDS, etc.), or any mothers who chronically consumed recreational substances (e.g., marijuana, cocaine, etc.), medications from FDA categories D and

X with documented detrimental fetal effects (e.g., alprazolam, clonazepam, simvastatin, methotrexate, etc.), or excessive amounts of alcohol (> 40 drinks) during the course of pregnancy were excluded from the study. Mothers also had to be at least 18 years of age in order to provide consent, and 35 years of age or younger so as to minimize the occurrence of adverse birth outcomes in our sample.

If exclusion criteria were not met, participants were invited to their initial prenatal session. One hundred and thirty-one participants declined to participate. Mothers listed several reasons for declining included difficulty making the commute to Idaho State University (*n*=53), the time commitment (*n*=19), scheduling conflicts (*n*=15), moving out of the area prior to study completion (*n*=7), lack of energy (*n*=1), would not give reason/not interested (*n*=27) *worried* about going into labor (*n*=2), not having custody of the baby (*n*=1), or bedrest (*n*=6). One hundred and seventy-nine prospective participants were unreachable by telephone, text, and e-mail communication attempts. Ninety-six participants completed both prenatal and postnatal sessions, and 29 participants completed only the prenatal session and did not attend their postnatal session for a total of 125 participants at the prenatal and 6-month postpartum time points. The same participants are also expected to complete 10-, 14-, and 18-month postnatal visits, though their data will not be used for the current thesis study. Forty-four participants completed the 10-month postpartum session, 53 completed the 14-month postpartum session, and 44 have completed the 18-month postpartum session. Data collection is complete for 10 and 14 months postpartum, and we will complete data collection of participants at 18 months postpartum in the summer of 2018.

Measures

Maternal variables included perceived stress, perinatal anxiety, breastfeeding difficulties, and breastfeeding behaviors. Infant variables included perceptions of responding to infant crying behavior. Potential covariates included maternal health conditions (i.e., prenatal, labor/delivery, and postnatal), infant physical health conditions (i.e., total number of conditions and colic), and parity. These covariates were selected because it was believed that maternal and infant health could impact the primary study variables. Furthermore, parity could impact mothers' level of difficulty with breastfeeding and breastfeeding behaviors. Maternal and infant health covariates were coded as the number of health conditions. Infant colic was coded as yes/no and parity was coded as the number of live births a participant had. Covariates were tested in relation to our primary predictor and outcome variables (see Figure 1). The current study considered up to three covariates (one infant, parity, and one maternal), as there would likely be multicollinearity among the six possible covariates listed above. Each of the covariate measures is described below in greater detail, following discussion of the primary maternal and infant variables used in the current study models.

Stress. The Perceived Stress Scale (PSS) is a 14-item self-report measure (see Appendix C; Cohen, Kamarck, & Mermelstein, 1983). The PSS was developed to assess the degree to which respondents find their lives "unpredictable, uncontrollable, and overloading," components that are central to experiencing stress (Cohen et al., 1983, p. 387). In two college and one smoking cessation sample, the PSS demonstrated high reliability (Cronbach's α=0.84, 0.85, 0.86). The test-retest reliability was high among groups retested after 2 days (Cronbach's α=0.85), and moderate for the group retested after 6 weeks (Cronbach's α=0.55). Overall, there was a small to moderate correlation between number of stressful life events, as measured by the

College Student Life-Event Schedule (CSLES), and the PSS in all the samples (Cronbach's αs ranged from 0.17 to 0.49). Furthermore, the PSS was a better predictor of depressive (r=0.65 to 0.76) and physical symptomology (r=0.52 to 0.70) than life event scores (life events-depression ranged from r=0.14 to 0.33; life events-physical ranged from r=0.23 to 0.51). While the PSS-14 has not been validated among pregnant women, the PSS-10 (α=0.74) and PSS-4 (α=0.79) have demonstrated good reliability within similar samples (Lee, 2012). Overall, the PSS is a more global measure than life-event scales and has strong reliability, as well as concurrent and predictive validity. In the present sample of 96 participants, the PSS demonstrated good reliability at both prenatal and 6-month postnatal time points (Cronbach's a=0.80 and 0.78, respectively).

Anxiety. The Perinatal Anxiety Screening Scale (PASS) is a 31-item self-report questionnaire developed to screen for a broad range of anxiety symptoms in perinatal women (see Appendix D; Somerville et al., 2014). The PASS is suitable for use in a variety of settings including antenatal clinics, inpatient and outpatient hospitals, and mental health treatment settings. The PASS includes four factors: Factor 1 (Acute Anxiety and Adjustment), Factor 2 (General Worry and Specific Fears), Factor 3 (Perfectionism, Control and Trauma), and Factor 4 (Social Anxiety). The four scales and total score have high internal consistency reliability (Cronbach's α ranged from 0.86 to 0.96). The scales are moderately correlated (r values ranged from 0.40 to 0.51), suggesting that they capture unique information regarding perinatal anxiety. The PASS total score is significantly correlated with the Depression Anxiety Stress Scale (DASS) Anxiety and Stress scales, anxiety scale of the EPDS and the State-Trait Anxiety Inventory (STAI), which support the measure's convergent validity. Among a subsample of antenatal and postnatal women (n=35), correlation for the PASS global scores was 0.74,

indicative of adequate test–retest reliability across antenatal and postnatal time points. The current study utilized the total global anxiety score. Internal consistency in the present sample of 96 participants was high at both prenatal and 6-month postnatal time points (Cronbach's *a*=0.95 and 0.93, respectively).

Breastfeeding difficulties. Breastfeeding difficulties were measured as part of the 6-Month Infant Dietary Questionnaire, an original measure created for the IDAHO Mom Study utilizing similar item content from the PRAMS (see Appendix B). The 7-item self-report questionnaire measures infant feeding behaviors since birth, including formula feeding, breastfeeding, consuming solid foods, and difficulties breastfeeding. Breastfeeding difficulties were measured with a yes/no question asking whether difficulties were or are present during breastfeeding. If mothers answered "yes," they were asked to specify which difficulties they experienced (e.g., expressing milk, soreness, fatigue), difficulties an infant may experience (e.g., latching, sucking, not obtaining enough milk, or not interested in feeding), difficulties with time management (e.g., returning to work and unable to pump), difficulties with insufficient an environment (e.g., discomfort feeding in public or around others at home), or other difficulties (e.g., open-ended question). Breastfeeding difficulties were quantified as the number of difficulties a mother endorsed. Percentage frequencies of these difficulties were provided as descriptive statistics (see Results).

Infant crying behavior. The Infant Crying Questionnaire-Revised (ICQ-R) is a 43-item self-report measure of maternal perceptions of infant crying behavior (see Appendix E). The ICQ-R consists of prenatal (ICQ-R-Pre) and postnatal versions (ICQ-R-Post), which assess for perceptions of maternal responses to infant crying prior to birth and following delivery, respectively. The ICQ-R-Post includes 20 additional items that assess how mothers feel when

their baby cries. Items are rated on a 5-point Likert-type scale ranging from *never* (1) to *always* (5). The ICQ-R consists of five scales, including two infant-oriented scales (Attachment/Comfort and Crying as Communication) and three parent-oriented scales (Minimization, Directive Control, and Spoiling). Investigation of the factor structure of the ICQ-R demonstrated that the five scales had adequate to high internal consistency with Cronbach's α ranging from 0.70 (Spoiling) to 0.83 (Attachment; Haltigan et al., 2012). A greater endorsement of "always" indicates increased infant- (e.g., Want to make my baby feel safe.) or parent-oriented (e.g., Want baby to stop b/c I can't get anything else done) attitudes. The present study utilized the Spoiling scale from the postnatal ICQ-R as an index of maternal perceptions of response to infant crying as spoiling. Specifically, the scores for the three items related to infant spoiling were totaled. Overall, the ICQ-R Post in the present sample of 96 participants demonstrated moderate internal consistency (Cronbach's a=0.79), as did the Spoiling scale (Cronbach's a=0.76).

Breastfeeding behaviors. Breastfeeding behaviors were measured as part of the 6-Month Infant Dietary Questionnaire (See Appendix B; Fein et al., 2008). Duration of breastfeeding was measured by a single open ended item asking the participant for how many months, weeks, or days they breastfed. Given the potential variability in responses to this question, all data were quantified at the level of days of breastfeeding. For the present analyses, breastfeeding behaviors was quantified by the duration of breastfeeding.

Maternal prenatal health. Maternal prenatal health was measured as part of the Prenatal Session Screener (see Appendix F), a measure adapted from previous perinatal longitudinal studies. Maternal prenatal health was measured by questions 18-26 and 28. These questions sample common health problems pregnant women may experience, including gestational diabetes, hypertension, pre-eclampsia, toxemia, and hyper/hypothyroidism, as well as excess/low

fluid or preterm labor which may constitute a high-risk pregnancy. Questions 26 and 28 ask about recent hospitalizations, and lifetime diagnoses including HIV, AIDS, heart disease, herpes, hepatitis, asthma, anemia, seizures, or Group B strep. Maternal prenatal health was quantified by the number of health conditions endorsed. Maternal prenatal physical health may be a covariate because it may be related to maternal mental health and may have direct or indirect (i.e., through maternal mental health) associations with breastfeeding difficulties and behaviors (Kitsantas & Pawloski, 2010; Thulier & Mercer, 2009). The same is true for maternal labor/delivery and postnatal physical health (Henninger et al., 2017; Odom, Li, Scanlon, Perrine, & Grummer-Strawn, 2013; Rioux, Allar, & Savoie, 2006).

Maternal labor/delivery health. Maternal labor/delivery health was measured as part of the Postnatal Session Screener (see Appendix G), a measure adapted from previous perinatal longitudinal studies. Maternal labor/delivery health was measured by questions 10 and 11, which asked if the participant had any complications during labor or delivery. Maternal labor/delivery health was quantified by the endorsement of either the number of complications during labor and/or delivery.

Maternal postnatal health. Maternal postnatal health was also measured as part of the Postnatal Session Screener. Maternal postnatal health was measured by question 24, asking whether a list of common perinatal health conditions was diagnosed at any point during the participant's pregnancy or since. Maternal postnatal health was quantified by the number of health conditions endorsed.

Infant health. Infant health conditions were measured as part of the 6-Month Infant Health and Sleep Questionnaire (see Appendix H), a measure adapted from previous perinatal longitudinal studies (Fein et al., 2008). Infant health was quantified by the number of health

conditions endorsed (e.g., fever, jaundice, reflux, colic, eczema, ear infection, colic, etc.). Infant health was considered as a prospective covariate because prenatal maternal mental health and distress are related to increased infant physical health risk, which may create barriers to breastfeeding (e.g., Neonatal Intensive Care Unit stay; Odom, Li, Scanlon, Perrine, & Grummer-Strawn, 2013; Thulier & Mercer, 2009).

Colic. Colic was measured as part of the 6-Month Infant Health and Sleep Questionnaire (see Appendix H). Infant colic was quantified as an endorsement of yes or no. It was considered as a covariate because it is related to postnatal maternal distress and can enhance breastfeeding difficulty, which may lead to decreased breastfeeding duration (Howard, Lanphear, Lanphear, Eberly, & Lawrence, 2006).

Parity. Parity was established on the Pregnancy Context questionnaire (see Appendix I). Parity was coded as the number of live births the participant had endorsed. It was considered as a covariate as it may be related to breastfeeding difficulties and behavior. In particular, first-time mothers do not have any experience breastfeeding (positive or negative) to draw from and balancing breastfeeding an infant with other childcare may create unique barriers to breastfeeding. Literature reviews suggest mixed findings regarding increased parity and breastfeeding behaviors (Thulier & Mercer, 2009).

Procedures

Privacy and confidentiality. In order to protect participant confidentiality and privacy, identifying information (i.e., names) was stored separately from participant data, except to document informed consent. A password-protected desktop computer in a locked laboratory (Garrison 527), which was only accessible by research staff, was used to store participant contact information. Participant numbers were not included in this file with participant names. Locked

file cabinets in the locked lab space were used to securely store consent forms. A unique identifier (i.e., a participant number) was used to code interview, anthropometric, behavioral, questionnaire, and audio/visual data, which was stored electronically on an encrypted, password-protected stationary computer stored in locked file cabinets in the locked lab space. In order to link prenatal session data with follow-up postnatal data for mother and infant, a list of the participants and their participant numbers had to be kept briefly. This electronic list was kept on a password protected computer in a locked lab space. As soon as data collection was completed, this list was destroyed.

In the event that a research participant indicated their intention, or that of another person, to hurt themselves or others, the Graduate Research Assistant discontinued the interview and ensured that the Undergraduate Research Assistant contacted Dr. Aubuchon-Endsley in person (her office is two doors down from the lab). If Dr. Aubuchon-Endsley was not onsite, the Undergraduate Research Assistant contacted her by cellular phone. The Graduate Research Assistant provided the participant with a list of mental health resources in the area and discussed methods that the participant could use to ensure her safety while waiting for Dr. Aubuchon-Endsley. Upon arrival, Dr. Aubuchon-Endsley was apprised of the situation and determined the need for and level of follow-up support/services. As Dr. Aubuchon-Endsley is the Director of the Psychology Clinic, she is well-versed in empirically-supported methods of risk assessment and management. The participant was informed as soon as possible in any instance of limits to confidentiality/mandated reporting (e.g., abuse or neglect of a dependent, duty to warn, or suicidal crisis). If violence was reported among non-dependent adults, the Research Assistant (RA) provided the participant with local mental health and support resources.

Recruitment. Participants were recruited from a variety of sites and events, including: professional organizations such as hospitals, clinics, medical centers, family programs and service centers, preschools and childcare facilities; public organizations such as local stores, libraries, schools, and recreational centers; diverse groups such as organizations and services on the Shoshone-Bannock reservation; newsletters; Idaho State University; and community-based maternity services such as doulas, LLLI, and midwives. Initially, prospective participants who contacted RA or provided their contact information during recruitment events received a brief phone call to determine their continued interest level and eligibility and learn more about participation in the study. During the prospective participant's third trimester, they met individually with a trained RA in the lab. The study's purpose, informed consent, benefits of participation (e.g., incentives, self-awareness), foreseeable risks (e.g., discomfort, reporting mandates on imminent harm), and freedom to skip questions or withdraw without penalty was reviewed. The consent form was summarized aloud by the interviewer and was written at an eighth-grade reading level had the participant wished to follow along or refer back to the document. The participant completed her prenatal visit at this time if she understood all concepts, agreed to participate, and signed the informed consent statement.

