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## **The Relationship Between Coping, Stress, and Breastfeeding Outcomes**

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To the Graduate Council:

I am submitting herewith a thesis written by Angela Nicole Sberna entitled "The Relationship Between Coping, Stress, and Breastfeeding Outcomes." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Nutrition.

Katherine F. Kavanagh, Major Professor

We have read this thesis and recommend its acceptance:

Terri Combs-Orme, Hollie A. Raynor

Accepted for the Council:

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Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

The Relationship Between Coping, Stress, and Breastfeeding Outcomes

A Thesis Presented for  
the Master of Science Degree  
The University of Tennessee, Knoxville

Angela Nicole Sberna

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## ABSTRACT

**Background:** Breastfeeding is the optimal form of nutrition for infants in their first year of life. While the benefits of breastfeeding are numerous, national rates remain below professional recommendations. Multiple barriers to breastfeeding have been identified, including various sociodemographic, psychosocial, and biomedical and health-care-related barriers. Maternal stress may be another barrier, as it has been previously associated with breastfeeding outcomes. Coping strategies are used to manage the demands of a stressful environment and can be categorized as problem- or emotion-focused. Emotion regulation emerged from the coping literature, but describes a unique set of techniques that affect the emotion-generating process. Social support is another coping resource that has been associated with successful breastfeeding outcomes.

**Objective:** The objective of this study was to assess the cross-sectional relationships between emotion regulation, perceived stress, perceived social support, problem solving, and breastfeeding outcomes (i.e., initiation and full breastfeeding) among mothers with infants less than six months of age via an online survey.

**Methods:** A total of 180 mothers were recruited, via social networking websites and the Principle Investigator's lab, to participate in an online survey that included the following measures: Difficulties in Emotion Regulation Scale (DERS), Perceived Stress Scale (PSS), Multidimensional Scale of Perceived Social Support (MSPSS), and Ways of Coping Questionnaire (WCQ). Independent t-tests, linear and logistic regressions, and Pearson's  $r$  correlations were used for analysis.

**Results:** Cross-sectional data from 91 mothers were analyzed. Results demonstrate a significant negative relationship between perceived maternal stress and breastfeeding

initiation. Additionally, less difficulty in emotion regulation and greater perceived social support were significantly associated with lower perceived stress.

**Conclusion:** Results from the present study suggest that perceived stress may be a barrier to breastfeeding initiation. Emotion regulation and perceived social support, both modifiable constructs, may be important target areas for reducing maternal stress and improving breastfeeding outcomes. Interventions using Dialectical Behavioral Therapy (DBT) or Acceptance and Commitment Therapy (ACT) may be effective in developing emotion regulation skills during the perinatal period.

**Keywords:** emotion regulation, breastfeeding, perceived stress, social support, coping

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## **CHAPTER I: LITERATURE REVIEW**

Breastfeeding has been well established as the preferred method of infant feeding, providing optimal nutrition for infants in their first year of life (1,2). The American Academy of Pediatrics (AAP), the Academy of Nutrition and Dietetics, and the World Health Organization (WHO) recommend exclusive breastfeeding for the first 6 months of life (1-4) and continued breastfeeding through the first (1,2) or second (3) year of life. WHO defines exclusive breastfeeding as receiving “only breastmilk from his/her mother or a wet nurse, or expressed breastmilk, and no other liquids or solids with the exception of drops or syrups consisting of vitamins, mineral supplements or medications” (p. 2) (5).

According to the 2007 National Immunization Survey from the Centers for Disease Control and Prevention (CDC), 75.0% of infants in the United States (U.S.) are offered the breast at least once (“ever breastfed”), 43.8% are breastfed at six months, 22.7% are breastfed at 12 months, 33.5% are exclusively breastfed through three months, and 13.8% are exclusively breastfed through six months (6). The U.S. Department of Health and Human Services’ Healthy People 2020 objectives for breastfeeding are to increase the proportion of infants who are ever breastfed to 81.9%, breastfed at six months to 60.6%, breastfed at one year to 34.1%, exclusively breastfed through three months to 46.2%, and exclusively breastfed through six months to 25.5% (7). Thus, the most current breastfeeding data suggest that breastfeeding rates in the U.S. remain below professional recommendations and Healthy People 2020 objectives. In 2011, the Surgeon General released a Call to Action to Support Breastfeeding in the U.S., reinforcing the nation’s commitment to reaching these breastfeeding objectives (8). It is clear that while initiation rates are relatively high, rates for duration and exclusivity drop dramatically,

suggesting that factors associated with or predictive of this trend may be clinically significant.

### ***Benefits of Breastfeeding***

The benefits of breastfeeding are numerous for both the infant and the mother (1). Potential benefits for infants include a reduced risk for acute otitis media (9), nonspecific gastroenteritis (9), severe lower respiratory tract infections (9), asthma (9), sudden infant death syndrome (SIDS) (9,10), hospital admission for infections (11), and overall morbidity and mortality (12). Long-term benefits include enhanced childhood cognitive development (9) and a reduced risk for chronic diseases such as type 1 and type 2 diabetes (13), cardiovascular disease (9), hypertension (13), hypercholesterolemia (13), and childhood leukemia (9,14). In addition, breastfed infants are less likely to become overweight as adults (15,16). Potential benefits for mothers include a reduced risk for chronic diseases such as type 2 diabetes (17,18), cardiovascular disease (17,19), and breast and ovarian cancer (20,21), a reduced risk for postpartum depression (17,22), faster shrinking of the uterus postpartum (1), and decreased postpartum bleeding (1). Breastfeeding also encourages strong bonding between the mother and infant and provides safe, fresh milk (1).

In addition to these health benefits, there are significant economic benefits to consider. According to the U.S. Department of Agriculture (USDA), a minimum of \$3.6 billion would be saved annually if breastfeeding rates reached recommended standards (based on Healthy People 2010 objectives) (23). This figure represents the total cost saving from the treatment of otitis media, gastroenteritis, and necrotizing enterocolitis (23). Consequently, the actual cost saving is likely to be much higher if “the cost of

purchases for over-the-counter medications for treatment of [otitis media] and gastroenteritis symptoms, physician charges related to the treatment of [necrotizing enterocolitis], and cost savings due to reductions in long-term morbidity” were included (p. 10) (23). Furthermore, recent evidence “suggests that a significant return on investment is likely with breastfeeding promotion” (p. 260) (24). In addition to savings in medical costs, employers and insurers can benefit economically through lower maternal absenteeism, reduced insurance costs, and increased productivity (1,24,25).

### ***Barriers to Breastfeeding***

Despite these benefits, there are significant barriers to breastfeeding. In a recent review, Whalen and Cramton organized these barriers into three categories: 1) sociodemographic, 2) psychosocial, and 3) biomedical and healthcare-related barriers (26). Example sociodemographic barriers include living in an urban area, living in the Midwest or Southern region of the U.S., having a lower household income, having a lower maternal education, being unmarried, being of younger maternal age, and returning to work soon after birth (26). Example psychosocial barriers include a lack of breastfeeding education, low maternal self-efficacy in breastfeeding, maternal anxiety during and after pregnancy, maternal depression prior to, during, and after pregnancy, and negative maternal attitudes regarding breastfeeding (26). Finally, example biomedical and healthcare-related barriers include Cesarean or other operative delivery, early introduction of solid foods, the introduction of formula in the hospital for non-medical reasons, limited prenatal education, maternal obesity, maternal tobacco use during or after pregnancy, no prior breastfeeding experience, pacifier introduction in the hospital, and primiparity (26). The same review suggests that effective anticipatory

guidance using the Ten Steps to Successful Breastfeeding through the Baby-Friendly Hospital Initiative (27) can help mothers overcome these barriers and reach professional and personal breastfeeding goals (26). This is important to increasing initiation and early support. However, other barriers appear as women transition into motherhood.

