Nurse-Navigated Mobile Messaging Support and Primiparous Women's Postpartum Symptom Experience Following Unplanned Cesarean Birth

A Dissertation Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Melanie Hall Morris
August 2018

Copyright © 2018 by Melanie Hall Morris

All rights reserved.

Dedication

My work and my life are dedicated to
The Great Father,
The Creator of all life,
The Holy One,
My Unfailing Love

"*Let the words of my mouth, and the meditation of my heart,*
be acceptable in thy sight,
O LORD,
my strength, and my redeemer."
(Psalms 19:14)

Acknowledgments

During such a long journey, the gratitude accumulated is immeasurable. I am so thankful for the words of wisdom and encouragement, the many acts of kindness, the abundant support, and the countless prayers prayed. For those who prayed, believed, funded, cheered, and even cried with me, thank you. So many have contributed so much to assist with the successful completion of this journey. With a heart overflowing with love and appreciation, I am incredibly grateful for:

- My FATHER – for your sustaining love, unending guidance, and many modes of support including timely texts.
- The love of my life, Craig Morris – THERE ARE NO WORDS!
- My precious children, John Michael and Cari Elizabeth Morris – You two are the reason!
- My parents, B.J. and Carolyn Hall – You created a strong foundation that anchored me, and your never-ending belief always propelled me forward.
- My sister, my first and everlasting BESTEST friend, Mindy Caudell – You always provided whatever I needed – endless scriptures, prayers, encouragement, flowers, chocolate, time and love.
- My hero who is the epitome of the brother I always hoped for, Scott Morris – You frequently remind me a bigger picture exists. You are a gift that keeps on giving.
- My nieces and nephews that I have held in my arms and rocked, Jessica, Rachel, Trey, Jeffrey, Jordan, McKenna, Delaney, Morgan, Stella Jaye, and Beckett – You all have perpetuated my adoration and love for babies.
- My in-loves Mawmaw (Jackie), Pawpaw(Johnny), J.C., Kim, Kenny, Michelle, Penny, and Heather – You have cared for me well.
- Jessica, Susan, Meredith, Jennie, Jo, Elizabeth, and Dani – thanks for the doses of love!
- Charlie, my all-night study buddy, and Maggie (and in memory of Sophie and Ginger) – Your never-ending unconditional love brightens every day.
- Papa and Mammy – Even though I can no longer hug you, your influence is ever present. The examples you set and the legacies you left continue to guide and inspire me.

My Dissertation Committee:

- Dr. Sadie Hutson, my committee chair – you have willingly invested and shared so much of your time, talent, and energy with me during these past six years. You are a true gem and a wonderful blessing. Your vision pushed me to reach higher allowing me to discover nuggets that would not have been possible without your innovative thinking and leadership. Thanks for helping me to recognize that "dwelling" has value and is when the most growth happens. I am so grateful for your mentorship and look forward to all that will be shared with the world about postpartum nurse navigators and postpartum health.
- Dr. Eric Heidel – you were the first to affirm, "You will graduate and be a doctor." Your belief and declaration of those seven words served to illuminate the path when I struggled to find my way.
- Dr. Lisa Lindley – your gentle guidance through the land of quantitative research equipped me with essential tools I needed to become a nurse scientist. I will always be grateful for the life preserver you tossed to me and for your ever-wise perspective.
- Dr. Tami Wyatt – beginning with the very first week of this journey, your timely words of encouragement have always managed to show up at critical junctures offering reassurance, hope, and enough "Oomph" to push me onward.

- My UTK CON faculty – each of you have contributed uniquely and significantly to my development and growth as a nurse researcher.
- Dr. Sandra Thomas – although I could not appreciate it initially, I thank you for seeing potential and pushing me to excel in ways I could have never imagined.
- Dr. Ralph Brockett – I learned valuable "how-to-educate" lessons from your examples.
.
- Marietta Zane and Maureen Barton – you have set the bar high as the original Postpartum Nurse Navigators. You never wavered in your commitment and devotion to moms and babies. This project would not have been possible without your belief or your friendship.
- Eva Montgomery, Teresa Wilson, Anna Zeller, Lauren Rollins, and Kelly Stafford – as liaisons, you have been the vital link for recruitment and enrollment of participants and so instrumental in this project's successful progression.
- All of the first-time mothers who willingly partnered with me in this research journey – I will continue to search for ways to promote and facilitate postpartum health for women.