Prenatal session. RAs were trained to perform anthropometric assessments (i.e., weight, height/length, and abdominal circumference) and administer self-report questionnaires. The prenatal visit included an interview regarding participants' current and past pregnancy-related information, brief health history, sociodemographic characteristics (socioeconomic status, ethnicity, race, age), psychological symptoms (mood and anxiety-relevant modules [A-I, L, and O] from the Mini International Neuropsychiatric Interview (MINI) (Sheehan, Lecrubier, Sheehan, Amorim, Janavas, Weiller, Hergueta, Baker, & Dunbar, 1998) and depressive

symptoms from the Edinburgh Depression Scale (Cox, Holden, & Sagovsky, 1987), and substance use (i.e., prescription medications, caffeine, nicotine, tobacco, and alcohol). The prenatal interview lasted approximately 40 minutes. To ensure that interviewers were conducting the assessment in a reliable manner, the MINI was audiotaped without identifiers. Tapes were regularly reviewed throughout data collection with the PI and other study interviewers to ensure diagnostic reliability. Following the interview, mothers were weighed and their height and abdominal circumference was measured, taking approximately 10 minutes. Mothers were then asked to complete several electronic self-report questionnaires (totaling about 40 minutes). All measures/questions implemented in this study have demonstrated good reliability and validity and have been used in research published in peer-reviewed journals. This includes the Perceived Stress Scale (subjective psychological stress measure; Sheldon, Kamarck, & Mermelstein, 1983), Dietary Screening Questionnaire (short dietary assessment instrument; Ahuja et al., 2012), Eating Behavior Questionnaire (meal and fast food frequency questionnaire; National Heart Lung and Blood Institute, 2011), Perinatal Anxiety Screening Scale (self-report of feelings of anxiety, adjusted for use in the perinatal period; Somerville et al., 2014), Perinatal Obsessive-Compulsive Scale (self-report of obsessional thoughts and compulsive behavior during the perinatal period; Lord, Rieder, Hall, Soares, & Steiner, 2011), Severity of Violence Against Women Scale (self-report of interpersonal conflict between participant and an identified romantic partner; Marshall, 1992); Trauma History Questionnaire (self-report of experience of past or current traumatic experiences; Hooper, Stockton, Krupnick, & Green, 2011); Domain-Specific Risk-Taking Scale (self-report measure of risk-taking behavior; Blais & Weber, 2006), and Infant Crying Questionnaire-Prenatal Version (maternal sensitivity and responsiveness questionnaire; Leerkes et al., 2014). RAs then reimbursed participants $30 for completing the

prenatal session. Before departing the lab, a 3-day saliva sampling procedure was explained to mothers and the RA prearranged a time to collect saliva sampling packets from participants in addition to reimbursing them for the completion of these packets. A mental health resource list was provided if participants endorsed critical items on any of the measures or reported experiencing distress. The RAs reviewed this document with participants prior to ending their study session. In the event that they were necessary, additional adverse reporting procedures developed by the Human Subjects Committee were also performed.

Postnatal session. One month after their due date, RAs contacted participants by phone and then email and postal mail, to schedule their 6-month postnatal session. Following this, RAs contacted participants at 1 month, 1 week, and 1 day prior to their 6-month session to confirm session date/time. Due to high demand placed on new mothers, and the variety of potential scheduling conflicts, the lab sent reminders to ensure sessions occurred as scheduled. During the 6-month session, mothers and infants first completed brief videotaped behavioral tasks, including: (1) a free-play interaction, (2) observation of baby playing with blocks, and (3) gentle infant arm holding by RA (Goldsmith & Rothbart, 1988). The behavioral tasks took approximately 20 minutes to complete. During these tasks, mothers began completing the Infant Health and Sleep Questionnaire and finished with the rest of the self-report measures later in the interview. Mothers and infants were weighed and their height/length and abdominal circumference was measured, following the behavioral tasks, taking approximately 10 minutes. Next, mothers completed interviews regarding their health (and baby's health) since the last session, the MINI (audiotaped to ensure reliability), and substance use (i.e., prescription medications, caffeine, nicotine, tobacco, and alcohol), which lasted roughly 30 minutes. Finally, mothers were asked to complete the following electronic self-report measures: the Edinburgh

Postnatal Depression Scale, Perceived Stress Scale, Dietary Screening Questionnaire, Eating Behavior Questionnaire, Perinatal Anxiety Screening Scale, Perinatal Obsessive-Compulsive Scale- Postnatal, Infant Crying Questionnaire-Postpartum Version (Leerkes et al., 2014), and Infant Behavior Questionnaire-Revised-Short Form (maternal report of the frequency of infant behaviors; Putnam, Helbig, Gartstein, Rothbart, & Leerkes, 2014). Participants took about 60 minutes to complete these questionnaires. Participants were compensated $30 for the postnatal session.

Data disposal. All quantitative and qualitative data (with identifiers removed) will be submitted for archiving. In accordance with the American Psychological Association (APA) Record Keeping Guidelines, data at ISU will be stored for no less than 3 years after infants in the study reach the age of 21. Data will be stored on ISU Box electronic server and will be destroyed once all projects related to the IDAHO Mom Study are completed.

Quantitative Analyses

Proposed Model and Preliminary Analyses

In conditional process analysis, the concepts of mediation and moderation are used in the same model to explain the relationship among the variables to test Hypotheses 1 and 2. Given the current literature on breastfeeding, a moderated mediation model was hypothesized. Specifically, literature has established a relationship between stress and anxiety, as separate constructs, and breastfeeding behaviors such as duration of breastfeeding. What is unclear is the mechanism by which this relationship exists. Given the relationship between breastfeeding difficulties and breastfeeding behaviors, it is plausible that breastfeeding difficulties mediate the relationship between stress and anxiety and breastfeeding behaviors (Ertem, Votto, & Leventhal, 2001; Purdy, 2010; Schmied and Barclay, 1999). Furthermore, a mother's perception of infant crying

may also impact breastfeeding behaviors. Therefore, high scores of maternal misperceptions of infant crying (i.e., interpreting a response to crying with breastfeeding as "spoiling" an infant) may moderate, or strengthen, the mediated relationship between anxiety and stress, breastfeeding difficulties, and breastfeeding behaviors (see Figure 1). In other words, the relationship between greater maternal stress and anxiety and reduced breastfeeding behaviors (i.e., breastfeeding duration) would be mediated by more breastfeeding difficulties (e.g., low milk expression, infant latching difficulty, or maternal pain). Relatedly, mothers who misperceived their response to an infant's crying as spoiling would have a significantly greater relationship between more breastfeeding difficulties and reduced breastfeeding behaviors than mothers who do not view responsiveness to infant crying as spoiling. However, it was possible that breastfeeding difficulties would serve as a stronger primary predictor of perinatal stress, anxiety, and breastfeeding behaviors. Therefore, Pearson's correlations among the predictor and outcome variables (X and Y, M and Y, and X and M) were run prior to testing the full model. Depending on the most robust relations between these variables, the hypotheses presented above (see Figure 1) and again below, could be modified based on these preliminary analyses.

In order to explore the impact of breastfeeding experiences on postnatal stress and anxiety, two further relationships were hypothesized. Previous literature suggests that mothers who are breastfeeding experience lower levels of stress and anxiety. Therefore, it was hypothesized that participants who breastfed through 6 months would demonstrate lower levels of postnatal stress and anxiety than those who discontinue breastfeeding prior to 6 months. To test this relationship, we conducted an independent samples *t*-test in which women who breastfed at 6 months were compared to women who did not breastfeed at 6 months on postnatal levels of stress and anxiety. Furthermore, we hypothesized that among women who breastfeed through 6

months, there would be a positive relationship between fewer breastfeeding difficulties and lower levels of postnatal stress and anxiety. Based on the research reviewed above, challenges with breastfeeding are related to the discontinuation of breastfeeding. Therefore, women who continue breastfeeding at 6 months may be experiencing fewer difficulties and relatedly, report lower levels of stress and anxiety. In assessing this relationship, we conducted a Pearson's product-moment correlation between breastfeeding difficulties and postnatal stress and anxiety among women who continued to breastfeed at 6 months.

Descriptive Statistics and Covariates

Descriptive statistics are provided for the types of breastfeeding difficulties participants endorse, religion, parity, ages of mothers and infants, and sociodemographic variables. As mentioned previously (see Methods), the present study considered up to three covariates (one infant variable, one maternal variable, and parity).

Primary Analyses

Data analysis was conducted using SPSS and Hayes' PROCESS macro v2.16 (Hayes, 2013). All regression assumptions were tested prior to conducting data analyses. These tests included casewise diagnostics for outliers (±3 SD), scatterplots to ensure linearity and no range restriction, frequency histograms to test for primary variable (i.e., Perceived Stress Scale (PSS) score, Perinatal Anxiety Screening Scale (PASS) score, breastfeeding difficulties, and breastfeeding behaviors) distribution normality, intercorrelations and variance inflation factors to rule out multicollinearity, and residuals plots to test for homoscedasticity and normality of residuals. The frequencies of sociodemographic variables and means and standard deviations for primary predictor and outcome variables were computed to describe the current sample.

Hypotheses 1 and 2. The PROCESS macro v2.16, Model 14 was used to test our moderated mediation hypotheses or Hypotheses 1 and 2 (Hayes, 2013). Specifically, we examined whether breastfeeding difficulties mediated or explained the relationship between prenatal stress and reduced breastfeeding duration, and whether perceptions of responding to infant crying as spoiling moderated the relationship between breastfeeding difficulties and breastfeeding duration along the b path (see Figure 1) for Hypothesis 1. This same model was used to test whether breastfeeding difficulties mediated or explained the relationship between prenatal anxiety and reduced breastfeeding duration, and whether perceptions of responding to infant crying as spoiling moderated the relationship between breastfeeding difficulties and breastfeeding duration along the b path (see Figure 1) for Hypothesis 2.

The PROCESS macro utilized the bootstrapping method of testing mediation. Bootstrapping assesses the statistical significance of the direct and indirect effects of variables in a way that maximizes power and is robust against non-normality. Bootstrapping involves sampling with replacement, therefore, our sample of n=94 was used to construct a number of resamples with replacement, of our dataset, which yielded a bootstrap sample the same size as the original sample. The bootstrap sample was used to calculate the indirect effect of X on Y through M, which is conditional upon V. This was repeated 1,000 times to provide an empirical sampling distribution or a replication of sampling from the same population distribution several times. Doing so allowed us to provide a bias-corrected 95% confidence interval of the empirical sampling distribution. Bias-corrected 95% confidence intervals are typically used to judge significance of the indirect effect because they are more accurate than percentile intervals. If these confidence interval ranges did not include 0, this indicated that we could reject the null

hypothesis that there is no indirect effect because the two-tailed *p*-value for the indirect effect is less than 0.05.

Hayes' (2013) Process macro quantifies the effect of V on the indirect effect of X on Y through M, and can also be used to assess for significance with the bias-corrected confidence interval. For Model 14, the conditional indirect effect is represented by the formula $a_i(b_{1i}+b_{3i}V)$, where a_i is the regression coefficient of X on M, b_{1i} is the regression coefficient of M on Y, controlling for X, b_{3i} is the regression coefficient of the product of M*V on Y, and V is the moderator. The Index of Moderated Mediation for Model 14 is defined as: a_ib_{3i} (Hayes, 2015). This value quantifies the effect of V on the indirect effect of X on Y through M.

Hypotheses 3 and 4. We conducted an independent samples *t*-test in which women who breastfed through 6 months were compared to women who did not breastfeed through 6 months on postnatal levels of stress (Hypothesis 3) and anxiety (Hypothesis 4).

Hypotheses 5 and 6. We conducted a Pearson's product-moment correlation to examine the relationship between breastfeeding difficulties and postnatal stress (Hypothesis 5) and anxiety (Hypothesis 6) among women who continued to breastfeed through 6 months postpartum.

Results

Correlations

When considering the moderated mediation models prior to analysis, it was believed that breastfeeding difficulties could serve as a stronger primary predictor of perinatal stress, anxiety, and breastfeeding behaviors. Therefore, Pearson's correlations among the predictor and outcome variables (X and Y, M and Y, and X and M) were computed prior to testing the full model. Univariate Pearson's product-moment correlations between primary predictor and outcome

variables yielded several significant and nonsignificant relationships (see Appendix J). Prenatal stress was significantly related to prenatal anxiety (r=0.686, p=0.01), postnatal anxiety (r=0.506, p=0.01), and postnatal stress (r=0.578, p=0.01). Postnatal stress was significantly related to prenatal anxiety (r=.483, p=0.01) and postnatal anxiety (r=0.487, p=0.01). Prenatal anxiety was significantly related to postnatal anxiety (r=0.608, p=0.01), breastfeeding duration (r=-0.258, p=0.05), and perceptions of spoiling (r=0.218, p=0.05). Finally, postnatal anxiety was significantly related to perceptions of spoiling (r=0.222, p=0.05). Significant correlations between measures of stress and anxiety at both time points were expected, as the constructs of stress and anxiety are theoretically closely related. The significant relationships between prenatal anxiety and breastfeeding duration, as well as the lack of other significant correlations between potential predictors (e.g., stress, anxiety, breastfeeding difficulties), indicated that the originally proposed model, as depicted in Figure 1, had the greatest statistical and theoretical support.

Univariate correlations between predictors (pre/postnatal stress and pre/postnatal anxiety) and outcome (breastfeeding duration) variables with potential covariates (prenatal maternal illness, postnatal maternal illness, colic, infant illness including colic, labor/delivery complications, and parity) indicated six significant relationships. Specifically, infant illness was related to prenatal maternal stress (r=0.204, p=0.05), colic was related to postnatal stress (r=0.215, p=0.04) and perceptions of infant crying as spoiling (r=0.248, p=0.02), parity was related to breastfeeding duration (r=0.282, p=0.01), postnatal maternal illness was related to prenatal maternal anxiety (r=0.285, p=0.01), and postnatal maternal illness was related to postnatal maternal anxiety (r=0.257, p=0.05). However, because none of the potential covariates significantly correlated with both predictor and outcome variables, no covariates were included in the two primary models for regression analysis.

Descriptive Statistics

Descriptive statistics revealed that the majority of the participants were European-American (92%), married (84%), employed (60%), and identified as a member of the Church of Jesus Christ of Latter-day Saints (61%). Diversity with regard to education and income was found in the current sample (see Appendix K). The largest percentage of mothers were educated with a standard college or university degree (39%) and had a total family income between $50,000 and $74,999 (28%; see Appendices Land M). Twenty-nine percent had given live birth to only one other child and, at the prenatal time point, 32% were living with only one child in the home.

The average level of stress as measured by the Perceived Stress Scale (PSS) was a score of 19.59 (*SD*=6.65) prenatally and 20.23 (*SD*=5.96) at the 6-month postnatal visit, out of a possible 56 points. Participants' average anxiety score, as measured by the Perinatal Anxiety Screening Scale (PASS), was 16.73 (*SD*=11.99) prenatally and 14.46 (*SD*=9.45) postnatally out of a possible 93 points. Participants indicated their feelings of spoiling by means of responding to infant crying on the Infant Crying Questionnaire-Revised (ICQ-R). On average, participants scored 5.62 points (*SD*=2.10) out of a possible 15 on this measure. Participants reported an average of 0.52 (*SD*=0.96) difficulties while breastfeeding. Specifically, 19% endorsed difficulties for themselves (e.g., not expressing enough milk, soreness, or fatigue), 17% endorsed difficulties for their babies (e.g., latching difficulties, inability to suck properly, not obtaining enough mild, or not interested in feeding), 11% of participants endorsed difficulties with time management (e.g., returning to work and unable to pump), 2% of participants endorsed an insufficient environment (e.g., discomfort feeding in public or around others in the home), and 3% of participants noted other difficulties, although their responses were found to be iterations of

the previously mentioned answer choices. Participants reported an average of 0.83 (*SD*=0.94) prenatal maternal illnesses, 0.64 (*SD*=0.80) postnatal maternal illnesses, 1.62 (*SD*=0.49) complications during labor or delivery, and 4.83 (*SD*=2.09) infant illnesses from birth to 6 months postpartum. The average duration of breastfeeding through 6 months was 138 days (*SD*=69.13 days) or roughly 4.4 months.

Regression Assumptions

Although three outliers (± 3 *SD*) were detected, one from the ICQ-R spoiling scale and two from the prenatal and postnatal PASS total scores, these participants were not removed from the dataset. All three participant's scores were elevated above the mean sample scores, suggesting that removing their scores may have resulted in restricted range or removal of the most distressed participants. Including participants with higher than average scores demonstrated expected variability in our sample and was thought to assist with accurately representing maternal perinatal distress in order to address study hypotheses. Two variables (PASS prenatally and postnatally) were positively skewed and thus were transformed using a natural log function prior to analyses. Two participants' data could not be transformed because of their scores of zero and were subsequently removed from the dataset, resulting in a final sample size of 94 participants. Other regression assumptions were tested via scatterplots to ensure linearity and the absence of range restriction, frequency histograms to test for primary variable (i.e., Perceived Stress Scale (PSS) score, Perinatal Anxiety Screening Scale (PASS) score, breastfeeding difficulties, and breastfeeding behaviors) distribution normality, intercorrelations and variance inflation factors to rule out multicollinearity, and residuals plots to test for homoscedasticity and normality of residuals. No other regression assumptions were violated.