For example, mothers experience a variety of physical, intrapersonal, and interpersonal stress during the postpartum period (27). These maternal stressors can be defined as events, situations, or demands that are sources of mental, emotional, or physical discomfort, anguish, or difficulty (28). Examples of physical stressors include breast symptoms, fatigue, poor appetite, constipation, and sexual concerns (27). Examples of intrapersonal and interpersonal stress include concerns about weight, the development of maternal identity and role attainment, and mothers' concerns about "their abilities to meet the needs of family members, take effective and safe care of their infants, and find time for themselves" (27). Research has demonstrated that both physiological and psychological types of stress have been associated with infant feeding outcomes (29).

### ***Maternal Stress and Infant Feeding Outcomes***

Multiple physiological stress markers have been studied in relationship to infant feeding outcomes (29). These markers include the release of stress hormones involved in the hypothalamic-pituitary-adrenal (HPA) axis and sympathetic-adrenomedullary (SAM) response (e.g., cortisol, norepinephrine, and epinephrine) and cardiovascular responses that are indices of the autonomic nervous system (ANS) (e.g., heart rate and blood pressure) (29). Research has shown that lactating mothers have blunted HPA and SAM responses to physical stress and a suppressed HPA response to psychosocial stress (29-

31). Furthermore, similar studies suggest that breastfeeding mothers experience better cardiovascular responses, such as decreased heart rates and blood pressures (29,32). Additional studies indicate that both maternal and fetal stress during labor and delivery are associated with delayed onset of lactation (33). Specifically, “studies in breastfeeding women have shown that acute physical and mental stress can impair the milk ejection reflex,” suggesting that “mothers who experience high levels of stress during and after childbirth should receive additional lactation guidance during the first week or two postpartum” (p. 3012S) (33).

In addition to physiological stress, psychological stress has been associated with infant feeding outcomes. Multiple studies have found that breastfeeding is significantly associated with lower perceived stress, as measured by the Perceived Stress Scale (34-37). Because mothers consider breastfeeding, associated pain, and feeding difficulties to be primary postpartum stressful events (38), it stands to reason that those who are able to breastfeed successfully may experience less stress. Although the causality of this association has not yet been examined, it is possible that stress may be an important barrier to breastfeeding and that mothers who are able to manage stress effectively may experience better breastfeeding outcomes.

### ***Coping with Stress***

Coping strategies are used to manage the demands of a stressful environment (39). Folkman and Lazarus defined coping as “the cognitive and behavioral efforts made to master, tolerate, or reduce external and internal demands and conflicts among them” and distinguished between two primary coping responses – “problem-focused coping” and “emotion-focused coping” (p. 223) (40). Problem-focused coping is “directed

towards the management of the problem” (p. 530) (41) and includes strategies such as planful problem-solving (42). Planful problem-solving describes deliberate efforts to alter the situation and analytically solve the problem (p. 995) (42). In contrast, emotion-focused coping attempts “to reduce the emotional distress associated with the problem” (i.e., regulating stressful emotions) (p. 530) (41). Distancing is one emotion-focused strategy that describes efforts to detach oneself by making light of the situation or refusing to think about it (p. 995) (42).

In one article, Terry argues that, “because problem-focused strategies actively confront the problem, they are, in general, proposed to facilitate adaptation to stress” (p. 530) (41). Emotion-focused strategies, however, “impair adaptation to stress, an expectation which is based on the fact that a reliance on this type of coping typically involves a failure to confront the event” (p. 530) (41). These hypotheses were supported by research, which found that a high level of problem-focused coping was associated with well-being and lower levels of stress, while a high level of emotion-focused coping was associated with a low level of well-being and higher levels of stress (41,43). It was from this research that the concept of emotion regulation emerged (44).

### ***Emotion Regulation***

Emotion regulation refers to “the heterogeneous set of processes by which emotions are themselves regulated” (p. 557) (44). Of the two terms – coping and emotion regulation – coping is considered to be the broader category because it also includes nonemotional actions and goals, or problem-focused coping (44) However, emotion regulation differs from coping in two important manners. First, the “unit of analysis” for coping is longer than that of emotion regulation (44). For example, coping processes



usually occur over hours, days, or months, while emotion regulation processes occur more rapidly, in seconds or minutes (44). Second, emotion regulation incorporates additional processes not typically considered in the coping literature, such as “regulating expressive or physiological aspects of emotion or influencing positively valenced emotions” (p. 556) (44). In other words, emotion-focused coping emphasizes lessening negative emotions by detaching oneself from the situation or suppressing one’s feelings, while emotion regulation encourages cognitive change through emotion regulatory processes (42,44).

According to Gross, “emotion begins with an evaluation of external or internal emotion cues,” which “trigger a co-ordinated set of behavioural, experiential, and physiological emotion reponse tendencies” (p. 559) (44). These tendencies can be modulated using a set of emotion regulatory processes, including situation selection, situation modification, attentional deployment, cognitive change, and response modulation (44). Situation selection “refers to approaching or avoiding certain people or situations on the basis of their likely emotional impact” (p. 559) (44). Situation modification “refers to modifying the local environment so as to alter its emotional impact” (p. 559) (44). Attentional deployment “refers to how individuals direct their attention within a given situation in order to influence their emotions,” and includes strategies such as distraction and rumination (p. 559) (44). Cognitive change “refers to evaluating the situation one is in so as to alter its emotional significance, either by changing how one thinks about the situation or about one’s capacity to manage the demands it poses” (p. 560) (44). Finally, response modulation “refers to influencing emotion response tendencies once they arise,” such as hiding anger or slowing one’s

breathing rate (p. 560) (44). Therefore, multiple approaches can be employed at the individual level throughout the emotion-generating process to alter one's response tendencies (44).

Research has established an association between emotion regulation and physiological stress, through the HPA axis discussed previously (45). For example, "HPA activity is associated with emotion regulation in children," and emotion regulation can predict elevations in cortisol (p. 97) (45). Furthermore, Wirtz and colleagues found that men with hypertension had poorer emotion regulation; higher cortisol, epinephrine, and norpinephrine secretions; and higher systolic and diastolic blood pressure, when compared with those without hypertension (46). However, research assessing the association between emotion regulation and psychological, or perceived, stress is limited. A recent study by Messerli-Brügy and colleagues approximated this relationship in a sample of cardiac patients, reporting that patients with deficits in emotion regulation were more likely to have Type D (distressed) personalities (Type D individuals perceive stress chronically) (47).

### ***Social Support***

In addition to problem- and emotion-focused coping and emotion regulation, social support has been identified as another significant coping resource, defined as "the perception or experience that one is loved and cared for by others, esteemed and valued, and part of a social network of mutual assistance and obligations" (p. 381) (39). Social support typically encompasses support from family, friends, and significant others; however, the broader definition also includes communities and social networks (48). Research has consistently shown that social support reduces psychological distress, such

as depression and anxiety, during times of stress and acts as a buffer between stressful events and symptoms (39,48). While social support can be measured both quantitatively (e.g., number of friends) and qualitatively (e.g., perceptions of social support adequacy), most researchers agree that perceived social support is a better predictor of psychological status than objectively measured social support (48).

Research shows that social support for breastfeeding and emotional support are associated with successful breastfeeding outcomes (49,50). For example, a recent synthesis of qualitative research revealed that breastfeeding mothers considered social support from family or a social network to be more important than support from healthcare professionals, due to the continuous nature of contact (51). However, this review included studies that assessed various types of social support, including practical (e.g., help with housework or older children), informational (e.g., from someone with knowledge of breastfeeding), and emotional (e.g., empathy, approval, praise, feeling nurtured or cared for), and the distinctions between each type of support were not always clear (51). Nonetheless, despite the type of social support received, the congruence and compatibility of the support appears to be more influential (51). Furthermore, it is important to note that professional support from physicians (52), peer counselors (53), and International Board Certified Lactation Consultants (IBCLCs) (54) has been shown to improve breastfeeding outcomes.

### ***Research Objective***

The objective of this study was to assess the cross-sectional relationships between emotion regulation, perceived stress, perceived social support, problem solving, and

breastfeeding outcomes (i.e., initiation and full breastfeeding) among mothers with infants less than six months of age, via an online survey.