- Dean Linda Norman – your gentle nudges pushed me to begin, the tangible support kept me going, and your encouraging words helped me to finish.
- Jennifer Doersam – you were my saving grace, so thankful for your REDCap assistance.
- Dr. Julia Phillippi – you always just understood. Your insights were invaluable.
- Dr. Suzanne Boswell – thanks for the hours you invested to help me figure it out.
- Dr. Kathryn Lee – I feel so lucky to have benefitted from your knowledge and expertise; you are the definition of an exemplary educator.
- Dr. Mary Gunther and Dr. Ken Phillips – your timely assistance – a true act of kindness.
- Dr. Betsy Weiner, Dr. Shelli Collins, Dr. Mary Dietrich, and Dr. Nancy Wells – I am grateful for your support and input on this project.
- My Vanderbilt family – you each motivate me to be a better educator, scholar, and friend. The completion of this journey would not have occurred without your continual support.

- All of the Moms who have allowed me to participate in your motherhood journey through pregnancy, birth, and beyond during my nursing career – you will always be an inspiration and the major reason I love what I do.

I am especially grateful for the generous support received from those who believed and provided funding for this project:

- Vanderbilt Institutes of Digital Learning and for Clinical and Translational Research
- University of Tennessee, Knoxville – Graduate School, College of Nursing Office of Research Administration, and Sandra P. Thomas PhD Research Award
- Tennessee Nurses Foundation
- Sigma Theta Tau, Iota chapter, Vanderbilt University School of Nursing

And to all who reached back and extended a hand to assist me to the other side – THANK YOU!
I will celebrate you each time I reach back to extend my hand to help another and will remember
"If thou canst believe, all things are possible to him that believeth." Mark 9:23
So……..BELIEVE!

Abstract

Within the maternity care cycle, the postpartum period garners the least consideration from healthcare providers as the focus shifts to the newborn after childbirth even though the health and functioning ability of the mother likely influences the health of her newborn. Nursing care of postpartum women historically has received limited research attention even though nearly 40% of United States (U.S.) maternal deaths have been found to occur during Days 1 to 41 following childbirth. Cesarean sections, considered major abdominal surgery, account for more than one million annual U.S. births resulting in increased morbidity and weeks longer recovery compared to vaginal birth.

The purpose of this study was to investigate the relationship between daily, interactive, nurse-navigated mobile messaging support and the outcomes of postpartum symptom experience and perceived availability of social support in first-time mothers who have unplanned cesarean births. Experienced maternity professional registered nurses, designated Postpartum Nurse Navigators (PPNN), implemented the novel texting intervention in an effort to bridge an existing gap between hospital discharge and follow-up healthcare, often not scheduled until four to six weeks postpartum.

Using Symptom Management Theory as a framework, a randomized controlled trial design was employed. Subjects completed three surveys electronically at 2-4 days, two weeks, and four weeks post-birth. The intervention consisted of daily, interactive, patient-focused texting with a PPNN that began the day following hospital discharge and continued until four weeks post-birth. Two PPNNs used decision-tree guidelines developed for the study as well as their clinical expertise when texting with subjects. Subjects interacted with an assigned primary PPNN who assessed general well-being, assisted with navigating postpartum symptoms, and

answered questions about breastfeeding, postpartum recovery, and newborn care. The control group received usual care.

Forty-one subjects completed the study. Underpowered, data analyses showed no differences between the intervention and control groups on the outcome variables postpartum symptom experience and perceived availability of social support. The majority of first-time mothers expressed satisfaction with receiving the nurse-navigated mobile messaging intervention. Establishing access to a PPNN may hold potential to foster maternal well-being during childbirth recovery and consequently promote a healthy beginning for newborns.