Primary Analyses

Hypothesis 1: Breastfeeding difficulties will mediate the relationship between prenatal stress and reduced breastfeeding duration. In particular, greater prenatal stress will be related to greater breastfeeding difficulties, which will predict reduced breastfeeding duration through 6 months. Perceptions of infant crying behavior will moderate the relationship between breastfeeding difficulties and breastfeeding duration in this model. Specifically, mothers who misperceive their response to an infant's crying as spoiling will have a more robust statistical relationship between more breastfeeding difficulties and reduced breastfeeding behaviors than mothers who do not view responsiveness to infant crying as spoiling.

This moderated mediation model was not statistically significant (F[4,89]=0.747, R^2=0.033, p=0.563). Specifically, prenatal stress did not significantly predict breastfeeding difficulties (b=0.003, t[93]=0.183, SE=0.015, p=0.855), breastfeeding difficulties did not significantly predict breastfeeding duration (b=-10.416, t[93]=-0.419, SE=24.829, p=0.676), and prenatal stress did not significantly predict breastfeeding duration (b=-1.068, t[93]=-0.969, SE=1.103, p=0.335). Furthermore, the interaction term (breastfeeding difficulties x response to infant crying as spoiling) was not significantly predictive of breastfeeding duration (b=0.503, t[93]=0.119, SE=4.201, p=0.905; see Appendix N).

Hypothesis 2: Breastfeeding difficulties will mediate the relationship between prenatal anxiety and reduced breastfeeding duration. In particular, greater prenatal anxiety will be related to greater breastfeeding difficulties, which will predict reduced breastfeeding duration through 6 months. The same moderation hypothesis is predicted in this model as in 1.

This moderated mediation model was not statistically significant (F[4,89]=1.889, R^2=0.078, p=0.119). Specifically, prenatal anxiety did not significantly predict breastfeeding difficulties (b=0.052, t[93]=0.345, SE=0.149, p=0.731), breastfeeding difficulties did not

significantly predict breastfeeding duration (b=-6.633, t[93]=-0.273, SE=24.299, p=0.786), however, prenatal anxiety significantly predicted breastfeeding duration (b=-25.253, t[93]=-2.325, SE=10.860, p=0.022). Moreover, the interaction term (breastfeeding difficulties x response to infant crying as spoiling) was not significantly predictive of breastfeeding duration (b=0.069, t[93]=0.017, SE=4.109, p=0.987; see Appendix N).

Hypothesis 3: Participants who breastfeed through 6 months will demonstrate lower levels of postnatal stress than those who discontinue breastfeeding prior to 6 months.

The Levene's test for homogeneity of variance indicated that the two groups were not significantly different in variance (F=0.291, p=0.591). The independent samples t-test revealed no differences in postnatal stress between participants who breastfed through 6 months and those who discontinued breastfeeding prior to 6 months (t(92)=-0.711, p=0.479; see Appendix O).

Hypothesis 4: Participants who breastfeed through 6 months will demonstrate lower levels of postnatal anxiety than those who discontinue breastfeeding prior to 6 months.

The Levene's test for homogeneity of variance indicated that the two groups were not significantly different in variance (F=2.165, p=0.145). The independent samples t-test revealed no differences in postnatal anxiety between participants who breastfed through 6 months and those who discontinued breastfeeding prior to 6 months (t(92)=-1.369, p=0.174; see Appendix O).

Hypothesis 5: Among women who breastfeed through 6 months, there will be a positive relationship between fewer breastfeeding difficulties and lower levels of postnatal stress.

Using a two-tailed Pearson's product-moment correlation, breastfeeding difficulties were not significantly related to postnatal stress (r=-0.156, p=0.114; see Appendix P).

Hypothesis 6: Among women who breastfeed through 6 months, there will be a positive relationship between fewer breastfeeding difficulties and lower levels of postnatal anxiety.

Using a two-tailed Pearson's product-moment correlation, breastfeeding difficulties were not significantly related to postnatal anxiety (r=-0.137, p=0.144; see Appendix P).

Follow-up Analyses

Follow-up analyses focused on examining possible group difference in prenatal anxiety based on some of the distinct sociodemographic variables in our sample. Analyses did not reveal group differences in anxiety between women: (1) who identified as LDS versus any other religion (t(92)=0.478, p=0.634), (2) who were employed versus unemployed (t(92)=-1.867, p=0.065), (3) who obtained a partial college education or higher versus any other education (t(92)=0.820, p=0.414), or (4) who were primiparous versus multiparous (t(92)=1.718, p=0.089; see Appendix Q). In order to explore a possible explanation for the discrepancy between national and Idaho average breastfeeding rates, the employment rate among IDAHO Moms and the U.S. national average was compared. It has been established that mothers who are not employed find it easier to manage their time to incorporate breastfeeding. However, according to a study conducted by the U.S. Census Bureau on mothers who gave birth between 2000-2007, the national postnatal employment average was 57% at 6 months postpartum while the current study's rate is of postnatal employment at 6 months is 60% (Laughlin, 2011). Therefore, employment status cannot truly account for the differences in breastfeeding duration in the present sample.

An independent samples t-test was conducted to determine the difference in breastfeeding duration between the 14 participants who were at or above the PASS cut-off of 26 and those below 26, in the prenatal period. For this analysis, all 96 participants were used, as the removal

of two participants was only necessary for the natural log transformation of the postnatal PASS scores. The Levene's test for homogeneity of variance indicated that the two groups were not significantly different in variance (F=3.172, p=0.078). It was determined that the two groups, those classified as above and below the PASS cut-off score, were statistically different (t(94)=-3.90, p<0.001). Furthermore, the difference in the mean duration for breastfeeding in days was 72.58, approximately 2.5 months' difference in breastfeeding duration between mothers with and without elevated prenatal anxiety scores. On average, the 14 mothers who met the prenatal PASS cut-off breastfed for a total of 75 days, while mothers who did not meet the cut-off for prenatal anxiety breastfed for an average of 148 days. Of the mothers with clinically elevated prenatal anxiety, only 4 breastfed through 6 months, while 56 of the 82 mothers who did not have clinically elevated prenatal anxiety continued breastfeeding at 6 months (see Appendix R and S).

Discussion

Study Strengths

Although no study is without limitations, the present project included many strengths that warrant mentioning. A prominent issue with longitudinal research is high rates of attrition. However, the IDAHO Mom Study sample size remained relatively large through 6 months postpartum (i.e., a shift from 125 to 96 participants). The measures to assess many of the study variables are grounded in strong theoretical work and are psychometrically strong. Furthermore, the statistical analyses used in the present study (i.e., conditional process analysis) allowed for the examination of complex multivariate relationships in a robust way (i.e., bias-corrected bootstrapping from the PROCESS macro). Finally, the present study explored an area of research that is important, yet understudied, particularly in rural and underserved samples. As previously mentioned, perinatal mental health research frequently focuses on clinical depression, often

overshadowing the role of stress and anxiety in the prenatal period (Fallon et al., 2016). However, based on prevalence rates reported by several independent studies and the CDC, the impact of stress *and* anxiety on maternal and infant outcomes necessitates further research. The present study is able to contribute to this growing body of literature and is the first known study to find a significant relationship between prenatal anxiety and breastfeeding duration within a U.S. sample.

Current Study Findings

Hypotheses 1 and 2. Perinatal literature has established relationships between stress, anxiety, breastfeeding difficulties, perceptions of responding to infant crying as spoiling, and breastfeeding duration. Although breastfeeding duration has continued to rise in the U.S., mothers still fall short of recommendations (Breastfeeding Report Card, 2016). The present study sought to quantify the relationship of the aforementioned variables among 94 women in two moderated mediation models. Specifically, it was hypothesized that breastfeeding difficulties would mediate the relationship between prenatal stress and anxiety, and breastfeeding duration. In particular, greater prenatal stress and anxiety would be related to greater breastfeeding difficulties and shorter duration of breastfeeding through 6 months. Furthermore, perceptions of response to infant crying behavior would moderate the relationship between breastfeeding difficulties and breastfeeding behaviors in these mediation models. Preliminary correlations examined whether breastfeeding difficulties would serve as a stronger predictor to breastfeeding duration. However, correlations among primary study variables indicated largely nonsignificant findings aside from prenatal anxiety's relationship to breastfeeding duration (see Appendix J). Therefore, the hypothesized moderated mediation models were maintained for primary analyses (see Figure 1). Although neither of the hypothesized moderated mediation models were

statistically significant, greater prenatal anxiety significantly predicted shorter breastfeeding duration (see Appendix N).

This finding replicates previous literature on anxiety during pregnancy and breastfeeding duration. Specifically, Insaf et al. (2011) found that high levels of trait anxiety in early and mid-pregnancy were associated with decreased breastfeeding rates. Furthermore, Kehler et al. (2009) found that many women who experience anxiety during pregnancy breastfeed for less than 6 months. Both Insaf et al. (2011) and Kehler et al. (2009) speculate that poor psychosocial health during pregnancy may be an indicator of poorer overall health, which may influence breastfeeding behaviors. However, the researchers do not provide any further explanation as to why prenatal anxiety, specifically, impacts breastfeeding duration. Mehta, Siega-Riz, Herring, Adair, and Bentley (2012) found that prenatal anxiety predicted shorter exclusive breastfeeding at 1 month postpartum, but only prenatal depression was related to the duration of any breastfeeding. Of note, Fallon, Bennett, and Harrold's review (2016) of the literature revealed mixed findings regarding prenatal anxiety and breastfeeding behaviors. It was found that while there are no associations between prenatal anxiety and breastfeeding initiation, a relationship does exist between high levels of prenatal anxiety and a decrease in breastfeeding intention and exclusivity (Fallon, Bennett, & Harrold, 2016). The authors concluded that the relationship between prenatal anxiety and breastfeeding is still poorly understood and necessitates further research (Fallon, Bennett, & Harrold, 2016).

Fallon, Bennett, and Harrold (2016) report possible explanations for this relationship, including that trait anxiety may interfere with oxytocin release, which has been shown to stimulate the milk-ejection reflex. Inhibition of the milk-ejection reflex may result in an overall lower milk production, perhaps leading to decreased breastfeeding behavior. State anxiety may

also result in heightened levels of cortisol and glucose, potentially decreasing milk volume in the postpartum period and resulting in decreased breastfeeding duration. From a psychological perspective, mothers who experience prenatal anxiety about parenting may avoid challenging parenting behaviors, such as breastfeeding, leading to decreased maternal-infant interaction and decreased breastfeeding behaviors.

To the best of our knowledge, few, if any studies aside from the present study have explored and found that various forms of prenatal anxiety, including state, trait, and perinatal, influence breastfeeding duration. Thus, the present project provides novel and important findings regarding correlates of breastfeeding behaviors. Future research should explore whether prenatal state, strait, or perinatal anxiety is most related to breastfeeding behaviors. While the present study provides further support for the relationship between heightened prenatal anxiety and decreased breastfeeding duration, the interactive biopsychosocial mechanisms by which this relationship exists remains elusive and should be further explored (e.g., stress hormone systems, immune functioning, maternal-infant bonding, and sociocultural understanding and support for breastfeeding).

Hypotheses 3, 4, 5, and 6. Postnatal analyses sought to examine the relationship between postnatal stress and anxiety and breastfeeding duration and difficulties. Specifically, it was hypothesized that participants who breastfed through 6 months would demonstrate lower levels of postnatal stress and anxiety than those who discontinued breastfeeding prior to 6 months. We also predicted that among women who breastfed through 6 months, there would be a positive relationship between fewer breastfeeding difficulties and lower levels of postnatal stress and anxiety. These hypotheses were analyzed via two independent samples *t*-tests and two Pearson product moment correlation coefficients, respectively. However, no significant group differences

or relationships were found via these analyses. Unfortunately, these variables could not be analyzed in moderated mediation models similar to those proposed in hypotheses 1 and 2, due to the way in which postnatal stress, anxiety and breastfeeding duration were measured. In particular, postnatal stress and anxiety were measured at 6 months postpartum and therefore could not theoretically predict breastfeeding duration for mothers who had discontinued breastfeeding prior to 6 months. Therefore, future research should consider measuring postnatal stress and anxiety at multiple time points, including directly after birth, in order to be able to predict later breastfeeding termination rates.

Null findings. Largely null findings (i.e., with regard to maternal prenatal and postnatal anxiety and breastfeeding difficulties/duration) may be based on the fact that when comparing the IDAHO Mom sample to the prenatal and postnatal PASS normative sample, it was found that the IDAHO Moms' anxiety scores reflected those of the healthy control group in the normative study (see Appendix T). Somerville and colleagues (2015) noted that participants with minimal anxiety were considered a healthy control group, therefore most of the IDAHO Mom participants were likely experiencing non-clinically significant levels of anxiety. Only 14 mothers from the IDAHO Mom sample scored at or above the clinical cut-off of 26 on the prenatal PASS, indicating that these women were at risk for an anxiety disorder (Somerville et al., 2015).

We did not find a relationship between breastfeeding difficulties and duration, which could possibly be related to protective mechanisms, such as social support. Alternatively, breastfeeding difficulties may have impacted other breastfeeding behaviors in our sample, such as initiation and frequency. Regarding the lack of a relationship between the interaction of breastfeeding difficulties and perceptions of responding to infant crying with breastfeeding as spoiling on breastfeeding duration, similar protective mechanisms, such as social support, may

be responsible for null findings.

Furthermore, it may be that a significant relationship between perinatal stress, postnatal anxiety, breastfeeding experiences and behaviors does not exist. As the literature review demonstrated, several studies have not found significant relationships among these variables (see Appendix A). In the preceding review of the literature (see Appendix A), significant variability in the population sampled, sample size, and measures of stress and anxiety were found. For example, Zhu et al., (2013) studied stress in the perinatal period among 1602 women. Based on the present analyses, that study was likely overpowered, increasing the likelihood for significant results. By examining the study sample sizes from the literature review (see Appendix A), it is apparent that several projects were likely overpowered in a similar way. Furthermore, Zhu et al., (2013) and Li et al., (2008) used lesser known or self-created measures of perinatal stress, drawing into question the reliability of their study measures and generalizability of their findings. Several researchers used the State-Trait Anxiety Inventory (STAI) to assess perinatal anxiety. However, even when examining the same variable (i.e., postpartum anxiety) and the same breastfeeding outcome (i.e., duration), Akman et al., (2008) and Britton (2007) came up with opposing findings. Present study findings may indicate that U.S. women do not experience perinatal stress and anxiety in the same way as other cultural groups. What remains unclear is why we see similarities and differences in stress, anxiety, and breastfeeding behaviors in women across the world. Future studies should test risk and resiliency factors, which may vary across culture.

Particularly, several possible explanations that should be explored via future research include quality of healthcare services, social/community support of perinatal women, sociocultural expectations/stigma, employment expectations (e.g., maternal leave varies widely

across countries from none to over 1 year), and parity, among many others, some of which have been explored in the present project's literature review. For example, it may be that the IDAHO Mom sample reflected an unidentified resilience in Southeastern Idaho women that is not see in other countries or areas of the U.S. Interestingly, follow-up analyses did not suggest that employment status impacted breastfeeding duration. Furthermore, although Idaho boasts a higher than national average breastfeeding rate (93% breastfeeding ever and 65% breastfeeding through 6 months postpartum), Idaho has some of the fewest community and policy supports for breastfeeding women. Based on these possible conclusions, researchers should be cautious in generalizing current study findings prior to further investigation of the mechanisms by which the relationship between prenatal anxiety and breastfeeding duration exists.