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## **CHAPTER II: MANUSCRIPT**

## Abstract

**Background:** Breastfeeding is the optimal form of nutrition for infants in their first year of life. While the benefits of breastfeeding are numerous, national rates remain below professional recommendations. Multiple barriers to breastfeeding have been identified, including various sociodemographic, psychosocial, and biomedical and health-care-related barriers. Maternal stress may be another barrier, as it has been previously associated with breastfeeding outcomes. Coping strategies are used to manage the demands of a stressful environment and can be categorized as problem- or emotion-focused. Emotion regulation emerged from the coping literature, but describes a unique set of techniques that affect the emotion-generating process. Social support is another coping resource that has been associated with successful breastfeeding outcomes.

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**Results:** Cross-sectional data from 91 mothers were analyzed. Results demonstrate a significant negative relationship between perceived maternal stress and breastfeeding

initiation. Additionally, less difficulty in emotion regulation and greater perceived social support were significantly associated with lower perceived stress.

**Conclusion:** Results from the present study suggest that perceived stress may be a barrier to breastfeeding initiation. Emotion regulation and perceived social support, both modifiable constructs, may be important target areas for reducing maternal stress and improving breastfeeding outcomes. Interventions using Dialectical Behavioral Therapy (DBT) or Acceptance and Commitment Therapy (ACT) may be effective in developing emotion regulation skills during the perinatal period.

## Introduction

Breastfeeding has been well established as the preferred method of infant feeding, providing optimal nutrition for infants in their first year of life (1,2). The American Academy of Pediatrics (AAP), the Academy of Nutrition and Dietetics, and the World Health Organization (WHO) recommend exclusive breastfeeding for the first six months of life (1-4) and continued breastfeeding through the first (1,2) or second (3) year of life. According to the 2007 National Immunization Survey from the Centers for Disease Control and Prevention (CDC), 75.0% of infants in the United States (U.S.) are offered the breast at least once (“ever breastfed”), but only 13.8% are exclusively breastfed through 6 months (5). The U.S. Department of Health and Human Services’ Healthy People 2020 objectives for breastfeeding are to increase the proportion of infants who are ever breastfed and exclusively breastfed through six months to 81.9% and 25.5%, respectively (6). Thus, the most current breastfeeding data suggest that breastfeeding rates in the U.S. remain below professional recommendations and Healthy People 2020 objectives.

The benefits of breastfeeding are numerous for both the infant and mother (1,2). Significant short-term benefits for infants include a reduced risk for acute otitis media (7), nonspecific gastroenteritis (7), and severe lower respiratory tract infections (7). Long-term benefits include enhanced childhood cognitive development (7) and a reduced risk for obesity (8,9), diabetes, and cardiovascular disease (10). Potential benefits for mothers include a reduced risk for breast and ovarian cancers (11,12), type 2 diabetes (13,14), and cardiovascular disease (13,15). Breastfeeding also encourages strong bonding between the mother and infant and provides safe, fresh milk (1). According to

the U.S. Department of Agriculture (USDA), a minimum of \$3.6 billion would be saved annually if breastfeeding rates reached recommended standards (based on Healthy People 2010 objectives) (16). In addition to savings in medical costs, employers and insurers can benefit economically through lower maternal absenteeism, reduced insurance costs, and increased productivity (1,17,18).

Despite these benefits, there are significant barriers to breastfeeding. In a recent review, Whalen and Cramton organized these barriers into three categories – sociodemographic, biomedical and healthcare-related, and psychosocial barriers (19). Examples of these barriers include having a lower household income, having a lower maternal education, returning to work soon after birth, the introduction of formula in the hospital for non-medical reasons, a lack of breastfeeding education, low maternal self-efficacy in breastfeeding, and maternal anxiety during and after pregnancy (19). The same review suggests that effective anticipatory guidance using the Ten Steps to Successful Breastfeeding through the Baby-Friendly Hospital Initiative (20) can help mothers overcome these barriers and reach professional and personal breastfeeding goals (19). This is important to increasing initiation and early support. However, others barriers appear as women transition into motherhood.

For example, mothers experience a variety of physical, intrapersonal, and interpersonal stress during the postpartum period (21). Examples of physical stressors include breast symptoms, fatigue, poor appetite, and constipation. Examples of intrapersonal and interpersonal stress include concerns about weight, the development of maternal identity and role attainment, and concerns about “their abilities to meet the needs of family members, take effective and safe care of their infants, and find time for



themselves” (21). Research has demonstrated that both physiological and psychological types of stress have been associated with infant feeding outcomes (22).

Physiological stress markers include the release of stress hormones involved in the hypothalamic-pituitary-adrenal (HPA) axis and sympathetic-adrenomedullary (SAM) response (e.g., cortisol, norepinephrine, and epinephrine) and cardiovascular responses that are indices of the autonomic nervous system (ANS) (e.g., heart rate and blood pressure) (22). Research has shown that lactating mothers have blunted HPA and SAM responses to physical stress and a suppressed HPA response to psychosocial stress (22-25). Furthermore, similar studies suggest that breastfeeding mothers experience better cardiovascular responses, such as decreased heart rates and blood pressures (22).

Additional studies indicate that both maternal and fetal stress during labor and delivery are associated with delayed onset of lactation (26).

Other studies have found that breastfeeding is significantly associated with lower perceived stress, as measured by the Perceived Stress Scale (27-30). Because mothers consider breastfeeding, associated pain, and feeding difficulties to be primary postpartum stressful events (31), it stands to reason that those who are able to breastfeed successfully may experience less stress. Although the causality of this association has not yet been examined, it is possible that stress may be an important barrier to breastfeeding and that mothers who are able to manage stress effectively may experience better breastfeeding outcomes.

Coping strategies are used to manage the demands of a stressful environment (32). Folkman and Lazarus distinguished between two primary coping responses – “problem-focused coping” and “emotion-focused coping” (p. 223) (33). Problem-focused

coping is “directed towards the management of the problem” (p. 530) (34) and includes strategies such as planful problem-solving (35). In contrast, emotion-focused coping attempts “to reduce the emotional distress associated with the problem” (i.e., regulating stressful emotions) (p. 530) (34) and includes strategies such as distancing (35). In one article, Terry argues that, “because problem-focused strategies actively confront the problem, they are, in general, proposed to facilitate adaptation to stress” (p. 530) (34). Emotion-focused strategies, however, “impair adaptation to stress, an expectation which is based on the fact that a reliance on this type of coping typically involves a failure to confront the event” (p. 530) (34). These hypotheses were supported by research, which found that a high level of problem-focused coping was associated with well-being and lower levels of stress, while a high level of emotion-focused coping was associated with a low level of well-being and higher levels of stress (34,36). It was from this research that the concept of emotion regulation emerged (37).

Emotion regulation refers to “the heterogeneous set of processes by which emotions are themselves regulated” (p. 557) (37). Of the two terms – coping and emotion regulation – coping is considered to be the broader category because it also includes nonemotional actions and goals, or problem-focused coping (37) However, emotion regulation differs from coping in two important manners. First, the “unit of analysis” for coping is longer than that of emotion regulation (37). For example, coping processes usually occur gradually, over hours, days, or months, while emotion regulation processes occur more rapidly, in seconds or minutes (37). Second, emotion regulation incorporates additional processes not typically considered in the coping literature, such as “regulating expressive or physiological aspects of emotion or influencing positively valenced

emotions” (p. 556) (37). In other words, emotion-focused coping emphasizes lessening negative emotions by detaching oneself from the situation or suppressing one’s feelings, while emotion regulation encourages cognitive change through emotion regulatory processes, including situation selection, situation modification, attentional deployment, cognitive change, and response modulation (35,37).

Research has established an association between emotion regulation and physiological stress through the HPA axis discussed previously (38). Furthermore, Wirtz and colleagues found that men with hypertension had poorer emotion regulation; higher cortisol, epinephrine, and norpeinephrine secretions; and higher systolic and diastolic blood pressure, when compared with those without hypertension (39). However, research assessing the association between emotion regulation and psychological, or perceived, stress is limited. A recent study by Messerli-Brügy and colleagues approximated this relationship in a sample of cardiac patients, reporting that patients with deficits in emotion regulation were more likely to have Type D (distressed) personalities (Type D individuals percieve stress chronically) (40).