Table of Contents

Chapter One: Introduction 1

Statement of the Problem 4

Specific Aims of the Study 15

Guiding Theory 16

Definition of Key Concepts 17

Research Questions 19

Assumptions 19

Delimitations 20

Significance and Summary 21

Chapter Two: Literature Review 24

Transition to Motherhood 24

Unplanned Cesarean Birth 25

Postpartum Symptom Experience 26

Social Support for Postpartum Women 30

Nurse Navigators 36

Summary and Gaps in the Literature 37

Chapter Three: Methods 39

Philosophical Stance 39

Theoretical Framework 40

Feasibility Work 43

Research Design 45

Research Questions and Hypotheses 47

Quantitative Procedures and Methods 48

Summary 74

Chapter Four: Results 75

The Sample 75

Data Analysis 79

Summary 85

Chapter Five: Discussion 87

Summary of Preliminary Findings 87

Implications for Research 97

Implications for Nursing Practice 100

Implications for Nursing Education 101

Policy Implications 101

Limitations 104

Strengths 106

Conclusion 107

References 109

Appendices 128

Appendix A – Telephone Screening Questionnaire 129

Appendix B – Consent Form 130

Appendix C – Demographic Questionnaire 135

Appendix D – Demographic Questionnaire Follow-up 140

Appendix E – Memorial Symptom Assessment Scale (MSAS) 144

Appendix F – Interpersonal Support Evaluation List (ISEL-12) 146

Appendix G – Mobile Messaging Encounter Form 148

Appendix H – Mobile Messaging Protocols/Decision Trees.....150

Appendix I – Nurse Liaison Script 159

Appendix J – Evaluation of Maternity Nurse Navigator Intervention.....160

Appendix K – Recruitment Flyer.....161

Appendix L – Symptom Management Model 162

Appendix M – Institutional Review Board Approval.....163

Appendix N – Reliance Agreement 166

Vita.....169

List of Tables

Table 3.1 – Study Variables.....69

Table 4.1 – Demographic Characteristics of the Sample.....78

Table 4.2 – Means and 95% Confidence Intervals over Time of the MSAS and ISEL-12 ...84

List of Figures

Figure 4.1 – Subject Allocation 76

Figure 4.2 – Overall experience of receiving daily text messages from the PPNN.....81

Figure 4.3 – Likelihood of choosing to receive daily text messages from a PPNN again.....81

Figure 4.4 – Line Graphs for the MSAS Interaction 84

Figure 4.5 – Line Graphs for the ISEL-12 Interaction.....86

Abbreviations

ED – Emergency Department

IRB – Institutional Review Board

ISEL-12 – Interpersonal Evaluation Support List shortened version

MNN – Maternity Nurse Navigator

MSAS – Memorial Symptom Assessment Scale

PPNN – Postpartum Nurse Navigator

PI – Principal Investigator

REDCap – Research Electronic Data Capture

SMT – Symptom Management Theory

TOUS – Theory of Unpleasant Symptoms

Chapter One: Introduction

Nearly four million women give birth in the United States (U.S.) each year (Martin, Hamilton, Osterman, Driscoll, & Drake, 2018). Most women receive deliberate, intense, and frequent healthcare during pregnancy and childbirth in an effort to promote the health of both the mother and newborn. Yet, following this intensified attention, the focus naturally shifts from the mother to the baby (Albers, 2000; "Focus on infants during childbirth leaves U.S. moms in danger," 2017). The postpartum period, a potentially vulnerable transition for both mother and newborn, garners the least attention from healthcare providers within the maternity care cycle even though the health and functional status of the mother very much influences the health of her newborn (Albers, 2000; Cheng, Fowles, & Walker, 2006; Nelson, 2003). The maternal/newborn dyad is often left to navigate the early postpartum period with minimal attention from healthcare providers and with perhaps only limited verbal or written instructions upon discharge from the hospital.

When postpartum symptoms occur such as pain, headache, or swelling, mothers may assume these symptoms are expected after childbirth, and often they are so focused on meeting the needs of their newborns, they may ignore their own health requirements (Albers, 2000). Moreover, unless the mother initiates contact with her healthcare provider, there is typically minimal if any, contact with a healthcare provider until the mother returns for a follow-up visit, and this likely is not scheduled until four to six weeks after the birth. However, the postpartum recovery period is not risk free from potentially devastating health outcomes. Hospital readmission rates following childbirth increased from 1.72% in 2004 to 2.14% in 2011 in three states resulting in 114,748 women being readmitted typically within three to nine days following hospital discharge with complications related to hypertension, infection, or psychiatric disease

typically (Clapp, Little, Zheng, & Robinson, 2016). Furthermore, the timing of maternal deaths highlights the nature of this critical time period for maternal health, as over one-half of U.S. maternal deaths from 2011 to 2013 were noted to occur during the postpartum period with nearly 40% of those deaths occurring during Days 1 through 41 following birth (Creanga, Syverson, Seed, & Callaghan, 2017).

For first-time mothers, this postpartum transition time following childbirth is overflowing with many new firsts. While recovering from childbirth, women must learn how to best meet a newborn's needs 24 hours a day. They are learning newborn caretaking tasks, and many must also navigate establishing breastfeeding. This can create anxiety especially when access to support systems is limited or unavailable (Albers, 2000; Leahy Warren, 2005; Leahy-Warren & McCarthy, 2007). Additionally, new mothers are adjusting to changing family dynamics, schedules, and transitioning to the parenting role. Furthermore, while new mothers are juggling all of these challenges, they must attend to their own physical, psychological, and emotional needs during recovery from childbirth.