The present null findings also draw into question the relationship between prenatal and postnatal anxiety. Interestingly, this project found a significant relationship between prenatal and postnatal anxiety scores (see Appendix J), however, only prenatal anxiety was related to breastfeeding duration. While we do not fully understand why only prenatal anxiety was related to breastfeeding duration, it may be that this relationship occurs via biological mechanisms (e.g., stress hormone impacts on milk supply), while perhaps breastfeeding termination predicts postnatal anxiety via psychosocial mechanisms (e.g., reduced maternal-infant bonding and social stigma). Furthermore, future research projects should not assume that mothers experience some form of anxiety in the prenatal and/or postnatal periods. Rather, researchers should consider dividing groups into prenatal or postnatal anxiety, neither, or both. This is consistent with *DSM-5* conceptions of peripartum mood disorders (APA, 2013) and may assist in understanding how the onset, course, and duration of other forms of psychopathology influence breastfeeding and maternal-infant health. In examining women who have anxiety in the prenatal and/or postnatal

period but continue to breastfeed through at least 1 year, we may be able to elucidate important resiliency factors for the maintenance of breastfeeding behaviors (e.g., social and community support).

Primary study variable correlations. Correlation analyses also supported significant relationships among prenatal stress/anxiety and postnatal stress/anxiety, suggesting that these constructs are related within and over time. This is predicted given that stress is necessary but not sufficient for the development of anxiety and that the types of internal and external stressors that may contribute to distress in the perinatal period (e.g., role changes, greater financial obligations, and difficulty balancing work/family) are stable across prenatal and postnatal time periods. Moreover, prenatal and postnatal anxiety were also significantly related to perceptions of infant spoiling. As previous literature suggests, excessive infant crying can be challenging for mothers, and this may lead to heightened feelings of stress and anxiety (Long & Johnson, 2001). Frequently, mothers will attempt to console a crying infant via breastfeeding (Howard, Lanphear, Lanphear, Eberly, & Lawrence, 2006). However, if mothers misperceive their response to infant cries with breastfeeding as spoiling, they may decrease breastfeeding behaviors (Bell & Ainsworth, 1972; Mathews, Leerkes, Lovelady, & Labban, 2014). Subsequently, mothers' stress and anxiety may increase if they notice a decrease in their milk supply due to decreased feeding behavior, or due to infant crying behavior that they are not addressing.

Covariate correlations. Interestingly, theoretical covariates measured in the current study were not significantly related to predictor (i.e., perinatal stress/anxiety) *and* outcome variables (i.e., breastfeeding duration). These findings may be due to limited variability in the IDAHO Mom sample, as the study's exclusion criteria likely limited the number and types of maternal and infant illnesses. However, greater prenatal maternal stress was related to a larger

number of infant illnesses through 6 months, greater prenatal and postnatal anxiety was related to more postnatal maternal illnesses, colic was related to greater postnatal stress and increased perceptions of infant crying as spoiling, and greater parity was related to longer breastfeeding duration. Previous literature supports many of these relationships. Biologically, increased stress is related to compromised health and immune functioning, therefore mothers who experienced heightened levels of stress prenatally may have negatively impacted their own and their child's health status early in life (Mezzacappa, 2004). Research also supports that anxiety works in a similar way to impact maternal illness (Stuebe, Grewen, & Meltzer-Brody, 2013; Ueda, Yokoyama, Irahara, & Aono, 1994). As mentioned previously, colic can pose a number of challenges for mothers and their families, including experiencing stress, a finding that is replicated in the IDAHO Mom sample as well (Long & Johnson, 2001). Furthermore, as colic and perceptions of responding to infant crying with breastfeeding as spoiling both measure infant crying behavior, the relationship between these variables also makes intuitive sense. Finally, Thulier and Mercer (2009) reviewed several studies examining parity and breastfeeding duration and although they report mixed findings, several of the studies they site reflect the positive relationship found in the present study.

Practical Implications

The current study's findings hold important implications. Interestingly, although our sample was a relatively low-risk, healthy community sample, we still found a significant relationship between greater prenatal anxiety and shorter breastfeeding duration. Furthermore, while most participants only met criteria for minimal levels of anxiety, this low level of prenatal anxiety still impacted breastfeeding duration. Therefore, healthcare providers may want to re-examine thresholds of prenatal anxiety that predict maladaptive postnatal health behaviors like

premature termination of breastfeeding. Appropriate mental health screening and intervention at the prenatal period may increase breastfeeding duration and reduce maternal and infant short- and long-term health risks. Furthermore, even pregnant women with low levels of anxiety may benefit from screening and intervention and should not be overlooked. Future prevention and intervention research should focus on the nature of maternal prenatal anxiety, including women who experience relatively low levels of anxiety. Understanding the characteristics of prenatal anxiety may help inform more specific targets for prevention, intervention, and support.

Follow-up analysis using the PASS cut-off score of 26, demonstrated that mothers who experienced clinically significant levels of prenatal anxiety on average breastfed for 72.58 days, approximately 2.5 months,' less than mothers without clinically significant levels of prenatal anxiety. A review by Dieterich, Felice, O'Sullivan, and Rasmussen (2013) summarized several findings indicating that even a 2.5-month difference in breastfeeding duration is clinically meaningful, including numerous implications in maternal and infant physical health. For example, Duijts, Jaddoe, Moll, and Hofman (2010) found that even a 2-month difference in breastfeeding duration and exclusivity impacted infant risk of infectious diseases. Of note, only 4 of the 14 mothers who were elevated on the prenatal PASS breastfed through 6 months, while 56 of the 82 mothers who did not have clinically elevated prenatal anxiety continued breastfeeding at 6 months. Furthermore, on average, the 14 mothers who experienced clinically significant prenatal anxiety breastfed for a total of 75 days or 2.5 months, while mothers who did not meet the cut-off breastfed for an average of 148 days or almost 5 months. This suggests that the effects of prenatal anxiety on breastfeeding duration may play a robust and critical role within the first few months, such that this is a time period when breastfeeding difficulties should be assessed in greater detail and breastfeeding resources, support, and interventions may be most efficacious. It

is important to note that that the two groups in the present analyses were not proportional: only 14 mothers met the threshold for clinically significant prenatal anxiety. Nonetheless, these findings indicate that maternal prenatal anxiety may have a clinically significant impact on breastfeeding duration, and subsequently, health outcomes for mother-infant dyads.

Current Study Limitations

Ryan and Hay (2016) summarize the many challenges in infant nutrition research, including variability in the definition and measurement of concepts such as breastfeeding frequency and exclusivity. Although the present study collected valuable information regarding breastfeeding duration, exclusivity and frequency were not explicitly defined nor isolated in the present analyses. Therefore, the present study did not examine multiple breastfeeding behaviors nor did it differentiate between partial and exclusive breastfeeding.

Follow-up analyses did not reveal significant group differences between religious preference, employment status, degree of educational attainment, or parity with regard to women who experienced clinically significant prenatal anxiety versus those who did not. Unfortunately, null findings indicate that we still do not fully understand why the relationship between prenatal anxiety and breastfeeding duration exists. This may be due to restricted range in anxiety and/or these sociodemographic variables within the current sample. It may be that the present measures of sociodemographic characteristics were not comprehensive enough to capture the unique variability in our sample. Future studies should not only reduce the number of exclusion criteria for participant sampling, but also explore other psychometrically strong measures of sociodemographic factors.

Insaf et al. (2011) found that Hispanic women with fewer children in the household and women who were employed during pregnancy were more likely to intend to breastfeed.

Furthermore, Kehler et al. (2009) noted risk factors for early breastfeeding cessation such as lower maternal education. However, neither of these studies noted group differences among women who experience prenatal anxiety. While Insaf et al. (2011) based their study on the differing experiences of Hispanic women as compared to others, our sample was too homogenous to analyze such differences. Overall, the IDAHO Mom sample was fairly homogeneous with regard to race, marital status, and religious preference (see Appendix K). Similarly, many women with various mental and physical health concerns were excluded from the study, which may explain the low levels of stress and anxiety seen in this sample.

The current study is also a correlational design; therefore, no causal conclusions can be drawn. Unfortunately, two of the final 96 participants had to be excluded in the current study sample due to our inability to transform and normalize their data using a natural log correction. Furthermore, breastfeeding behaviors primarily measured breastfeeding duration and a clear measure of average breastfeeding frequency or pumping was not included. This was because the larger IDAHO Mom Study was not designed to examine these variables as primary predictors, but as covariates to relationships between maternal and infant health. The present thesis study also looked only at breastfeeding duration through 6 months postpartum and most of our participants (65%) were primarily or exclusively breastfeeding through this time.

As mentioned above, the present study also did not measure postnatal anxiety throughout several postnatal time points, therefore this variable could not be used to predict breastfeeding experiences or behaviors in additional moderated mediation models. Initially, two postnatal moderated mediation models, with *6-month* stress and anxiety as predictors (as opposed to *prenatal* stress and anxiety), were hypothesized with identical directions of effect as hypothesized in the present prenatal models (see Figure 1). However, initial correlational

analyses among primary variables revealed non-significant relationships among postnatal stress and anxiety and all other primary study variables. Additionally, after the full postnatal moderated mediation models were run, it became clear that 6-month postnatal stress and anxiety could not be used to predict breastfeeding behaviors, which may have terminated before the 6-month stress/anxiety was measured (i.e., 35% of the sample had stopped breastfeeding prior to 6 months postpartum). Therefore, it is likely that these original models were non-significant because they were not viable. As a result, these initial postnatal moderated mediation models and hypotheses were replaced with the present Hypotheses 3, 4, 5, and 6. These replacement hypotheses allowed us to analyze postnatal variable relationships, while considering issues of temporal causation and how this impacts direction of effects. As noted previously, future studies should consider measuring postnatal stress and anxiety multiple times, beginning at labor/delivery to minimize these measurement issues in the future.

Finally, number of breastfeeding difficulties were quantified on a scale of 0-5, however, the way in which the questionnaire is designed potentially left room for double counting of difficulties via an "other" designation, which seemed to qualitatively overlap with existing breastfeeding difficulty categories. Future projects should design a measure of breastfeeding difficulties that restricts the range of possible responses, or qualitatively assesses and code open-ended responses in a standardized way, potentially informed via content analysis. Present data from open-ended responses could be used to design additional categories for breastfeeding difficulties on future measures.

Future Directions

There are several areas for future research in the growing field of perinatal psychology. Future studies should include more comprehensive measures of breastfeeding, examining

behaviors such as breastfeeding frequency and pumping. There are several measures that exist for measuring infant feeding behaviors. Perhaps the most comprehensive measure is available through the CDC and was developed for The Infant Feeding Practices Study II, a longitudinal study conducted by the CDC and Food and Drug Administration (FDA) between 2005-2007 (CDC, 2008). The CDC's Neonatal Questionnaire and Postnatal Questionnaires ask in-depth questions about infant feeding, including details surrounding intention, initiation, frequency, amount, and duration of breastfeeding, pumping, and formula feeding. These measures also include a variety of questions related to maternal experiences with infant feedings including the degree of support from medical providers and a variety of possible difficulties with infant feeding (e.g., physical discomfort, social support or feelings of judgement, issues with time management, concerns about infant intake, etc.). While other measures of infant feeding behaviors have been tested, sample sizes have been small, greater support for reliability and validity are still needed, and none are as detailed as the ones put forth by the CDC (Noel-Weiss, Taljaard, & Kujawa-Myles, 2014; O'Sullivan & Rasmussen, 2017). The WHO published the "Indicators for Assessing Infant and Young Child Feeding Practices" in 2008, providing important areas for measurement and operational definitions for feeding behaviors (e.g., exclusive breastfeeding, complementary breastfeeding, bottle-feeding, etc.). Future studies should continue to create and assess measurements based on the WHO's indicators and model the level of detail provided in the CDC's Neonatal Questionnaire and Postnatal Questionnaires.

Studies should also explore breastfeeding difficulties in more detail, including a range of possible difficulties for mothers and infants, including physical, psychological, and environmental factors. The CDC's Neonatal and Postnatal Questionnaires include this level of detail in both dichotomous and rating scales (CDC, 2008). Overall, there appears to be no

comprehensive, well-validated measure of breastfeeding difficulties at this time. Future research should focus on creating a well-validated measure of a variety of breastfeeding difficulties to enhance standardization and psychometric properties of measures of breastfeeding across future studies, which would support the use of meta analyses to critically evaluate predictors and mechanisms of breastfeeding difficulties and behaviors.

Additionally, examining breastfeeding duration beyond 6 months may have revealed more variability. Increased variability may change the relationship of the variables in this thesis study's models, as more mothers who terminated breastfeeding over a longer period of time may allow us to explore in richer detail breastfeeding difficulties, reasons for cessation, and psychological distress. The IDAHO Mom Study has continued to collect data from many of these participants and will be able to examine breastfeeding behaviors at 10-, 14-, and 18-months postpartum. With reference to the present study limitation regarding postnatal moderated mediation analyses, future analyses could use maternal 6-month stress and anxiety scores to predict subsequent breastfeeding duration at the follow-up sessions. With this timeline, postnatal moderated mediation models, similar to the ones proposed prenatally in the present study (see Figure 1), could be examined.

Future research should also study more heterogeneous samples by including women with varying demographic, socioeconomic, psychosocial, familial, and physical health characteristics. Reducing the breadth of exclusion criteria will likely capture women who are more representative of their broader communities. Due to the limited sociodemographic variability in the present study, current findings may not generalize directly to more diverse and/or urban samples. Specifically, the unique rate of LDS members in this community is likely related to study variables in some way (i.e., social support, expectations of motherhood). However, the

present study's prenatal anxiety rate of 15% is similar to Idaho's rate of 17%. Therefore, with regard to prenatal anxiety, the present study appears to reflect the broader community fairly accurately.

Researchers should continue to explore additional risk and protective mechanisms between perinatal psychopathology and breastfeeding. Unfortunately, most studies examining breastfeeding difficulties focus on physical difficulties for mother and infant, occasionally inquiring about social support in a single question (Hobbs, Mannion, McDonald, Brockway, & Tough, 2016; Lamontagne, Hamelin, & St-Pierre, 2008). Researchers should also examine breastfeeding difficulties as predictors of various psychopathology, including trauma, depression, self-efficacy, and quality of life. Understanding the relationships between breastfeeding difficulties, their origins (e.g., social, psychological, and physical), and psychopathology beyond anxiety and stress could inform the best targets for prevention and intervention. Future models should consider examining social support as a possible mediator in these relationships. Within the present sample, investigating the role of support from religious communities, such as the LDS church, may inform protective or risk factors. Furthermore, investigating mothers' perceptions of support and resources on a larger community and health care system scale may help us understand the discrepancy between the limited resources available to breastfeeding mothers in Idaho and Idaho's higher than national average breastfeeding rates (Breastfeeding Report Card, 2016).

Researchers should also consider exploring participants' feelings surrounding sharing challenges during pregnancy and early motherhood with researchers. Social support, community perceptions, and religious affiliation may influence whether mothers are comfortable and completely forthcoming with information regarding the negative aspects of motherhood. While

exploring negative maternal experiences and psychopathology during the perinatal period will continue to be an important area of study, researchers should also examine resiliency factors that aid mothers' in continued breastfeeding. Potential resiliency factors to examine include social support, and religious community and religious identification. These variables would be especially interesting to examine in a seemingly resilient sample such as the IDAHO Moms.

Furthermore, future projects should study the relationship between breastfeeding difficulties and other breastfeeding behaviors such as frequency and future intention to breastfeed. While the present study did not find a relationship between difficulties and breastfeeding duration, other breastfeeding behaviors may be more influenced by challenges with breastfeeding. Recognizing which breastfeeding behaviors are most impacted by difficulties breastfeeding could provide further indicators for treatment targets. Future research should also consider studying which anxiety disorders mothers' PASS symptoms map onto, as the questions on the PASS can be broken down into several factors to indicate which anxiety disorder(s) a mother screens positive for (e.g., adjustment, trauma, social anxiety, perfectionism, etc.). Furthermore, the PASS includes a factor surrounding symptoms of pregnancy related anxiety, so future research could examine differences between pregnancy related anxiety and symptoms of anxiety disorders in the impact on breastfeeding behaviors (Somerville et al., 2014). In understanding which symptoms of which potential anxiety disorder a mother is experiencing, treatment providers may be able to utilize treatment manuals or approaches that have been found to be most effective for the presenting symptoms.