In addition, social support has been identified as another significant coping resource, defined as “the perception or experience that one is loved and cared for by others, esteemed and valued, and part of a social network of mutual assistance and obligations” (p. 381) (32). Social support typically encompasses support from family, friends, and significant others; however, the broader definition also includes communities and social networks (41). Research has consistently shown that social support reduces psychological distress, such as depression and anxiety, during times of stress and acts as a buffer between stressful events and symptoms (32,41). While social support can be

measured both quantitatively (e.g., number of friends) and qualitatively (e.g., perceptions of social support adequacy), most researchers agree that perceived social support is a better predictor of psychological status than objectively measured social support (41).

Research shows that social support for breastfeeding and emotional support are associated with successful breastfeeding outcomes (42,43). For example, a recent synthesis of qualitative research revealed that breastfeeding mothers considered social support from family or a social network to be more important than support from healthcare professionals, due to the continuous nature of contact (44). However, this review included studies that assessed various types of social support, including practical (e.g., help with housework or older children), informational (e.g., from someone with knowledge of breastfeeding), and emotional (e.g., empathy, approval, praise, feeling nurtured or cared for), and the distinctions between each type of support was not always clear (44). Nonetheless, despite the type of social support received, the congruence and compatibility of the support appears to be more influential (44). Furthermore, it is important to note that professional support from physicians (45), peer counselors (46), and International Board Certified Lactation Consultants (IBCLCs) (47) has been shown to improve breastfeeding outcomes.

The objective of this study was to assess the cross-sectional relationships between emotion regulation, perceived stress, perceived social support, problem solving, and breastfeeding outcomes (i.e., initiation and full breastfeeding) among mothers with infants less than six months of age, via an online survey.

## Methods

### *Recruitment and Procedures*

Mothers with infants less than six months of age were recruited, via Facebook, Twitter, and the Principal Investigator's lab, from June to September 2011 to participate in an online survey (Appendix A). Recruitment advertisements were posted to 220 Facebook pages primarily related to infant feeding, parenting, and infants and three Twitter accounts. Eligible mothers who contacted the Principle Investigator's lab via phone or email were asked to participate. This lab studies infant, child, and adolescent nutrition and continuously recruits mothers and infants via their Facebook page and website, the East Tennessee Participant Database, and information flyers posted at local organizations. These organizations include Special Supplemental Program for Women, Infants, and Children (WIC) offices, health clinics, and pregnancy and birthing centers.

All participants were required to be at least 18 years of age and able to read English, but were not required to reside in the U.S. (thus, international mothers were eligible to participate). The survey included, in order: the Difficulties in Emotion Regulation Scale (DERS; Appendix B), the Perceived Stress Scale (PSS; Appendix C), the Multidimensional Scale of Perceived Social Support (MSPSS; Appendix D), and the Ways of Coping Questionnaire (WCQ; Appendix E). The demographic variables assessed included infant age, maternal age, ethnicity, marital status, parity, household size, income, education, and region of residence (Appendix F). Additionally, infant feeding behavior questions, adapted from the CDC's 2011 National Immunization Survey (NIS) Household Interview Questionnaire (p. 53-54), were used to assess breastfeeding

outcomes (i.e., initiation and full breastfeeding) (Appendix G) (48). The complete survey included 166 questions, and the estimated completion time was 15-30 minutes.

The university's Institutional Review Board approved all procedures (IRB #8493B). SurveyMonkey (49) was used for data collection, and all data were kept confidential on a password-protected server. Upon clicking the survey link, participants were directed to an information page, which served as an electronic consent form. Participants were asked to read the information and provide their consent by clicking "Yes" at the bottom of the page, and only those consenting to participate were directed to the survey. Furthermore, SurveyMonkey actively collects IP addresses and was set to block respondents from completing the survey twice from the same IP address. This method was used to reduce the probability that any individual would participate more than once. However, prior to the final submission, participants could re-access the survey an unlimited number of times, providing flexibility to answer the questions in more than one sitting. Participants were also able to skip any question other than those related to the DERS, PSS, MSPSS, and WCQ measures; however, for these items, participants were given the option to select "decline to answer." This design feature was used to limit the amount of missing data that would result from skipped questions.

As an incentive, participants were eligible to enter into a \$25 Babies "R" Us gift card drawing upon completing the survey. To enter the drawing, each participant was asked, but not required, to provide her email address for use in contacting the winners (Appendix H). However, participants not providing email addresses were excluded from the drawing, as they could not be reached otherwise. Winners were randomly selected each time 25 participants completed the survey; thus, drawings were based on a discreet

group of 25, resulting in a 1/25 (4.0%) chance of winning. Once contacted, winners were given one week to provide a postal address for mailing of the gift card and were sent a reminder email one day prior to this deadline, as necessary. If no response from the participant was received, another winner was selected.

### ***Measures***

#### *Difficulties in Emotion Regulation Scale (DERS)*

The Difficulties in Emotion Regulation Scale is a 36-item self-report scale measuring emotion dysregulation (50). Items are rated on a 5-point Likert scale, from 1 (*almost never*) to 5 (*almost always*), and 11 items are reverse-scored. Scores are summed for a total score, ranging from 36 to 180, with higher scores indicating greater dysregulation. In a sample of undergraduate students, the DERS showed high internal consistency ( $\alpha = 0.93$ ) and good test-retest reliability over a 4-8 week period ( $\rho_T = 0.88, p < 0.01$ ) (50).

#### *Perceived Stress Scale (PSS)*

The Perceived Stress Scale is a 14-item self-report scale measuring “the degree to which situations in one’s life are appraised as stressful” (p. 385) (51). Items are rated on a 5-point Likert scale, from 1 (*never*) to 5 (*very often*), and seven items are reverse-scored. Scores are summed for a total score, ranging from 14 to 70, with higher scores indicating greater perceived stress. In two samples of college students, the PSS showed adequate internal and test-retest reliability ( $\alpha = 0.85$  for both) (51).

#### *Multidimensional Scale of Perceived Social Support (MSPSS)*

The Multidimensional Scale of Perceived Social Support is a 12-item self-report scale measuring the degree to which, in general, one perceives social support from

significant others, family, and friends (41). Items are rated on a 7-point Likert scale, from 1 (*very strongly disagree*) to 7 (*very strongly agree*). Scores are averaged for a mean score, ranging from 1 to 7, with higher means indicating greater perceived social support. In a sample of undergraduate students, the MSPSS showed good internal consistency ( $\alpha = 0.88$ ) and good test-retest reliability ( $\alpha = 0.85$ ) (41).

#### *Ways of Coping Questionnaire (WCQ)*

The Ways of Coping Questionnaire is a 66-item self-report scale designed to measure problem-focused and emotion-focused coping strategies in a specific stressful event (52). Participants are asked to indicate the extent to which they used each item during a recent stressful event using a 4-point Likert scale, from 0 (*not used*) to 3 (*used a great deal*). The WCQ is divided into the following eight subscales: 1) Confrontive coping; 2) Distancing; 3) Self-control; 4) Seeking social support; 5) Accepting responsibility; 6) Escape-avoidance; 7) Planful problem-solving; and 8) Positive reappraisal. While all subscales were included in the survey to maintain reliability, only the planful-problem solving (PPS) subscale was analyzed to assess problem-focused coping. Scores from the six items in this subscale were summed for a total subscale score, ranging from 0 to 18, with higher scores indicating a greater use of this coping strategy. In a sample of married couples, a Cronbach's  $\alpha$  of 0.68 was reported for the PPS subscale (52). Emotion-focused coping was not assessed due to its association with higher levels of stress; rather, only those strategies associated with stress reduction (i.e., emotion regulation, social support, and problem solving) were examined.