For future research projects, perinatal researchers should also consider comparing the psychometric properties of the PSS-14, PSS-10 and PSS-4 in perinatal samples to determine the most appropriate and efficient way to measure stress in the prenatal and postpartum periods.

Researchers may also consider studying stress and anxiety specific to pregnancy, rather than general symptomatology. Models may include examining whether pregnancy-related anxiety predicts breastfeeding difficulties and subsequent breastfeeding behaviors. Understanding the source of anxiety could inform treatment approaches as well as appropriate providers (e.g., psychologist versus lactation consultant).

With regard to perceptions of infant crying, future research projects should examine mothers' perceptions more broadly, rather than limiting study foci to perceptions of responding to infant crying with breastfeeding as spoiling. Within the context of the same moderated mediation models proposed in the present study, future research could replace the present moderator with a broader measure of maternal perceptions of infant crying and its impact on maternal stress and anxiety, breastfeeding difficulties, and breastfeeding behaviors. By elucidating the perceptions that mothers have on infant crying, we may be able to better target educational interventions about normative neonatal behaviors and appropriate maternal responses. Finally, future research should continue to investigate maternal psychopathology and subclinical distress during pregnancy, not just in the postpartum period, as the present study has provided further support that experiences during pregnancy influence postnatal outcomes. Given the aforementioned current conceptualization in the *DSM-5* (2013) of a peripartum specifier for mood disorders, perinatal mental health can occur at any point throughout the perinatal period and is not exclusive to the postnatal period. Thus, based on our current understanding of perinatal psychopathology from the *DSM-5* (2013) and the present study findings, future researchers should continue to study mental health prenatally and not only in the postnatal period.

Conclusion

The present thesis project sought to better understand the relationships among perinatal stress, anxiety, breastfeeding difficulties, perceptions of responding to infant crying, and breastfeeding duration in an understudied rural sample. Previous cross-cultural research has demonstrated some relationships among these variables, however there is inconsistency in these findings (see Appendix A). Furthermore, this is the first study to our knowledge to examine these variables collectively through moderated mediation models. The present project also fills a gap in the literature by exploring the unique experiences of U.S. women, specifically in Southeastern Idaho. Study results revealed a statistically and clinically significant relationship between clinical levels of prenatal anxiety and decreased breastfeeding duration. Largely null findings may be due to low variability of sample demographics, low reliability of our measure of stress, the way in which postnatal anxiety was measured, or perhaps a general lack of relationships between study variables. The project included notable strengths and important weaknesses. For example, our sample size remained fairly large for a longitudinal research project, our study variables were grounded in strong theory and were largely assessed by psychometrically strong measures, and conditional process analysis allowed for a robust and multivariate examination of prenatal stress and anxiety. However, the present study also included limitations, including issues with the way in which we measured some study variables (i.e., breastfeeding difficulties, behaviors, and perinatal stress), the removal of two participants, no clear explanation for the relationship between prenatal anxiety and breastfeeding duration, and an overall correlational design, disallowing for causal conclusions. Nonetheless, the current study findings also have consequential practical implications including the recognition that even low levels of prenatal anxiety impact breastfeeding duration and should not be overlooked in research or clinical

settings. While the present study has filled an important gap in the larger literature, there are several crucial directions for future projects. Possible directions include creating comprehensive and psychometrically sound measures of breastfeeding behaviors, difficulties, and psychosocial experiences, tracking breastfeeding duration and anxiety at multiple time points and beyond 6 months postpartum, studying more demographically heterogeneous samples, exploring additional risk and reliance factors, and examining perceptions of infant crying more broadly. Focus in each of these areas will lead to a richer understanding of maternal experiences in the perinatal period, informing future intervention and policy.

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Appendix A

Table 1

Mixed Findings Regarding Stress and Anxiety on Breastfeeding Behaviors

Author	Sample	Stress/Anxiety Measure	Stress/Anxiety Timing	Breastfeeding Behavior Variable	Finding
Akman et al., (2008)	Turkish *n*=60	STAI	Postpartum Anxiety	Exclusivity	-
				Duration	-
					-
Britton (2007)	American (USA) *n*=422	STAI	Postpartum Anxiety	Initiation	+
				Exclusivity	+
				Duration	+
Doulougeri, Panagopoulou, & Montgomery (2013)	Greek *n*=95	Impact of Event Cortisol	Postpartum Stress	Initiation	+
				Frequency	+
				Volume	+
Fairlie, Gillman, & Rich-Edwards (2009)	American (USA) *n*= 1436	STAI-7 item version	Pregnancy Anxiety	Intention	+
				Initiation	–
Fallon, Bennett, & Harrold (2016)	British, American (USA), Canadian *n*= 3185	Varied	Prenatal Anxiety	Intention	–
				Initiation	+
				Exclusivity	+
Fallon, Groves, Halford, Bennett, & Harrold (2016)	11 countries	Varied	Postpartum Anxiety	Initiation	+
				Exclusivity	+
				Duration	+

Insaf et al., (2011)	Hispanic (USA) *n*=424	PSS-14 STAI	Pregnancy Stress and Anxiety	Intention	+
Kehler, Chaput, and Tough (2009)	Canadian *n*=780	Symptom Anxiety Questionnaire	Pregnancy Anxiety	Duration	+
Li, Henderson, Landsborough, and Oddy (2008)	Australian *n*=2420	Self-created measure	Pregnancy Stress	Duration	+ +
O'Brien, Buikstra, & Hegney (2008)	Australian *n*=375	Depression, Anxiety Stress Scale-21	Postpartum Stress and Anxiety	Duration	+ (Anxiety) - (Stress)
Papinczak & Turner (2000)	Australian *n*=159	Duke Health Profile	Postpartum Anxiety	Duration	+
Rondó and Souza (2007)	Brazilian *n*=852	PSS-14 STAI	Pregnancy Anxiety and Stress	Intended duration	-
Zhu, Jiang, Huang, and Tao (2013)	Chinese *n*=1602	Modified Life Event Scale	Pregnancy Stress	Duration	+

Note. + indicates a relationship between stress/anxiety timing and breastfeeding behavior variable. – indicates no relationship.

Appendix B

6-Month Infant Dietary Questionnaire

---

1. **Since we last saw you** on _____ (date of last session), how have you fed your baby? (Please circle yes or no)

   Formula: yes no

   Breastfeeding: yes no

   Other food **not** including meat (e.g., infant snacks, meals, or other solids): yes no

   Other foods including meat (e.g., pureed meats, infant dinner, other meat products) yes no

---

2. **If you have fed your baby formula since we last saw you:**
   a. How old was you baby when you this began? _____months _____weeks _____days
   b. What kind of formula (or non-breast milk) do you use?

      _____

      i. Is this iron fortified? (circle:) yes no
      ii. Is this DHA or other supplemented? (circle:) yes no
      iii. Is this special diet formula (e.g., lactose free)? (circle:) yes no
   c. Presently, for how many feedings a day do you use formula? _____Feedings per day

---

3. **If you have breastfed your baby since we last saw you:**
   a. Are you currently breastfeeding your baby? (circle:) yes no
      i. If no, for how long did you breastfeed you baby? ____months ____weeks ____days
   b. Are you having or did you have any difficulty with breastfeeding? (circle:) yes no

      If yes, was this due to (Check all that apply):

      - Difficulties for you (e.g., not expressing enough milk, soreness, or fatigue)

- Difficulties for baby (e.g., latching, inability to suck properly, not obtaining enough milk, or not interested in feeding)
- Time management (e.g., returning to work and unable to pump)
- Insufficient environment (e.g., discomfort feeding in public or around others in the home)
- Other (please explain):

  _____

c. Presently, for how many feedings a day do you breastfeed? _____Feedings per day

---

4. **If you have fed your baby other food <u>not including</u> meat since we last saw you:**
   a. How old was your baby when this began? ____months _____weeks _____days
   b. Presently, for how may feedings a day do you use other foods not including meat products? _____ Feedings per day

---

5. **If you have fed your baby other food <u>including</u> meat since we last saw you:**
   a. How old was your baby when this began? ____months _____weeks ____days
   b. Presently, for how many feedings a day does your baby eat pureed meats, infant dinners, or other meat products? _____months _____weeks _____days

---

6. **What kinds of foods does your baby take now?** Please **circle** all that apply **AND** estimate the number of feedings your baby had per week for each category.

a. baby cereal: *example: Gerber rice or grain cereal*	**YES NO**	**____(#servings/week)**
b. cereal: example cheerios/oatmeal (not infant)	**YES NO**	**____(#servings/week)**
c. cow's milk	**YES NO (whole, 2%, 1%, or skim)**	**____(#servings/week)**
d. mashed table food	**YES NO**	**____(#servings/week)**
e. infant fruit	**YES NO**	**____(#servings/week)**
f. infant vegetables	**YES NO**	**____(#servings/week)**
g. baby meat	**YES NO**	**____(#servings/week)**
h. infant "dinners"	**YES NO**	**____(#servings/week)**
i. infant juice	**YES NO**	**____(#servings/week)**
j. regular juice/juice drinks	**YES NO**	**____(#servings/week)**

k. infant desserts	**YES NO**	**____(#servings/week)**
l. other homemade puree/ground baby food	**YES NO**	**____(#servings/week)**
m. other foods (please list **AND** include # of servings/week in parentheses): _____ _____ _____	**YES NO**	**____(#servings/week)**

7. **Do you give your baby any supplements?** (circle:) yes no

If yes, please list all that apply:

_____

_____

_____

_____

Appendix C

PSS-Feeling Questionnaire

The questions in this scale ask you about your feelings and thoughts **DURING THE LAST MONTH.** In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way but rather indicate the alternative that seems like a reasonable estimate.

Be sure to circle just* ONE *number for each question	**NEVER**	**ALMOST NEVER**	**SOMETIMES**	**FAIRLY OFTEN**	**VERY OFTEN**
1. In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2. In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3. In the last month, how often have you felt nervous and "stressed"?	0	1	2	3	4
4. In the last month, how often have you dealt successfully with irritation life hassles?	0	1	2	3	4
5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?	0	1	2	3	4
6. In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
7. In the last month, how often have you felt things were going your way?	0	1	2	3	4
8. In the last month, how often have you found you could not cope with all the things that you had to do?	0	1	2	3	4
9. In the last month, how often have you been able to control irritations in your life?	0	1	2	3	4
10. In the last month, how often have you felt that you were on top of things?	0	1	2	3	4

11. In the last month, how often have you been angered because of things that happened that were outside of your control?	0	1	2	3	4
12. In the last month, how often have you found yourself thinking about things that you have to accomplish?	0	1	2	3	4
13. In the last month, how often have you been able to control the way you spend your time?	0	1	2	3	4
14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

Appendix D

Perinatal Anxiety Screening Scale (PASS)

ANTENATAL POSTNATAL DATE: ..... Weeks pregnant .....

Baby's age .....

	Not at all	Sometimes	Often	Almost Always
1. Worry about the baby/pregnancy	0	1	2	3
2. Fear that harm will come to the baby	0	1	2	3
3. A sense of dread that something bad is going to happen	0	1	2	3
4. Worry about many things	0	1	2	3
5. Worry about the future	0	1	2	3
6. Feeling overwhelmed	0	1	2	3
7. Really strong fears about things, eg needles, blood, birth, pain, etc	0	1	2	3
8. Sudden rushes of extreme fear or discomfort	0	1	2	3
9. Repetitive thoughts that are difficult to stop or control	0	1	2	3
10. Difficulty sleeping even when I have the chance to sleep	0	1	2	3
11. Having to do things in a certain way or order	0	1	2	3
12. Wanting things to be perfect	0	1	2	3
13. Needing to be in control of things	0	1	2	3
14. Difficulty stopping checking or doing things over and over	0	1	2	3
15. Feeling jumpy or easily startled	0	1	2	3
16. Concerns about repeated thoughts	0	1	2	3
17. Being 'on guard' or needing to watch out for things	0	1	2	3
18. Upset about repeated memories, dreams or nightmares	0	1	2	3
19. Worry that I will embarrass myself in front of others	0	1	2	3
20. Fear that others will judge me negatively	0	1	2	3
21. Feeling really uneasy in crowds	0	1	2	3
22. Avoiding social activities because I might be nervous	0	1	2	3
23. Avoiding things which concern me	0	1	2	3

24. Feeling detached like you're watching yourself in a movie	0	1	2	3
25. Losing track of time and can't remember what happened	0	1	2	3
26. Difficulty adjusting to recent changes	0	1	2	3
27. Anxiety getting in the way of being able to do things	0	1	2	3
28. Racing thoughts making it hard to concentrate	0	1	2	3
29. Fear of losing control	0	1	2	3
30. Feeling panicky	0	1	2	3
31. Feeling agitated	0	1	2	3
Global Score				

Over the past month, how often have you experienced the following? Please tick the response that **most closely** describes your experience for **every** question.

Name: ....

DOB: .....

Women and Newborn Health Service
King Edward Memorial Hospital
Western Australia
Women's Health Care Clinical Care Unit (WHCCU) Department of Psychological Medicine

Reference:

Somerville, S., Dedman, K., Hagan, R., Oxnam, E., Wettinger, M., Byrne, S., Coo, S., Doherty, D., Page, A.C. (2014).

The Perinatal Anxiety Screening Scale: development and preliminary validation. *Archives of Women's Mental Health*, DOI: 10.1007/s00737-014-0425-8

Appendix E

6-Month ICQ-R

We are interested in how parents think and feel when their babies cry. Please circle how often you tend to think or feel this way when your baby cries on a 5-point scale, where 1=never and 5=always.

When my baby cries:	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
1. I want my baby to know he/she can rely on me to help.	1	2	3	4	5
2. I want to make my baby stop quickly because crying is a nuisance.	1	2	3	4	5
3. I want to make my baby feel secure/cared for.	1	2	3	4	5
4. I want to make my baby stop so others aren't disturbed.	1	2	3	4	5
5. I let my baby cry it out so s/he doesn't get too dependent on me.	1	2	3	4	5
6. I want to make my baby feel better because it makes me feel like a good parent.	1	2	3	4	5
7. I will just remind myself babies don't have feelings.	1	2	3	4	5
8. I want my baby to stop crying because I'm not sure I know the right way to respond.	1	2	3	4	5
9. I think my baby is trying to tell me something.	1	2	3	4	5
10. I know it's for a physical reason like needing to be fed, changed, or take a nap and not for an emotional reason like feeling sad or afraid.	1	2	3	4	5
11. I want to make my baby stop crying because it shows people I'm a good parent.	1	2	3	4	5
12. I think my baby just wants attention.	1	2	3	4	5
13. I think my baby is trying to communicate with me.	1	2	3	4	5
14. I think my baby is trying to control or manipulate me.	1	2	3	4	5
15. I want to make my baby feel better.	1	2	3	4	5
16. I want my baby to stop because can't get anything else done.	1	2	3	4	5

17. I want to make my baby feel safe.	1	2	3	4	5
18. I want my baby to stop because crying doesn't accomplish anything.	1	2	3	4	5
19. I want to comfort my baby.	1	2	3	4	5
20. I think my baby is crying for a reason.	1	2	3	4	5
21. I let my baby cry it out so he/she doesn't get spoiled.	1	2	3	4	5

We also want to know why parents decide how to respond when their babies cry. Please circle how often you have felt or thought the following things when you respond to your baby's cries on a 5-point scale, where 1=never and 5=always.