### ***Data Analysis***

Survey responses were imported into SPSS and analyzed using version 19 (2010, IBM Corporation, Armonk, NY). Only participants providing complete data were included in the final dataset. Participants were considered to have complete data if they did not select “decline to answer” for any of the DERS, PSS, MSPSS, WCQ, or infant feeding behavior questions. Therefore, participants who did select “declined to answer” were removed from the sample because total or mean measure scores and/or breastfeeding outcome classifications could not be determined.

Within the final dataset, all participants were classified into two of four infant feeding groups. They first were classified by breastfeeding initiation (Yes/No) and then by current status of full breastfeeding (Yes/No). Participants were considered to have initiated breastfeeding if they reported that their infants had ever received breast milk (i.e., replying “Yes” to #1 of Appendix G). Furthermore, participants were considered to be fully breastfeeding if they reported currently breastfeeding, but having not yet introduced formula or other liquids or solids, excluding vitamins, minerals, or water (i.e., replying “Yes” to #1, “Yes” to #2, “No” to #4, and “only breast milk” to #6 of Appendix G), as suggested by Labbok and Krasovec (53). Each of the two sets of categories was mutually exclusive.

The demographic variables of infant age, maternal age, and household size were assessed and analyzed continuously, while ethnicity, marital status, parity, income, and education were assessed categorically, but analyzed dichotomously to increase the sample size for each category. Since the majority of participants were Caucasian, all other participants were categorized as non-white. Similarly, since the majority of

participants were married, all other participants were categorized as not married. Participants were categorized as primiparous or multiparous because breastfeeding outcomes differ by parity (54) and categorized as either having or not having a college degree because college graduates are more likely to breastfeed than women with less than a college degree (55). Furthermore, the cutoff for determining higher versus lower income was established using the upper value of the WIC income eligibility range for an average household size of four persons (\$34,999) (56). Finally, participants were categorized into one of four regions based on the U.S. Census Bureau's Regions and Divisions (57), with an additional fifth region for international participants.

Cronbach's alpha was used to assess the reliability of the study measures, and histogram, skewness, and kurtosis analyses were completed to assess the normality of distributions for the continuous variables (i.e., DERS, PSS, MSPSS, and PPS subscale scores and continuous demographic variables). An alpha level of 0.05 was set for all analyses, which included independent t-tests, linear and logistic regressions, and Pearson's r correlations.

Independent t-tests were used to examine differences in perceived stress between infant feeding groups (to compare with previous research). Assumptions of an independent t-test include: 1) independent random sampling, 2) normal distributions, and 3) homogeneity of variance (58). A forward stepwise logistic regression was then used to identify the demographic variables that were significantly related to breastfeeding outcomes (i.e., initiation and full breastfeeding). These significant variables were then controlled for using force entry in block I of a hierarchical logistic regression that was used to examine the relationships between measure scores (i.e., DERS, PSS, MSPSS, and

PPS subscale) and breastfeeding outcomes. Assumptions of a logistic regression include: 1) a linear relationship does not exist, 2) the dependent variable is discrete, 3) the independent variables need not be normally distributed nor of equal variance, and 4) the categories are mutually exclusive and exhaustive (59). Next, a hierarchical linear regression was used to examine the relationships among measure scores. Assumptions of a linear regression include: 1) independent random sampling, 2) linearity, 3) normal distribution, and 4) homoscedasticity (58). Finally, Pearson's *r* correlations were used to assess the strengths of relationships among select measure scores to further examine significant regressions. Assumptions of a Pearson's *r* correlation include: 1) independent random sampling and 2) normal distribution (58).

## **Results**

### ***Participants***

Nearly two hundred ( $n = 180$ ) eligible participants accessed the survey and consented to participate. While most participants ( $n = 177$ , 98.3% of 180) reached the end of the survey, only 94 (52.2% of 180) provided complete data. Of these 94 participants, three were excluded because they reported that their infants were greater than six months of age. Thus, 91 participants (96.8% of 94, 50.6% of 180) were included in the final sample. In this sample, all measures showed good internal consistency (Table 1), and all continuous variables were normally distributed.

Participants were primarily Caucasian (79.1%), married (84.6%), of higher income (74.7%, defined below), and college degree holders (65.9%). The average maternal age was 29.41 (SD = 4.92) years, and the average infant age was 3.34 (SD = 1.71) months. A complete set of demographic data can be found in Table 2. Additionally,

**Table 1.** Reliability scores for study measures using Cronbach's  $\alpha$  analyses

<b>Measure<sup>a</sup></b>	<b>Cronbach's <math>\alpha</math></b>
DERS	0.96
PSS	0.89
MSPSS	0.92
PPS subscale	0.74

<sup>a</sup>DERS = Difficulties in Emotion Regulation Scale; PSS = Perceived Stress Scale; MSPSS = Multidimensional Scale of Perceived Social Support; PPS = Planful Problem-Solving

**Table 2.** Demographics of mothers with infants less than six months of age (N = 91)

<b>Demographic variable</b>	<b>M (SD) or n (%)</b>
<b>Infant age (months)</b>	3.34 (1.71)
<b>Maternal age (years)</b>	29.41 (4.92)
<b>Ethnicity</b>	
White (Caucasian)	72 (79.1%)
Non-white	19 (20.9%)
<b>Marital status</b>	
Married	77 (84.6%)
Not married	14 (15.4%)
<b>Parity</b>	
Primiparous	41 (45.1%)
Multiparous	50 (54.9%)
<b>Household size (# persons)</b>	3.97 (1.24)
<b>Annual household income<sup>a</sup></b>	
Lower income	22 (24.2%)
Higher income	68 (74.7%)
<b>Education level</b>	
No college degree	30 (33.0%)
College degree	60 (65.9%)
<b>Region</b>	
Northeast	6 (6.6%)
Midwest	23 (25.3%)
South	42 (46.2%)
West	13 (14.3%)
International	4 (4.4%)

<sup>a</sup>Lower income = annual household income  $\leq$ \$34,999; higher income = annual household income  $>$ \$34,999

while a high proportion of participants initiated breastfeeding ( $n = 84$ , 92.3%), only 34 (37.4%) reported full breastfeeding at the time of survey completion.

### ***Differences in Perceived Stress Between Infant Feeding Groups***

Participants who initiated breastfeeding ( $n = 84$ ,  $M = 35.93$ ,  $SD = 8.90$ ) reported significantly lower perceived stress than participants who did not initiate ( $n = 7$ ,  $M = 44.00$ ,  $SD = 8.93$ ),  $t(88) = 2.31$ ,  $p = 0.024$ . However, participants who were fully breastfeeding ( $n = 34$ ,  $M = 36.24$ ,  $SD = 8.64$ ) did not significantly differ in perceived stress from participants who were not fully breastfeeding ( $n = 57$ ,  $M = 36.75$ ,  $SD = 9.46$ ),  $t(88) = 0.26$ ,  $p = 0.797$ .

### ***Significant Demographic Variables***

A forward stepwise logistic regression identified three demographic variables that were significantly related to breastfeeding outcomes. For initiation, a test of the full model against a constant model was statistically significant,  $\chi^2 = 4.441$ ,  $p = 0.035$  with  $df = 1$ , and the Wald criterion demonstrated that only marital status was significant,  $p = 0.028$ . For full breastfeeding, a test of the full model against a constant model was also statistically significant,  $\chi^2 = 10.058$ ,  $p = 0.007$  with  $df = 2$ , and the Wald criterion demonstrated that both maternal age and education were significant,  $p = 0.040$  and  $0.007$ , respectively.

### ***Measure Scores and Breastfeeding Outcomes***

A hierarchical logistic regression utilized two blocks to assess the relationships between measure scores and breastfeeding outcomes (Table 3). In block I, the significant demographic variables identified previously were controlled for using force entry for each regression. Thus, for initiation, the analysis controlled for marital status, and for full

**Table 3.** Hierarchical logistic regression models of significantly related demographic variables and measure scores on breastfeeding outcomes

<b>Block</b>	<b>Variables<sup>a</sup></b>	<b>P value<sup>b</sup></b>
<b>Initiation</b>		
I	Infant age Marital status	
II	DERS PSS MSPSS PPS subscale $\chi^2 = 9.546^c$ , df = 3, $p = 0.023$	$p = 0.047$
<b>Full breastfeeding</b>		
I	Infant age Maternal age Education	$p = 0.046$ $p = 0.003$
II	DERS PSS MSPSS PPS subscale $\chi^2 = 13.529$ , df = 3, $p = 0.004$	

<sup>a</sup>DERS = Difficulties in Emotion Regulation Scale; PSS = Perceived Stress Scale; MSPSS = Multidimensional Scale of Perceived Social Support; PPS = Planful Problem-Solving

<sup>b</sup>P values for significant variables only are shown

<sup>c</sup>Model chi-square

breastfeeding, the analysis controlled for maternal age and education. In addition, to account for the wide range of infant ages in the present sample (0.13 to 5.95 months), infant age was also controlled for in block I of each regression. In block II, the measure scores (i.e., DERS, PSS, MSPSS, and PPS subscale) were entered using a forward stepwise method. The results indicated that only the PSS was significantly associated with breastfeeding initiation, while none of the measures were significantly associated with full breastfeeding.

### ***Relationships Among Measure Scores***

Since the previous analysis showed that the DERS, MSPSS, and PPS subscale were not related to breastfeeding outcomes, a hierarchical linear regression was used to examine if they were instead related to the PSS (Table 4). Again, in block I, infant age and the demographic variables significantly related to the PSS and were controlled for using force entry. To identify these significant variables, a forward stepwise linear regression was used and demonstrated that only income was significantly related to the PSS,  $R^2 = 0.168$ ,  $F(1,83) = 17.95$ ,  $\beta = -0.422$ . In block II, the measure scores (i.e., DERS, MSPSS, and PPS subscale) were entered using a forward stepwise method. The results indicated that the DERS and MSPSS were significantly associated with the PSS.

### ***Pearson's r Correlations***

Finally, Pearson's  $r$  correlations were used to assess the strengths of relationships between the DERS and PSS and the MSPSS and PSS. The results showed a strong positive correlation between the DERS and PSS,  $r = 0.75$ ,  $p < 0.001$ , and a moderate negative correlation between the MSPSS and PSS,  $r = -0.51$ ,  $p < 0.001$ . To summarize,

**Table 4.** Hierarchical linear regression model of significantly related demographic variables and measure scores on perceived stress

<b>Block</b>	<b>Variables<sup>a</sup></b>	<b><math>R^2_{\Delta}</math><sup>b</sup></b>	<b>P value</b>
<b>PSS<sup>c</sup> score</b>			
I	Infant age		
	Income	0.172	$p < 0.001$
II	DERS		
	MSPSS	0.040	$p = 0.005$
$R^2_{cum} = 0.604^d, F(1,81) = 33.41$			

<sup>a</sup>DERS = Difficulties in Emotion Regulation Scale; MSPSS = Multidimensional Scale of Perceived Social Support

<sup>b</sup> $R^2_{\Delta}$  = Incremental variance accounted for by each block;  $\Delta$  = change

<sup>c</sup>PSS = Perceived Stress Scale

<sup>d</sup> $R^2_{cum}$  = Variance accounted for by entire model

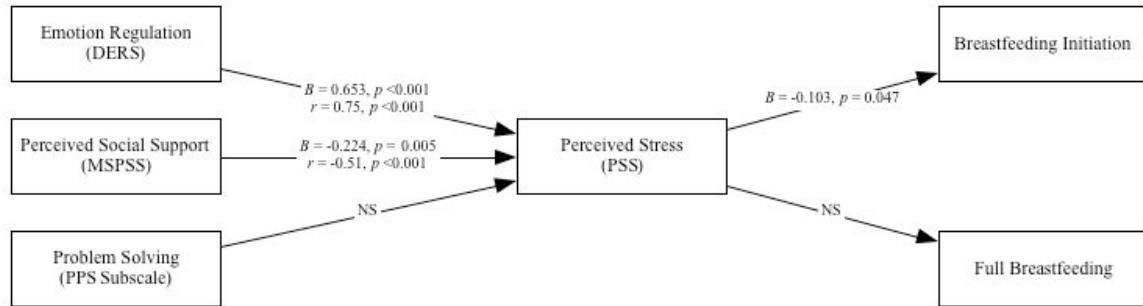


Figure 1 represents the findings from all analyses and includes relevant statistical information for select regressions and correlations.

### **Discussion**

While breastfeeding initiation and exclusivity rates in the present sample were slightly higher than national averages, the downward trend is similar (5). However, it is important to remember that this sample is a convenience sample that is unlikely to be comparable to the general population. Importantly, the results presented here demonstrate a significant negative relationship between perceived maternal stress and breastfeeding initiation. Therefore, perceived stress may be a critical factor to target both prenatally and in the early postpartum period.

Additionally, less difficulty in emotion regulation and greater perceived social support were significantly associated with lower perceived stress. Therefore, improving mothers' emotion regulation abilities and their perceptions of social support may reduce stress and lead to improved breastfeeding outcomes. However, because social support is perhaps less easily modifiable than emotion regulation, it may be most beneficial to test interventions targeting emotion regulation alone. For example, mothers who perceive little to no social support may greatly benefit from effective interventions such as Dialectical Behavior Therapy (DBT; 60) and Acceptance and Commitment Therapy (ACT; 61). Both DBT and ACT are cognitive-behavioral and acceptance-based techniques, most often used to treat borderline personality disorder (BPD) – a disorder characterized by emotion dysregulation (62, 63). Research shows that DBT and ACT successfully enhance emotion regulation in individuals with BPD (64, 65). However, although these therapies are effective in many applications (70,71), they have never been



**Figure 1.** Developed model representing the relationships between measure scores and breastfeeding outcomes via regression and correlation statistics. NS = non-significant.

examined in relation to breastfeeding. Future studies could evaluate the effectiveness of these therapies to improve breastfeeding outcomes.

### ***Sample Bias***

The greatest limitation to the present study is the homogenous, highly biased sample that is not representative of the larger U.S. population. As mentioned previously, the majority of participants were Caucasian, married, college-educated, and of higher income. While the sample shares similar characteristics with the breastfeeding population (1, 30), it clearly lacks representation from more ethnically diverse individuals of lower socioeconomic status. Therefore, the results from this study have limited generalizability to other populations (66).

This coverage error is primarily due to the use of an internet-based survey (66). According to the most recent data from the U.S. Census Bureau (from 2009), 68.7% of households in the U.S. have internet access at home (67). This is a great increase from 18.0% in 1997 and a slight increase from 54.7% in 2003 (67). However, despite the widespread access, research indicates that low-income individuals with limited literacy do not currently use this access (68). Therefore, the characteristics of the present sample are not surprising. Furthermore, while the sample's homogeneity (which decreases variability) may have increased the statistical power to detect differences between infant feeding groups (30), it is important to note the relatively small sample of mothers who did not initiate breastfeeding ( $n = 7$ ). Future studies could use alternative methodologies, such as paper-based surveys or phone interviews, to reach a larger, more representative population.

### ***Other Limitations***

There are several other limitations to the present study. First, the categories used to assess income, though based on those used by the U.S. Census Bureau (69), were not easily dichotomized, and results using this variable should be interpreted with caution. Secondly, because breastfeeding status is defined inconsistently in the literature, the infant feeding groups discussed here cannot be directly compared with groups defined differently in other studies (28, 30). Third, the MSPSS is a broad measure of social support and does not specifically measure social support for breastfeeding. Although various types of social support have been related to breastfeeding (44), future studies could benefit by addressing this specific type. Fourth, the veracity of the data cannot be confirmed, as the survey was completely dependent upon the honesty and integrity of the participants (66).