The way I respond when my baby cries:	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
1. Can spoil my baby.	1	2	3	4	5
2. Can affect how my baby feels about him/herself in the future.	1	2	3	4	5
3. Teaches my baby about emotions (like how to show them appropriately).	1	2	3	4	5
4. Lets my baby know that I am in charge.	1	2	3	4	5
5. Helps my baby learn how to cope with emotions.	1	2	3	4	5
6. Shows what a good parent I am.	1	2	3	4	5
7. Makes my baby feel safe and secure.	1	2	3	4	5
8. Can affect how my baby feels about me in the future.	1	2	3	4	5
9. Lets my baby know that it is okay to be upset.	1	2	3	4	5
10. Lets my baby know that there is no good reason to cry.	1	2	3	4	5
11. Makes my baby feel like he/she can rely on me.	1	2	3	4	5
12. Helps me get on with other things.	1	2	3	4	5
13. Helps my baby move on to more important things like learning and exploring.	1	2	3	4	5
14. Is more important to me than my baby.	1	2	3	4	5
15. Makes my baby feel like I care about he/she feels.	1	2	3	4	5
16. Teaches my baby that it is just not okay to throw a fit.	1	2	3	4	5
17. Teaches my baby to control his/her emotions.	1	2	3	4	5

18. Makes my baby feel confident.	1	2	3	4	5
19. Helps my baby move on to having fun.	1	2	3	4	5
20. Teaches my baby that crying doesn't get you what you want.	1	2	3	4	5
21. Teachers my baby how to get along with other people.	1	2	3	4	5
22. Has no effect long term effect on my baby.	1	2	3	4	5

Additionally, we are interested in how mothers feel when their babies cry. Please circle how often you feel these ways when your baby cries on a 5-point scale, where 1=never and 5=always.

When my baby cries:	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
1. I feel sad for my baby.	1	2	3	4	5
2. I feel irritated by the sound.	1	2	3	4	5
3. I feel anxious; like nothing I do will help.	1	2	3	4	5
4. I feel annoyed that my baby is pulling me away from other things.	1	2	3	4	5
5. I feel nervous that I won't know how to respond.	1	2	3	4	5
6. I feel sorry for my baby.	1	2	3	4	5
7. I feel worried that others will think I am a bad parent.	1	2	3	4	5
8. I feel concerned for my baby.	1	2	3	4	5
9. I feel worried for my baby- about what my baby might want or need.	1	2	3	4	5
10. I feel worried for me that my baby might keep crying for a while.	1	2	3	4	5
11. I feel a strong desire to make my baby feel better.	1	2	3	4	5
12. I feel amused that my baby is upset.	1	2	3	4	5
13. I feel sad for myself because I have to deal with it.	1	2	3	4	5
14. I feel angry at the situation or person that upset my baby.	1	2	3	4	5
15. I feel angry at my baby.	1	2	3	4	5
16. I feel like it's funny.	1	2	3	4	5
17. I feel frustrated with my baby for not calming down.	1	2	3	4	5
18. I feel like laughing.	1	2	3	4	5
19. I feel annoyed at my baby for over-reacting.	1	2	3	4	5
20. I feel protective of my baby.	1	2	3	4	5

Appendix F

Prenatal Session Screener

STATUS: ____eligible ____ineligible

1. Date:_____

2. Administered By:_____

(To be separated from interview after completed)

Name: _____ Date: _____

How are you doing? How is your baby doing? Since we last spoke, has anything changed with the following:

3. Have you moved? ____ No ____ Yes

3a. If yes, explain?

_____

_____

(*Write new address in "Current Address" space).*

4. Do you plan to move anytime in the near future? ____ No ____ Yes

4a. If yes, explain?

_____

5. Verify **Current Address**: _____

_____

_____

(IF RELEVANT) Future Address: _____

_____

Future Home Phone Number: _____

6. Subject Day Phone #: _____ (Best time to call: _____)

7. Evening Phone #: _____ (Best time to call: _____)

8. Email: _____

9. How best to leave a message:
_____

10a. Permission to email message: ____ No ____ Yes
10b. Text message: ____ No ____ Yes

Since you were last contacted:

11. Has there been any change in your due date? ____ No ____ Yes
12. Expected Date of Delivery: _____
13. Current Gestation: _____
14. At which hospital are you planning to deliver your baby? _____
15. Do you know the sex of your baby? ____No _____Yes
15a. **IF YES,** what is it? _____Boy _____Girl
16. Have you been told that you are having more than one baby? ____yes ____no
17. How are you planning to feed your baby? (keep open-ended; let mother explain and then code.)
Explanation: _____
1=breast feed only 2=breast and bottle feed 3=bottle feed only 4=not sure 5=declined to answer
18. What was your approximate weight before you became pregnant? ____lbs.
19. Diagnosed with Gestational Diabetes? ___yes ___no
20. Did you have Gestational Diabetes in previous pregnancy(ies)?
_____yes _____no _____N/A
21. Told you were at high risk for Gestational Diabetes: _____yes _____no
22. Diagnosed with High Blood Pressure, Pre-eclampsia, or Toxemia _____yes _____no
23. Did you have High Blood Pressure, Pre-eclampsia, or Toxemia in previous pregnancy(ies)?
_____yes _____no _____N/A
24. Diagnosed with Hyper/hypothyroidism or any other type of thyroid disorder: ___yes ____no
25. Other complications: (**"Has your doctor said that you are a 'high risk pregnancy'? Is he/she concerned about your baby being small?" or concerned about high blood pressure, excess fluid, low fluid, preterm labor):** ___yes ____no
25a. If yes, explain:_____
26. Have you been hospitalized during this pregnancy? ____ yes ____no
26a. If yes, reason for hospitalization: _____
27. Have you been in any accidents during your pregnancy? (e.g., did you have a fall, car accident?) _____Yes ____ No
If yes, please explain_____
28. Have you **ever** been diagnosed with a physical illness, such as HIV, AIDS, Heart Disease, Herpes, Hepatitis, Asthma, Anemia, Seizures, or Group B Strep? ___yes ____no
28a. If yes, list physical illnesses:_____
29. During your pregnancy and the three months prior, have you taken **any** medications, **other than prenatal vitamins**? _____yes _____ no

1. Medication Name	Medication Information

2. Medication Name	Medication Information

	Date Started:	Notes:
Medication Type		
	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	
5=Opiate or Pain Med		
6=Other		

	Date Started:	Notes:
Medication Type		
	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	
5=Opiate or Pain Med		
6=Other		

3. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type		
	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	
5=Opiate or Pain Med		
6=Other		

4. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type		
	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	
5=Opiate or Pain Med		
6=Other		

30. During your pregnancy and three months prior, have you taken **prenatal vitamins or other vitamins**? ___ yes ___ no

If yes, list vitamins:

1. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type		
	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	

2. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type		
	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	

5=Opiate or Pain Med 6=Other		

5=Opiate or Pain Med 6=Other		

3. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type	Date Stopped:	
1=Steroid 2=Insulin 3=Antidepressant 4=Antibiotic 5=Opiate or Pain Med 6=Other	Dosage: Reason Taken:	

4. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type	Date Stopped:	
1=Steroid 2=Insulin 3=Antidepressant 4=Antibiotic 5=Opiate or Pain Med 6=Other	Dosage: Reason Taken:	

31. During your pregnancy and three months prior, have you taken **any supplements** (e.g., iron, folic acid/folate fish oil/Omega-3 fatty acids, etc.)? ___ yes ___ no

1. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type	Date Stopped:	
1=Steroid 2=Insulin 3=Antidepressant 4=Antibiotic 5=Opiate or Pain Med 6=Other	Dosage: Reason Taken:	

2. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type	Date Stopped:	
1=Steroid 2=Insulin 3=Antidepressant 4=Antibiotic 5=Opiate or Pain Med 6=Other	Dosage: Reason Taken:	

3. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type	Date Stopped:	

4. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type	Date Stopped:	

1=Steroid 2=Insulin 3=Antidepressant 4=Antibiotic 5=Opiate or Pain Med 6=Other	Dosage: Reason Taken:	

1=Steroid 2=Insulin 3=Antidepressant 4=Antibiotic 5=Opiate or Pain Med 6=Other	Dosage: Reason Taken:	

32. Do you have any physical or learning disabilities? ___Yes ____No
Explanation: _____
33. Have you had any other health issues? _____yes _____no
If yes, describe: _____
34. Have you been diagnosed with a psychological disorder: ____yes _____no
If yes, describe: _____
34a. Check if one of the categories below:

Bipolar disorder _____Yes ____No
Schizophrenia _____Yes ____No
Schizoaffective disorder _____Yes ____No
Psychosis _____Yes ____No

General Information

35. What is your primary language? _____
35a. **(If English)** Do you have difficulty reading? ____Yes ____No
35b. (**IF NOT ENGLISH)** How well do you:
read _____
write, and _____
understand English? _____
which country did your family come from? _____
36. Do all of your children live with you? ____Yes ____ No
If no, why not? _____
37. Is the Department of Children, Youth and Families involved in this pregnancy or will they be involved at the baby's birth? _____ Yes _____ No
How will they be involved? _____

Appendix G

Postnatal Session Screener

STATUS: ____eligible ____ineligible

1. Date:_____

2. Administered By:_____

[redacted]

(To be separated from interview after completed)

Name: _____ Date: _____

How are you doing? How is your baby doing? Since we last spoke, has anything changed with the following:

3. Have you moved? ____ No ____ Yes

3a. If yes, explain?

_____
_____

(*Write new address in "Current Address" space).*

4. Do you plan to move anytime in the near future? ____ No ____ Yes

4a. If yes, explain?

_____

6. Verify **Current Address**: _____
_____
_____

(IF RELEVANT) Future Address: _____
_____

Future Home Phone Number: _____

6. Subject Day Phone #: _____ (Best time to call: _____)

7. Evening Phone #: _____ (Best time to call: _____)

8. Email: _____

9. How best to leave a message:
_____

10. Did you have any complications during labor? ____ No ____ Yes
10a. If yes, please explain:
_____
_____
____

11. Any complications during delivery? ____ No ____ Yes
11a. If yes, explain:
_____
_____
____

12a. How did you deliver? Vaginally ____ Planned C-section ____ Emergency C-section
____

12b. Where did you deliver? Home____Portneuf____Bingham Memorial____
Other (Please
List)_____

13. Did you have to take any medications during labor/delivery? Common medications may include (1) prostaglandin gel to soften the cervix, (2) a cervical ripening agent and/or labor/contraction-inducing agent such as Pitocin; (3) pain medication in the form of a narcotic, epidural, or spinal block/anesthesia; (4) an anti-nausea medication given orally or by IV such as promethazine; or (5) an antacid such as Bicitra.

1. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type	Date Stopped:	
1=Steroid 2=Insulin 3=Antidepressant 4=Antibiotic 5=Opiate or Pain Med 6=Other	Dosage: Reason Taken:	

2. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type	Date Stopped:	
1=Steroid 2=Insulin 3=Antidepressant 4=Antibiotic 5=Opiate or Pain Med 6=Other	Dosage: Reason Taken:	

3. Medication Name	Medication Information

4. Medication Name	Medication Information

	Date Started:	Notes:
Medication Type		
	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	
5=Opiate or Pain Med		
6=Other		

	Date Started:	Notes:
Medication Type		
	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	
5=Opiate or Pain Med		
6=Other		

14. Were any interventions needed during labor/delivery (e.g., stripping membranes, flipping baby, episiotomy)?
14a. If yes, explain:
_____
_____
____
15. Any complications post-delivery? ____ No ____ Yes
15a. If yes, explain:
_____
_____
____

16. Did you have to take any medications post-delivery? Common medications may include (1) pitocin or another medication to ensure uterine contraction and reduce blood loss following delivery, (2) pain medication like Ibuprofen or Tylenol, (3) an anti-nausea medication given orally or by IV such as promethazine, (4) an antacid such as Bicitra, (5) a stool softener like Colace or laxative like fiber, or (6) pain-relieving gel for hemorrhoids or the perineum.

1. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type		
	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	
5=Opiate or Pain Med		
6=Other		

2. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type		
	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	
5=Opiate or Pain Med		
6=Other		

3. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type		
1=Steroid 2=Insulin 3=Antidepressant 4=Antibiotic 5=Opiate or Pain Med 6=Other	Date Stopped: Dosage: Reason Taken:	

4. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type		
1=Steroid 2=Insulin 3=Antidepressant 4=Antibiotic 5=Opiate or Pain Med 6=Other	Date Stopped: Dosage: Reason Taken:	

17. Did you have any surgery aside from a C-section (tubal ligation, hysterectomy, uterine embolization)? ____ No ____ Yes

17a. If yes, explain:

_____

_____

____

18. Did your Baby have any complications (e.g., fetal distress, meconium exposure, asphyxia, shoulder dystocia, or umbilical cord issues)? ____ No ____ Yes

18a. If yes, explain:

_____

_____

____

19. What was your baby's birth date/gestational age at delivery?

_____

20. What was your baby's length and weight at delivery (**add percentiles, if known**)?

Length _____%ile _____ inches Weight _____%ile _____ lbs.

21. Since your prenatal session, has there been any change in your medications (started/stopped) other than what we discussed surrounding labor/delivery? This includes vitamins/supplements.

1. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type		

2. Medication Name	Medication Information	
	Date Started:	Notes:
Medication Type		

	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	
5=Opiate or Pain Med		
6=Other		

	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	
5=Opiate or Pain Med		
6=Other		

3. Medication Name	Medication Information	
		Notes:
	Date Started:	
Medication Type		
	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	
5=Opiate or Pain Med		
6=Other		

4. Medication Name	Medication Information	
		Notes:
	Date Started:	
Medication Type		
	Date Stopped:	
1=Steroid		
2=Insulin	Dosage:	
3=Antidepressant		
4=Antibiotic	Reason Taken:	
5=Opiate or Pain Med		
6=Other		

22. What was your approximate weight when admitted to the hospital for delivery? _____lbs.

23. What was your approximate weight as soon as measured after delivery (at home or in hospital)? _____lbs.

23a. Approximately how postpartum were you when this measure was taken? _____

24. Were any of the following conditions diagnosed at any point during your pregnancy or since?

24a. Gestational or Type II Diabetes: ____ yes ____ no

24b. High Blood Pressure, Pre-eclampsia, or Toxemia: ____ yes ____ no

24c. Hyper/hypothyroidism or any other type of thyroid disorder: ____ yes ____ no

24d. Group B Strep: ____ yes ____ no

24e. Anemia: ____ yes ____ no

24f. Asthma: ____ yes ____ no

24g. An infection (e.g., Bacterial Vaginosis, Yeast Infection, Trichomoniasis, Urinary Tract Infection, or Chlamydia)

25. Have you **ever** been diagnosed with a physical illness, such as HIV, AIDS, Heart Disease, Herpes, Hepatitis, or Seizures? ____ yes ____no

25a. If yes, list physical illnesses:_____

26. Have you been diagnosed with a psychological disorder since your prenatal session: _____ yes _____ no

If yes, describe:_____

26a. Check if one of the categories below:

Bipolar disorder	____ Yes	____ No
Schizophrenia	____ Yes	____ No
Schizoaffective disorder	____ Yes	____ No
Psychosis	____ Yes	____ No

Was the Idaho Department of Health and Welfare involved in your labor/delivery or do you anticipate them being involved in the future? ____ Yes ____ No

How so?

_____

DEMOGRAPHICS UPDATE:

Now, I would like to review some of the information you shared about your family, work status and living arrangements and see if anything has changed.

27. Has your relationship with your partner changed at all? _____ No _____ Yes

27a. If yes, describe:

_____

_____

_____

_____

Code change in status
1. single _____
2. married _____
3. divorced _____
4. widowed _____
5. separated _____
6. committed relationship _____
7. Other (Describe)
_____

28. Has anything about your living conditions changed since your prenatal session?
_____ No _____ Yes
***(If Yes there is a change, circle appropriate code)*:**

Code new living arrangement
_____ Rent an apt. _____ Live with relatives (***If Yes ask, "Do you pay rent? _____Yes _____ No)*** _____ Own condo _____ Own house _____ rent house _____ Other _____

29. Number of people living in the house ____ # Total ____# Adults ____# Children

30. Are you working? _____ No _____ Yes
30a. **If yes:** What is your occupation? _____

31. Are you in school? _____ No _____ Yes

32. What is the total income in your household from all sources over the last year?

<$5,000	1
$5,000 to $9,999	2
$10,000 to $19,999	3
$20,000 to $29,999	4
$30,000 to $39,999	5
$40,000 to $49,999	6
$50,000 to $74,999	7
$75,000 to $99,999	8
≥ $100,000	9

Thanks so much for your time!