Finally, measurement error may be affecting the results of this study in two primary ways. First, all study constructs (i.e., emotion regulation, stress, social support, and problem solving) were based on only one self-reported measurement. For example, stress was measured with the PSS, but could have also been measured physiologically with cortisol samples. However, this methodology was limited by the use of an internet-based survey and the feasibility of data collection. Second, because the infant feeding behavior questions appeared at the end of the survey (66), and participants not providing this information were eliminated from data analysis, the attrition rate (52.2%) was relatively high. This rate is typical for internet-based research (66); however, future studies could improve the study design by positioning these primary outcome-related questions at the beginning of the survey to maximize the final sample size.

## **Conclusion**

Results from the present study suggest that perceived stress may be an important barrier to breastfeeding initiation. In addition, emotion regulation and social support are modifiable constructs that may reduce maternal stress and increase breastfeeding rates during the postpartum period. However, the causality of these relationships is unknown and is currently being investigated. If found to be predictive of breastfeeding outcomes, the DERS, MSPSS, and PSS measures may serve as important early-identifiers of women at risk of suboptimal infant feeding practices.

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## **CHAPTER III: CONCLUSION**

Results from the present study suggest that perceived stress may be an important barrier to breastfeeding initiation. In addition, emotion regulation and social support are modifiable constructs that may reduce maternal stress and increase breastfeeding rates during the postpartum period. However, the causality of these relationships is unknown and is currently being investigated. If found to be predictive of breastfeeding outcomes, the DERS, MSPSS, and PSS measures may serve as important early-identifiers of women at risk of suboptimal infant feeding practices.



## APPENDICIES

## Appendix A: Recruitment

### *Appendix A-1: Social Networking Website Advertisements*

#### *Facebook*

Are you pregnant or the mother of an infant less than 6 months of age? If so, you may be eligible to participate in a 15-30 minute online survey about infant feeding & life stress. If you are eligible & decide to participate, you can enter for a chance to win a \$25 Babies “R” Us gift card. For more information & to access the survey, please click the following link: <https://www.surveymonkey.com/s/feedingandstress>

#### *Twitter*

Pregnant or have an infant <6 months? You may be eligible to participate in a survey & enter to win a \$25 gift card: <http://t.co/NRrUiTX>

***Appendix A-2: Lab Database Email***

*Subject:* ICAN Lab Online Survey

Dear [Name],

Hi, this is Angie from the ICAN Lab at the University of Tennessee. I received your name from our lab database and am emailing because you are eligible to participate in an online survey about infant feeding and life stress. The survey should take 15-30 minutes to complete, and you will be eligible to enter into a [\\$25 Babies "R" Us gift card drawing](#) upon completion. If you are interested in participating, please click the following link: <https://www.surveymonkey.com/s/feedingandstress>.

Thanks,

**ICAN Lab Research Team**

[ican@utk.edu](mailto:ican@utk.edu)

865-974-2109

Angela Sberna

Graduate Student

[asberna1@utk.edu](mailto:asberna1@utk.edu)

***Appendix A-3: Lab Database Phone Script***

Hi, this is Angie from the ICAN Lab at the University of Tennessee. I received your name from our lab database and am calling because you are eligible to participate in an online survey about infant feeding and life stress. Would you be interested in participating?

*If interested in participating:*

Your participation will help us to understand more about infant feeding and life stress. You will be asked to complete an online survey about how you handle stress and how you feed your baby. The survey should take 15-30 minutes to complete. There is no cost to you to participate, and you will be eligible to enter into a \$25 Babies “R” Us gift card drawing. Multiple drawings will be held, and all information will remain confidential.

*For voicemail:*

Hi [Name], this is Angie from the ICAN Lab at the University of Tennessee. I received your name from our lab database and am calling because you are eligible to participate in an online survey about infant feeding and life stress. The survey takes about 15-30 minutes to complete and you will be eligible to enter into a \$25 Babies “R” Us gift card drawing. If you are interested in participating, please give us a call at 865-974-2109. If you are directed to our voicemail, feel free to leave your name and email address, and I will send you the link as soon as possible. Thank you.

## **Appendix B: Difficulties in Emotion Regulation Scale (DERS)**

*Directions:* Please rate how often you agree with the following statements.

*Response options:* Almost never (0-10%), Sometimes (11-35%), About half the time (36-65%), Most of the time (66-90%), Almost always (91-100%)

*Items:*

1. I am clear about my feelings.
2. I pay attention to how I feel.
3. I experience my emotions as overwhelming and out of control.
4. I have no idea how I am feeling.
5. I have difficulty making sense out of my feelings.
6. I am attentive to my feelings.
7. I know exactly how I am feeling.
8. I care about what I am feeling.
9. I am confused about how I feel.
10. When I'm upset, I acknowledge my emotions.
11. When I'm upset, I become angry with myself for feeling that way.
12. When I'm upset, I become embarrassed for feeling that way.
13. When I'm upset, I have difficulty getting work done.
14. When I'm upset, I become out of control.
15. When I'm upset, I believe that I will remain that way for a long time.
16. When I'm upset, I believe that I'll end up feeling very depressed.
17. When I'm upset, I believe that my feelings are valid and important.
18. When I'm upset, I have difficulty focusing on other things.
19. When I'm upset, I feel out of control.
20. When I'm upset, I can still get things done.
21. When I'm upset, I feel ashamed with myself for feeling that way.
22. When I'm upset, I know that I can find a way to eventually feel better.
23. When I'm upset, I feel like I am weak.
24. When I'm upset, I feel like I can remain in control of my behaviors.
25. When I'm upset, I feel guilty for feeling that way.
26. When I'm upset, I have difficulty concentrating.
27. When I'm upset, I have difficulty controlling my behaviors.
28. When I'm upset, I believe that there is nothing I can do to make myself feel better.
29. When I'm upset, I become irritated with myself for feeling that way.
30. When I'm upset, I start to feel very bad about myself.
31. When I'm upset, I believe that wallowing in it is all I can do.
32. When I'm upset, I lose control over my behaviors.
33. When I'm upset, I have difficulty thinking about anything else.
34. When I'm upset, I take time to figure out what I'm really feeling.
35. When I'm upset, it takes me a long time to feel better.
36. When I'm upset, my emotions feel overwhelming.

## Appendix C: Perceived Stress Scale (PSS)

*Directions:* Please rate your answers to the following questions.

*Response options:* Never, Almost never, Sometimes, Fairly often, Very often

*Items:*

1. In the last month, how often have you been upset because of something that happened unexpectedly?
2. In the last month, how often have you felt that you were unable to control the important things in your life?
3. In the last month, how often have you felt nervous and “stressed”?
4. In the last month, how often have you dealt successfully with irritating life hassles?
5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?
6. In the last month, how often have you felt confident about your ability to handle your personal problems?
7. In the last month, how often have you felt that things were going your way?
8. In the last month, how often have you found that you could not cope with all the things that you had to do?
9. In the last month, how often have you been able to control irritations in your life?
10. In the last month, how often have you felt that you were on top of things?
11. In the last month, how often have you been angered because of things that happened that were outside of your control?
12. In the last month, how often have you found yourself thinking about things that you have to accomplish?
13. In the last month, how often have you been able to control the way you spend your time?
14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

## **Appendix D: Multidimensional Scale of Perceived Social Support (MSPSS)**

*Directions:* Please rate how you feel about each statement.

*Response options:* Very strongly disagree, Strongly disagree, Mildly disagree, Neutral, Mildly agree, Strongly agree, Very strongly agree

*Items:*

1. There is a special person who is around when I am in need.
2. There is a special person with whom I can share my joys and sorrows.
3. My family really tries to help me.
4. I get the emotional help and support I need from my family.
5. I have a special person who is a real source of comfort to me.
6. My friends really try to help me.
7. I can count on my friends when things go wrong.
8. I can talk about my problems with my family.
9. I have friends with whom I can share my joys and sorrows.
10. There is a special person in my life who cares about my feelings.
11. My family is willing to help me make decisions.
12. I can talk about my problems with my friends.

## Appendix E: Ways of Coping Questionnaire (WCQ)

*Directions:* Think of the most stressful encounter you've had during the past week (7 days). Please read each item below and indicate to what extent you used it in the situation you just thought of.