Appendix H

6-Month Infant Health and Sleep Questionnaire
(To be completed by mother during free play task)

1. Has your baby been sick since birth?
   □ No □ Yes

2. Which of the following has your baby had since birth, including today?

YES	NO	Condition	Onset Date	Offset Date	Have Today?	YES	NO	Condition	Onset Date	Offset Date	Have Today?
□	□	Fever			No Yes	□	□	Respiratory Syncytial Virus (RSV)			No Yes
□	□	Diarrhea			No Yes	□	□	Cough or wheeze			No Yes
□	□	Vomiting			No Yes	□	□	Asthma			No Yes
□	□	Ear Infection			No Yes	□	□	Food allergy			No Yes
□	□	Colic			No Yes	□	□	Eczema (atopic dermatitis)			No Yes
□	□	Fussy/Irritable			No Yes	□	□	Thrush			No Yes
□	□	Jaundice			No Yes	□	□	Teething:			No Yes
□	□	Reflux			No Yes	□	□	Other (specify):			No Yes
□	□	Runny nose or cold			No Yes	□	□	Other (specify):			No Yes

3. Has your baby had any immunizations since birth?
   □ Yes □ No

   a. Immunization: _____ Date: _____
   b. Immunization: _____ Date: _____
   c. Immunization: _____ Date: _____
   d. Immunization: _____ Date: _____

4. Has your baby taken any medication since birth, including today?

□ No □ Yes

Medication	Type	Dosage	Frequency	Onset/Offset	Took Today?	If yes, time last given	Classification
4a.	1=Prescription 2=Over the Counter			Date Started: _____ Date Stopped: _____ Date Started: _____ Date Stopped: _____	NO YES		1=Antibiotics 2=Reflux Med 3=Thrush Med 4=Opiate/Pain Med 5=Vitamin/Mineral Supplement 6= Other Prescription 7= Other non-prescription
4b.	1=Prescription 2=Over the Counter			Date Started: _____ Date Stopped: _____ Date Started: _____ Date Stopped: _____	NO YES		1=Antibiotics 2=Reflux Med 3=Thrush Med 4=Opiate/Pain Med 5=Vitamin/Mineral Supplement 6= Other Prescription 7= Other non-prescription
4c.	1=Prescription 2=Over the Counter			Date Started: _____ Date Stopped: _____ Date Started: _____ Date Stopped: _____	NO YES		1=Antibiotics 2=Reflux Med 3=Thrush Med 4=Opiate/Pain Med 5=Vitamin/Mineral Supplement 6= Other Prescription 7= Other non-prescription
4d.	1=Prescription 2=Over the Counter			Date Started: _____ Date Stopped: _____ Date Started: _____ Date Stopped: _____	NO YES		1=Antibiotics 2=Reflux Med 3=Thrush Med 4=Opiate/Pain Med 5=Vitamin/Mineral Supplement 6= Other Prescription 7= Other non-prescription
4e.	1=Prescription 2=Over the Counter			Date Started: _____ Date Stopped: _____ Date Started: _____ Date Stopped: _____	NO YES		1=Antibiotics 2=Reflux Med 3=Thrush Med 4=Opiate/Pain Med 5=Vitamin/Mineral Supplement 6= Other Prescription 7= Other non-prescription

5. Was your baby given any herbal or botanical preparation or any kind of tea since birth? (Do not count preparations applied to the baby's skin or anything the baby received through breastfeeding after you took an herbal or botanical preparation.) □ No □ Yes *(If no, skip to #8)*

6. Please list all the kinds of herbal or botanical preparations or teas your baby was given since birth.

_____

_____

_____

7. Why was your baby given the preparations or teas? (PLEASE "X" ALL THAT APPLY)
   - □ To ease diaper rash
   - □ To ease a cold or other respiratory symptoms
   - □ To ease colic
   - □ To ease an illness other than a cold or respiratory symptoms
   - □ To ease digestion
   - □ To stimulate the baby's immune system
   - □ To ease fussiness
   - □ Other (SPECIFY):_____
   - □ To help the baby relax

8. Has your baby been hospitalized for any reason or has your baby been taken to a hospital for any outpatient procedure or surgery since birth? □ No □ Yes

9. If Yes:

Reason for Hospital Visit:	**Date Infant Was Hospitalized:**	**Number of nights baby was in the hospital (Write 0 if your baby did not stay overnight)**

Rate each of the following items on **your baby's sleep** on a scale of 1 (not like your baby) to 5 (very much like your baby)

	Not at all like				Very much like
10. My baby is a good sleeper.	1	2	3	4	5
11. My baby's sleep patterns have been easy to adjust to.	1	2	3	4	5
12. My baby's sleep patterns have quickly become easier.	1	2	3	4	5
13. My baby sleeps through the night.	1	2	3	4	5
14. My baby wakes only once in the night.	1	2	3	4	5
15. My baby wakes more than once in the night.	1	2	3	4	5

16. My baby has a regular bedtime. 1 2 3 4 5
17. My baby has a regular bedtime routine. 1 2 3 4 5

18. My baby's usual bedtime is __ __: __ __ *(use military time)*

Below are some more specific questions about how the baby is doing today:

19. What time did your baby wake up this morning? *(use military time)*
__ __: __ __

20. How many hours of sleep did your baby get last night?
__ __ . __ __ hours

21. How many times did your baby wake up last night?
_____ times

22. For how many minutes was your baby awake during the night last night?
_____ minutes

23. How was your baby's sleep last night? (please check one)
□ Less than/shorter than usual □ Typical □ More than/longer than usual

24. Has your baby napped yet today prior to the session?
□ No □ Yes

If yes, at what time did your baby nap and for how long? *(use military time)*

Nap 1
Nap Started (time): __ __: __ __
Nap Ended (time): __ __: __ __

Nap 2
Nap Started (time): __ __: __ __
Nap Ended (time): __ __: __ __

Nap 3
Nap Started (time): __ __: __ __
Nap Ended (time): __ __: __ __

Nap 4
Nap Started (time): __ __: __ __
Nap Ended (time): __ __: __ __

25. How is your baby's eating today? (please check one)
□ Eating less than usual □ Regular □ Eating more than usual

26. Before you came in for the session today, how has your baby's mood been? (please check one)
□ Less fussy than usual □ Typical mood □ More fussy than usual

27. How many teeth does your baby have now? (Write in 0 if none.) _____ NUMBER OF TEETH

28. How many stools (dirty diapers) does your baby usually have in a 24-hour period? If less than one a day, how many days usually pass between stools?
    _____ NUMBER OF STOOLS IN 24 HOURS **OR** ONE STOOL EVERY _____ DAYS

29. How would you describe your baby's stool in the past 7 days? (PLEASE "X" ALL THAT APPLY)
    □ Hard □ Formed □ Soft □ Semi-watery □ Watery

Appendix I

Pregnancy Context

Subject ID#: _____ Date: _____ Session: _____

PREGNANCY CONTEXT

SUBJECT DOB:_____ AGE:_____

I would also like to ask you some questions about your pregnancy and behaviors and feeling during your pregnancy.

How was your due date established?
By your Last Menstrual Period? __**Yes** __**No**
By 1st Trimester Ultrasound (up to 12 weeks)? __**Yes** __**No**
By 2nd Trimester Ultrasound (up to 28 weeks)? __**Yes** __**No**
Other
Describe:_____

1. When was you last menstrual period? _____ (date)
2. How exact is that date?_____
   Were you keeping track of your menstrual period? ___Yes ___No
   Explanation: _____
3. When did you first find out that you were pregnant? _____ (date or weeks gestation)
4. How did you find out that you were pregnant?
   _____
5. Was your pregnancy planned? ___Yes ___No
6. Did you have any trouble conceiving?
   ____ No
   ____ Yes, but no treatment
   ____ Yes, received fertility treatment
7. If yes, how long were you trying to conceive?
   _____
8. If received fertility treatment, please describe: _____
9. When was your first prenatal exam? _____ (if date, then calculate # weeks pregnant after interview and fill in here) _____
10. Is this your first pregnancy? _____Yes _____No
11. How many pregnancies have you had **(including this one)**? _____ (#)

Note: If this is mother's first pregnancy, Skip to Questions 19

Of these previous pregnancies…

12. Did any result in full term deliveries? ___Yes ___No
13. Did any result in preterm deliveries? ___Yes ___No
    If yes, how may? _____
14. Were any of these miscarriages or stillbirths? ___Yes ___No
15. Were any of these elective abortions? ___Yes ___No

If yes, how many?_____

16. So overall, you have given birth to how many children? _____(# live births or N/A)
17. Approximately, how many weeks gestation were you for each of your previous pregnancies resulting in live births?
    Pregnancy 1:_____
    Pregnancy 2:_____
    Pregnancy 3:_____
    Pregnancy 4:_____
    Pregnancy 5:_____
    Pregnancy 6:_____
18. How old were you when your first child was born? _____ **(record Age) N/A**

(Fill In: How old will mother be when baby is born? _____ (Calculate from due date)

19. Have you had any of the following symptoms during this pregnancy?
    a. Severe morning sickness _____Yes _____No
    b. Any morning sickness _____ Yes _____No
       If yes, to a or b, for how many weeks? _____
       When during pregnancy _____ (date) to _____ (date)
       If yes to a or b, please describe
       _____
       _____
    c. High blood pressure _____Yes_____No
    d. Bleeding/spotting _____Yes_____No
       If yes, please describe
       _____
       _____
    e. Infection (Bacterial Vaginosis, Yeast Infection, Trichomoniasis, Urinary Tract Infection, or Chlamydia) _____Yes _____No
       If yes, please describe
       _____
       _____
    f. Anything else?
       If yes, please describe
       _____
       _____
20. Has the pregnancy affected your eating habits? _____Yes _____No
    If yes, please describe
    _____
    _____
21. Has the pregnancy affected your stress level? _____Yes _____No
    If yes, please describe
    _____
    _____
22. Have any significant or important events or changes happened to your during this pregnancy or 3 months before this pregnancy? ____Yes ____No

If yes, what happened?

_____

_____

23. How did you feel when you found out you were pregnant with this baby?
(open-ended, write verbatim)

_____

_____

24. How are you feeling about the pregnancy now?
(open-ended, write verbatim)

_____

_____

25. Were you using birth control at the time you became pregnant?
___Yes, but not regularly (a:Type_____)
___Yes, much have failed (b.Type_____)
___No, but not trying to conceive
___No, trying to conceive
26. At any time during this pregnancy, did you consider abortion or adoption? (Note: If mother has responded that she was pleased to pregnant, say "I know you said you were pleased to be pregnant but…." _____Yes _____No
27. Are you planning to have a C-section? _____Yes _____No
IF YES: What is the reason for the planned C-section?

_____

_____

If pregnant previously: Have you ever had a C-section? ___Yes ___No
IF YES: What was the reason for the C-section?

_____

28. *If pregnant previously*: Did you have any complications with your prior pregnancies or deliveries?
___yes ___no
If yes, explain:

_____

_____

29. *If other children*: Were/are there any medical or developmental problems with any of your children?
___yes ___no
30. What is your current marital status?
    1. Single
    2. Married
    3. Divorced
    4. Widowed
    5. Separated
    6. Committed relationship
    7. Engaged
31. What is your current relationship with this baby's father?
___We are married ___(how long-specify months or years)

___We are divorced/separated ___(how long married, how long divorced/separated-months years)
___We are living together but not married ____(how long together-specify months/years)
___We are no longer involved with each other romantically_____
___We are no longer involved with each other romantically_____
Probe for reason-e.g broke up,_____
When did relationship end? _____ months prior
Are you currently involved other than romantically (e.g., does he share responsibility for previous children?)

32. **(If known)** how old is baby's father? ___ years ___Not sure of father
33. **(If known)** Does baby's father smoke currently? ___Yes ___No
Approximately how many cigarettes per day?_____
(If not smoking currently, ask next question; otherwise skip to Questions 35)
34. **(If known)** has baby's father ever smoked regularly? ___Yes ___No
(If yes) Approximately how many cigarettes per day? _____
35. **(If father is not current partner)**, is there another man in your life right now?
___Yes
___No
If yes, how long have you been together? _____(months) **N/A**
36. ***Note: If first birth, skip this)*** Now, can you tell me about each of your children. I would like to know their ages and whether the child lives with you now.
(List children and include any deceased children).

Child's Age	Does Child Live with You? Y/N

Living Arrangements
Now I'd like to get to know something about your household.

37. What are your current living arrangements?
___ rent an apt.
___ live with relatives (***If Yes ask, "Do you pay rent? ___Yes ____No***)
___ own condo
___ own house
___ rent house
___ other _____

37a. If live with relatives, do you live in a:
___apartment
___ house or condo

37b. If living in apartment, how many units are in your apt building?
_____ (3units) or _____unsure
If unsure: Can you estimate the number of units?
___≤to 5 units
___6-10 units

___ 11-15 units
___ 16-20 units
___ 21-25 units
___ >25

38. Have you moved at any time during this pregnancy? __No __Yes
    If yes, how many times?_____
    If yes, explain? _____
39. Do you plan to move anytime in the near future (e.g., after baby comes)? ___No
    ___Yes
    If yes, explain? _____
40. Who live in the house/apartment with you?
    Number of adults: ___
    Number of children: ___
41. Does anyone else in the household smoke? _____Yes _____No
42. Please list for me who smokes and how much they smoke per day? N/A

Who Smokes	How much do they smoke on average each day?

Appendix J

Table 2
Correlations among Primary Study Variables

	PASS (prenatal)	PSS (prenatal)	PASS (6M)	PSS (6M)	Bf diff.	Spoiling	Duration
PASS (prenatal)	1						
PSS (prenatal)	0.686**	1					
PASS (6M)	0.608**	0.506**	1				
PSS (6M)	0.483**	0.578**	0.487**	1			
Bf difficulties	0.036	0.019	0.109	0.027	1		
Spoiling	0.218*	0.178	0.222*	0.169	-0.028	1	
Bf duration	-0.258*	-0.121	-0.155	-0.130	-0.105	-0.102	1

Note. This table compares univariate correlations between primary study variables. PASS=Perinatal Anxiety Screening Scale; PSS=Perceived Stress Scale; 6M=postnatal 6-month time point; Bf=breastfeeding; Spoiling=response to infant crying with breastfeeding as spoiling. *<0.05. **p<0.01.

Appendix K

Table 3

Sample Sociodemographic Description (n=94)

Race (categories not mutually exclusive)	**N / %**
White/Caucasian	88 / 94
Black/African American	2 / 2
Native Hawaiian or other Pacific Islander	2 / 2
American Indian/Alaska Native	1 / 1
Hispanic/Latino	13 / 14
Asian	1 / 1
Other	5 / 5
Relationship Status	
Single/never married	9 / 10
Married	79 / 84
Divorced	1 / 1
Committed relationship	3 / 3
Engaged	2 / 2
Employment Status	
Employed	56 / 60
Not currently working	38 / 40
Highest Degree of Education	
Partial high school	2 / 2
High school	13 / 14
Partial college	33 / 35
Standard college or university	36 / 38
Graduate training with a degree	10 / 11
Income	
<$5,000	1 / 1
$5,000-9,000	2 / 2
$10,000-19,000	14 / 15
$20,000-29,000	16 / 17
$30,000-39,000	12 / 13
$40,000-49,000	9 / 10
$50,000-74,999	27 / 29
$75,000-99,999	7 / 7
>/=$100,000	6 / 6
Religious Preference	
Agnostic	3 / 3
Assembly of God	2 / 2
Atheist	2 / 2
Baptist	2 / 2
Catholic	4 / 4
Lutheran	2 / 2
Methodist	1 / 1
Church of Jesus Christ of Latter-day Saints	58 / 62
Non-denominational	10 / 11

Pentecostal	1 / 1
Presbyterian	1 / 1
Other	12 / 13
Prefer not to answer	9 / 10
Parity	
No other child	39 / 41
One other child	28 / 30
Two other children	12 / 13
Three other children	6 / 6
Four other children	3 / 3
5 other children	5 / 5
6 other children	1 / 1
Number of children living in the home	
Zero	34 / 36
One	31 / 33
Two	12 / 13
Three	8 / 9
Four	4 / 4
Five	4 / 4
Six	1 / 1

Note. Categories for race and religious preference were not mutually exclusive.