*Response options:* Not used, Used somewhat, Used quite a bit, Used a great deal

*Items:*

1. **Just concentrated on what I had to do next – the next step.**
2. I tried to analyze the problem in order to understand it better.
3. Turned to work or substitute activity to take my mind off things.
4. I felt that time would make a difference – the only thing to do was to wait.
5. Bargained or compromised to get something positive from the situation.
6. I did something which I didn't think would work, but at least I was doing something.
7. Tried to get the person responsible to change his or her mind.
8. Talked to someone to find out more about the situation.
9. Criticized or lectured myself.
10. Tried not to burn my bridges, but leave things open somewhat.
11. Hoped a miracle would happen.
12. Went along with fate; sometimes I just have bad luck.
13. Went on as if nothing had happened.
14. I tried to keep my feelings to myself.
15. Looked for the silver lining, so to speak; tried to look on the bright side of things.
16. Slept more than usual.
17. I expressed anger to the person(s) who caused the problem.
18. Accepted sympathy and understanding from someone.
19. I told myself things that helped me to feel better.
20. I was inspired to do something creative.
21. Tried to forget the whole thing.
22. I got professional help.
23. Changed or grew as a person in a good way.
24. I waited to see what would happen before doing anything.
25. I apologized or did something to make up.
26. **I made a plan of action and followed it.**
27. I accepted the next best thing to what I wanted.
28. I let my feelings out somehow.
29. Realized I brought the problem on myself.
30. I came out of the experience better than when I went in.
31. Talked to someone who could do something concrete about the problem.
32. Got away from it for a while; tried to rest or take a vacation.
33. Tried to make myself feel better by eating, drinking, smoking, using drugs or medication, etc.
34. Took a big chance or did something very risky.



35. I tried not to act too hastily or follow my first hunch.
36. Found new faith.
37. Maintained my pride and kept a stiff upper lip.
38. Rediscovered what is important in life.
39. **Changed something so things would turn out all right.**
40. Avoided being with people in general.
41. Didn't let it get to me; refused to think too much about it.
42. I asked a relative or friend I respected for advice.
43. Kept others from knowing how bad things were.
44. Made light of the situation; refused to get too serious about it.
45. Talked to someone about how I was feeling.
46. Stood my ground and fought for what I wanted.
47. Took it out on other people.
48. **Drew on my past experiences; I was in a similar situation before.**
49. **I knew what had to be done, so I doubled my efforts to make things work.**
50. Refused to believe that it had happened.
51. I made a promise to myself that things would be different next time.
52. **Came up with a couple of different solutions to the problem.**
53. Accepted it, since nothing could be done.
54. I tried to keep my feelings from interfering with other things too much.
55. Wished that I could change what had happened or how I felt.
56. I changed something about myself.
57. I daydreamed or imagined a better time or place than the one I was in.
58. Wished that the situation would go away or somehow be over with.
59. Had fantasies or wishes about how things might turn out.
60. I prayed.
61. I prepared myself for the worst.
62. I went over in my mind what I would say or do.
63. I thought about how a person I admire would handle the situation and used that as a model.
64. I tried to see things from the other person's point of view.
65. I reminded myself how much worse things could be.
66. I jogged or exercised.

**\*Bolded items comprise the Planful Problem-Solving subscale.**

## Appendix F: Demographic Questions

1. What is your child's birth date?
2. How old is your child? (Please respond in MONTHS and WEEKS, ex. 3 months 2 weeks)
3. What is your birth date?
4. How old are you? (Please respond in YEARS, ex. 30 years)
5. What is your ethnicity?
  - a. American Indian or Alaska Native
  - b. Asian or Asian American
  - c. Black African American or Haitian
  - d. Hispanic or Latino
  - e. Native Hawaiian or Pacific Islander
  - f. White (Caucasian)
  - g. Other
6. What is your marital status?
  - a. Single
  - b. Married
  - c. Divorced
  - d. Widowed
7. How many children do you have?
8. How many people are in your household?
9. What is your annual household income?
  - a. Less than \$10,000
  - b. \$10,000 to \$14,999
  - c. \$15,000 to \$24,999
  - d. \$25,000 to \$34,999
  - e. \$35,000 to \$49,999
  - f. \$50,000 to \$74,999
  - g. \$75,000 to \$99,999
  - h. \$100,000 to \$149,000
  - i. \$150,000 to \$199,999
  - j. \$200,000 or more
10. What is the highest grade of school that you have completed?
  - a. Primary (elementary school)
  - b. Secondary (middle and high school)
  - c. Vocational/technical
  - d. Some college
  - e. College
  - f. Graduate school
11. What is your state of residence?

## Appendix G: Infant Feeding Behavior Questions

1. Was your child ever breastfed or fed breast milk?
  - a. Yes
  - b. No
2. Is your child still breastfeeding or being fed breast milk?
  - a. Yes
  - b. No
3. How old was your child when he/she completely stopped breastfeeding or being fed breast milk? (Please respond in MONTHS and WEEKS, ex. 3 months 2 weeks) (For those responding “No” to #2 only)
4. Was your child ever fed formula?
  - a. Yes
  - b. No
5. How old was your child when he/she was first fed formula? (Please respond in MONTHS and WEEKS, ex. 3 months 2 weeks) (For those responding “Yes” to #4 only)
6. This next question is about the first thing that your child was given other than breast milk or formula. Please include juice, cow’s milk, sugar water, baby food, or anything else that your child might have been given, even water. How old was your child when he/she was first fed anything other than breast milk or formula? (Please respond in MONTHS and WEEKS, ex. 3 months 2 weeks) If your child has not been fed anything other than breast milk or formula, please enter “only breast milk” or “only formula” in the space provided.

## Appendix H: Winner Selection Emails

### *Appendix H-1: Initial Email*

*Subject:* ICAN Lab Online Survey WINNER!

Dear Participant,

Congratulations! You were randomly selected as the winner of a \$25 Babies "R" Us gift card for completing our online survey about infant feeding and life stress! Please email us a valid address by [date] to where the gift card can be sent. For more information about our lab, please visit <http://web.utk.edu/~ican/>.

Thanks,

**ICAN Lab Research Team**

The University of Tennessee, Knoxville

Angela Sberna  
Graduate Student  
[asberna1@utk.edu](mailto:asberna1@utk.edu)

*Appendix H-2: Reminder Email*

Subject: RE: ICAN Lab Online Survey WINNER!

Dear Participant,

This is a reminder that you were randomly selected as the winner of a \$25 Babies "R" Us gift card for completing our online survey about infant feeding and life stress! Please email us a valid address by [date] to where the gift card can be sent. If we do not hear back from you by then, another winner will be selected.

Thanks,

**ICAN Lab Research Team**

The University of Tennessee, Knoxville

Angela Sberna  
Graduate Student  
[asberna1@utk.edu](mailto:asberna1@utk.edu)

## VITA

Angela Sberna was born in Cleveland, Ohio to the parents of Frank and Gail Sberna and was raised in Westlake, Ohio with her older sister, Monica. She graduated *magna cum laude* and Honors with Distinction from Miami University of Ohio in 2010, with a Bachelor of Science in Dietetics and a minor in Management and Organizations. She worked as an Undergraduate Research Assistant under Dr. Rose Marie Ward and completed her senior thesis on the relationship between emotional intelligence and alcohol and marijuana use on college campuses. She also interned at Cincinnati Children's Hospital, where she worked on a research study in the Regional Center for Newborn Intensive Care, examining hospital readmissions among infants with gastroschisis (published in the *Journal of Perinatology*, 2011;31:546-550). Angela accepted a Graduate Research Assistantship at The University of Tennessee, Knoxville, in the Infant, Child, and Adolescent Nutrition (ICAN) Lab under Dr. Katie Kavanagh. She worked on a three-year, USDA/NIFA/AFRI-funded study, examining formula preparation and infant growth. Angela received the Outstanding Dietetics Student Award in 2012 from the Tennessee Dietetic Association and graduated with her Master of Science in Nutrition. She completed the Dietetic Internship at The University of Tennessee, Knoxville and plans to become a Registered Dietitian.