Appendix L

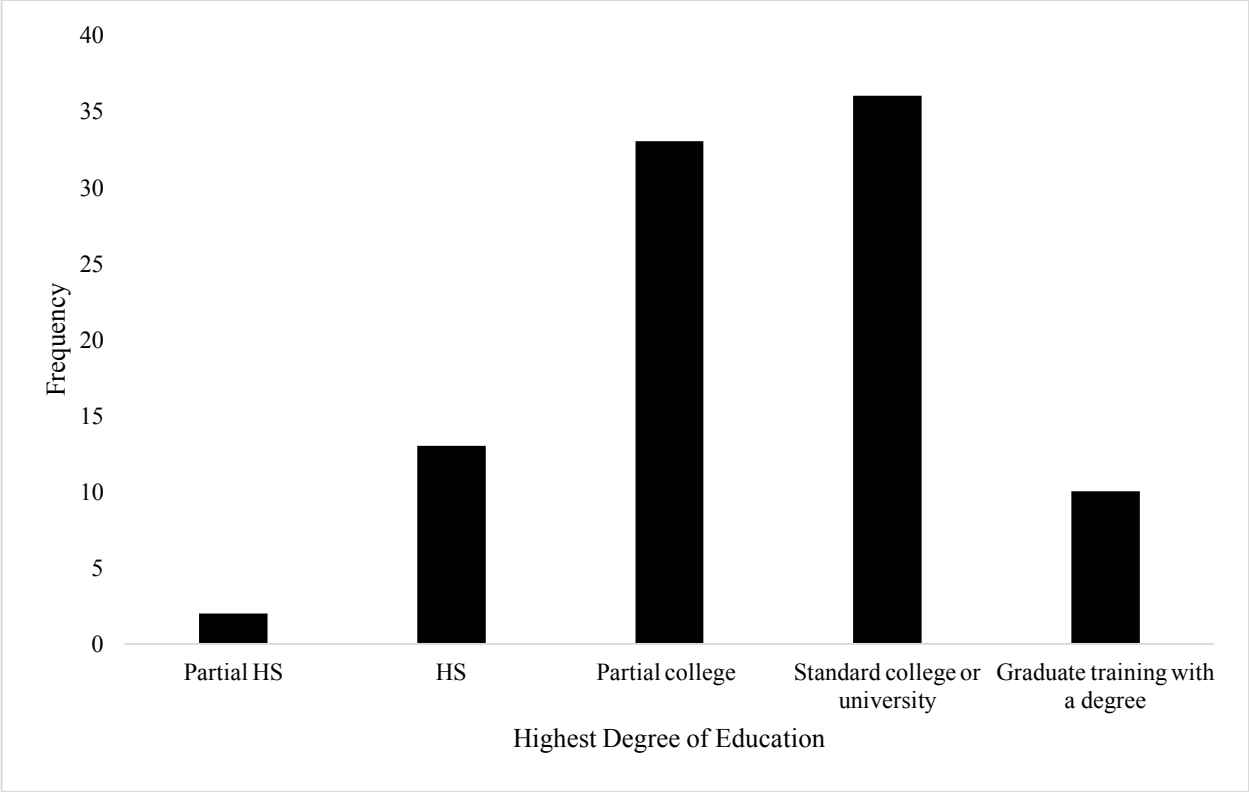

Figure 2. This graph depicts the frequency of maternal participants' highest degree of education. HS=high school.

Appendix M

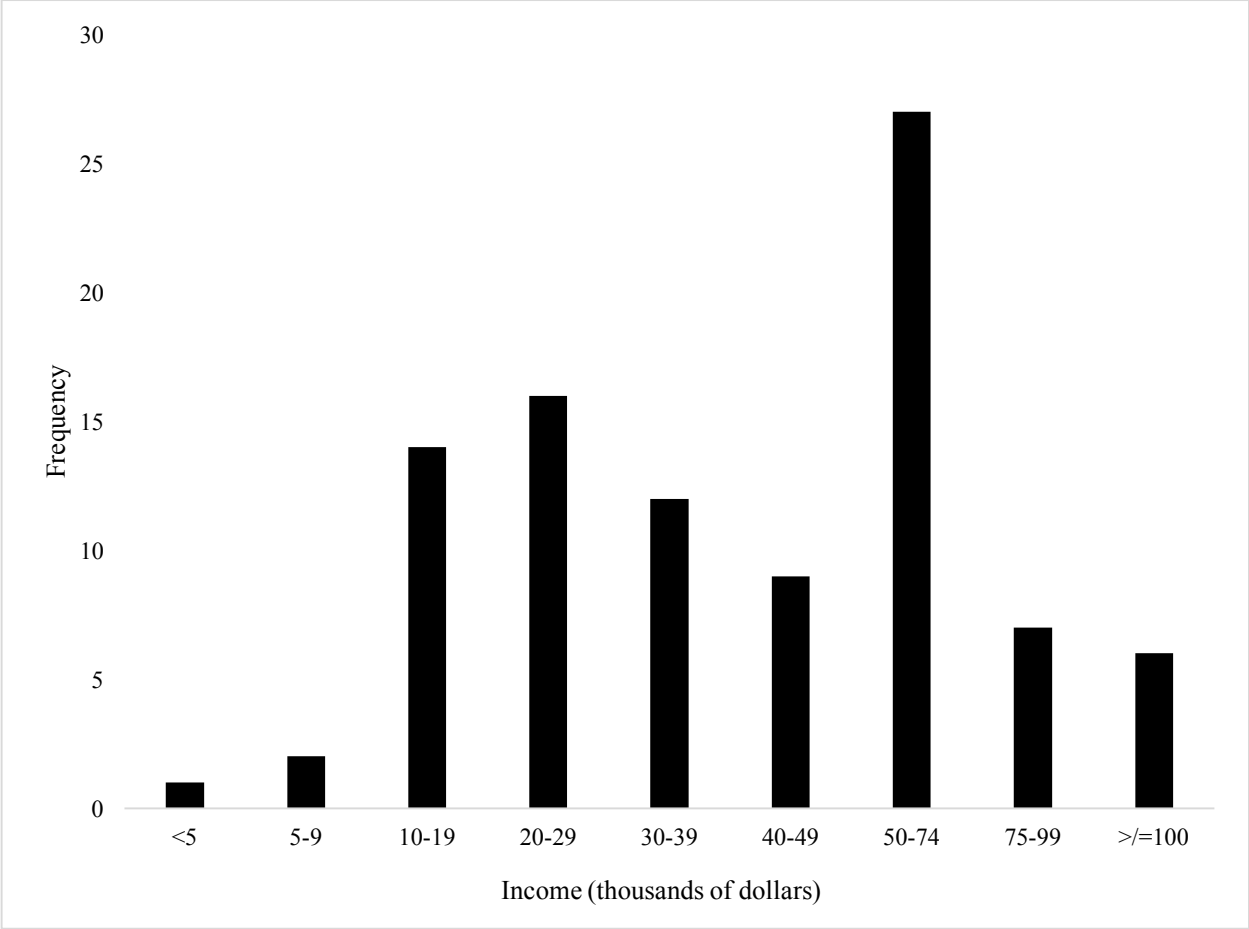

Figure 3. This graph depicts the frequency of participants' total annual household income.

Appendix N

Table 4

Prenatal Moderated Mediation Findings

	F	R^2	S/A → bf diff	Bf difficulties → duration	S/A → duration	Interaction (Bf difficulties x spoiling)
			b/SE	*b/SE*	*b/SE*	*b/SE*
Stress	0.747	0.033	0.003 / 0.015	-10.416 / 24.829	-1.068 / 1.103	0.503 / 4.201
Anxiety	1.889	0.078*	0.052 / 0.149	-6.633 / 24.299	-25.253* / 10.860	0.069 / 4.109

Note. This table depicts the moderated mediation results from the prenatal models. Bf=breastfeeding; Spoiling=response to infant crying with breastfeeding as spoiling; Duration=breastfeeding duration; *SE*=standard error; S/A=stress/anxiety. Arrows indicate direction of prediction. *p<0.05.

Appendix O

Table 5

Postnatal Stress and Anxiety t-test Analyses

	Bf at 6M *M* score/*SD*	Not Bf at 6M *M* score/*SD*	*t*
Stress	19.92 / 5.94	20.84 / 6.04	-0.711
Anxiety	2.37 / 0.688	2.59 / 0.857	-1.369

Note. This table depicts the *t*-test results from the postnatal models as outlined in Hypotheses 3 and 4. Predicted: participants who breastfeed through 6 months (*n*=62) will demonstrate lower levels of postnatal stress/anxiety than those who discontinue breastfeeding prior to 6 months (*n*=32). Bf=breastfeeding; 6M=6 months postnatally; *M* score=mean score on Perinatal Anxiety Screening Scale or Perceived Stress Scale; *SD*=standard deviation. Anxiety scores have been transformed via natural log. * $p<0.05$.

Appendix P

Table 6

Postnatal Stress and Anxiety Correlational Analyses

	M Difficulties/*SD*	*M* Score/*SD*	*r*
Stress	0.27 / 0.632	19.92 / 5.94	-0.156
Anxiety	0.27 / 0.632	2.37 / 0.688	-0.137

Note. This table depicts the correlation results from the postnatal models as outlined in hypotheses 5 and 6. Predicted: Among women who breastfeed through 6 months (n=62), there will be a positive relationship between fewer breastfeeding difficulties and lower levels of postnatal stress/anxiety. *M*=mean; *M* score=mean score on Perinatal Anxiety Screening Scale or Perceived Stress Scale; *SD*=standard deviation. Anxiety scores have been transformed via natural log. * p<0.05.

Appendix Q

Table 7

Follow-up Sociodemographic Analyses

	t
LDS vs. Other	0.478
Employed vs. Unemployed	-1.867
College vs. Other	0.820
Primi- vs. Multiparous	1.718

Note. This table depicts the *t*-test results examining group differences from the prenatal models. Specifically, the differences in anxiety were examined among the sociodemographic variables. LDS=Jesus Christ of Latter-day Saints. * $p<0.05$.

Appendix R

Table 8

Follow-up PASS Cut-off t-test Analyses

	n	*M* Duration	Bf through 6M	*t*
Clinical Anxiety	14	75	4	-3.90**
Nonclinical	82	148	56	--

Note. This table depicts the group differences between participants who met the PASS clinical cut-off score of 26 and those who did not. Specifically, differences in breastfeeding duration was examined. *n*=sample size; *M*=mean; Duration=breastfeeding duration in days; Bf=breastfeeding; 6M= 6 months postnatally; PASS=Perinatal Anxiety Screening Scale. * $p<0.05$. ** $p<0.001$.

Appendix S

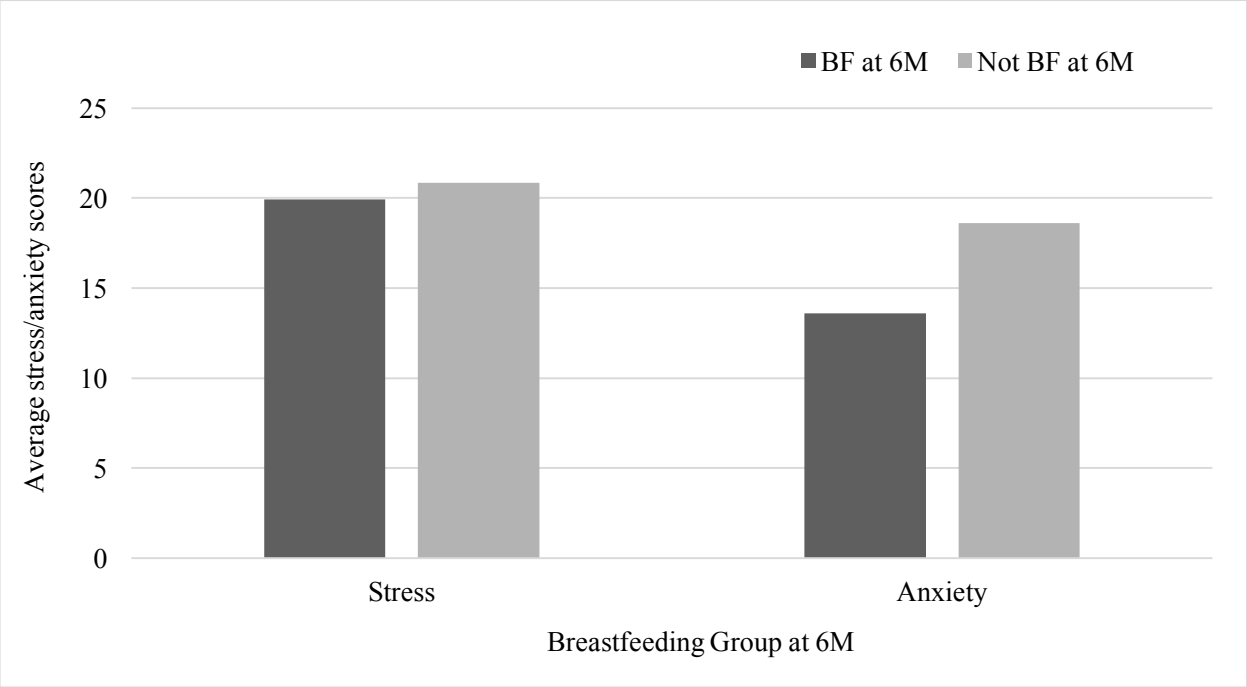

Figure 4. This graph depicts the results of the postnatal stress and anxiety t-tests. To more accurately reflect the scale of the Perinatal Anxiety Screening Scale (PASS), mean scores are presented prior to transformation, but note that the analyses were conducted with the transformed data. Stress was measured by the Perceived Stress Scale (PSS).

Appendix T

Table 9

Primary Variables Average Comparison t-test Analyses

Measure	**IDAHO Mom Mean**	**IDAHO Mom SD**	**Normative Mean**	**Normative SD**	***t***
PASS (prenatal; minimal)	16.734	(11.991)	13.37	(7.74)	2.720**
PASS (6M; minimal)	15.319	(10.516)	13.37	(7.74)	1.797
PASS (prenatal; mild-moderate)	16.734	(11.991)	30.44	(13.65)	-11.082***
PASS (6M; mild-moderate)	15.319	(10.516)	30.44	(13.65)	-13.941***
PASS (prenatal; severe)	16.734	(11.991)	52.99	(15.67)	-29.314***
PASS (6M; severe)	15.319	(10.516)	52.99	(15.67)	-34.731***
PSS (prenatal)	19.585	(6.650)	25.6	(8.24)	-8.769***
PSS (6M)	20.234	(5.961)	25.6	(8.24)	-8.727***
ICQ	5.62	(2.100)	NA	NA	NA

Note. This table compares the mean scores for participants in the IDAHO Mom Study to normative samples. Normative scores for the PASS were retrieved from Somerville et al., (2015). Normative scores for the PSS were retrieved from Cohen et al., 1983. The ICQ-R does not have normative scores available. 6M=postnatal 6-month time point; SD=standard deviation; PASS=Perinatal Anxiety Screening Scale; PSS=Perceived Stress Scale; ICQ=Infant Crying Questionnaire. * $p<0.05$. ** $p<0.01$. *** $p<0.001$.