Of the nearly four million U.S. 2016 births, 31.9% or more than one million women delivered by cesarean section, and 728,500 of these were primary and/or first-time cesarean births. (Martin et al., 2018). A cesarean section is the birth of a fetus via an opening created by surgical incisions through the abdominal wall, abdominal cavity, and uterine wall (Lowdermilk, Perry, Cashion, & Alden, 2016). Of women considered low-risk, defined as delivering a singleton (one fetus), term (37 weeks or more gestation), cephalic (fetal occiput [head] first)] for their first birth, 25.7% out of 100 women had a first-birth cesarean delivery (Martin et al., 2018). This resulted in nearly 330,000 U.S. women who had an unplanned surgical first-birth (Martin et al., 2018). Unexpected surgical birth leads to an unanticipated longer postpartum recovery from

this major abdominal surgery compared to the typical recovery from a physiological vaginal birth (Thompson, Roberts, Currie, & Ellwood, 2002). These women must cope with the managing the anticipated post-birth symptoms along with the unexpected recovery symptoms related to surgery as well as juggle caring for a newborn around-the-clock while assimilating the new role of parent (Leahy Warren, 2005; Razurel, Bruchon-Schweitzer, Dupanloup, Irion, & Epiney, 2011; Wiegers, 2006).

Mothers who give birth by unplanned cesarean section, considered a major abdominal surgery, face weeks longer recovery than those giving birth vaginally and may require postpartum pain management just to accomplish their activities of daily living. The occurrence of an unexpected surgical recovery and the likely associated post-operative symptoms, can intensify what is already a typically stressful time of adjustment (Lobel & DeLuca, 2007). Furthermore, a cesarean birth means the forfeiture of an anticipated vaginal birth experience. This can precipitate a flood of emotions including guilt as women may grieve the loss of certain birth expectations (Fenech & Thomson, 2014; Puia, 2013).

Women may lack readily available support to help them during an unforeseen extended recovery. Furthermore, even when new mothers are provided with information and resources upon discharge, the reality of arriving home with a newborn can precipitate additional questions that may not have been addressed or contemplated while hospitalized. Experiencing doubts about being able to recognize problems or provide “correct” care for either self or the newborn can be commonplace. Consequently, if concerns emerge, information may be sought from internet sources or family or friends who may or may not offer accurate advice. Healthcare professionals may not be the initial “go-to” when new mothers seek information because they are often not

readily accessible. However, daily nursing support of new mothers may enhance maternal and/or newborn health during the vulnerable recovery period following childbirth.

This study proposed to describe the role of a nurse navigator as applied in the postpartum setting with first-time mothers who have an unplanned cesarean birth and investigate whether daily mobile messaging from a maternity nurse until four weeks following childbirth influenced the new mothers' postpartum recovery symptom experience. This chapter outlines the statement of the problem, the specific aims of the study, the guiding theoretical framework, the definitions of key concepts, the research questions, the assumptions, limitations, and delimitations. The chapter concludes with the significance of this study.

Statement of the Problem

Cesarean Birth

Childbirth is a natural process that has transpired for thousands of years. Numerous hormonal benefits exist for both the mother and her newborn when vaginal birth occurs (Buckley, 2015). For most women, the birth process happens without complications, yet many women receive medical interventions. Prior to 1900, the majority of births, regardless of whether attended by physicians or midwives, occurred in the home. In the early twentieth century when childbirth began to move from the home to the hospital and from midwife-attended to physician-attended births, the use of readily available medical interventions increased (Thomasson & Treber, 2008). A prevalent biomedical model of care culture continues to exist in the U.S. and is an approach to care that suggests childbirth be treated as an illness rather than a normal physiologic process (Davis-Floyd, 2001). This mindset contributes to the medicalization of childbirth, which is the implementation of interventions without justification or need ("Medicalize," 2014). The routine practice of implementing obstetrical interventions interferes

with the natural hormonal physiology of childbearing and hampers the progression of normal physiologic birth. Often the implementation of even one intervention precipitates a subsequent cascade of interventions that eventually may lead, if not immediately, then eventually, to the delivery of the fetus via a cesarean section (Hotelling, 2004), the surgical opening created in the lower abdomen (Lowdermilk et al., 2016).

One consequence of this medically driven approach is an overwhelming increase in the number of surgical cesarean sections during the previous two decades, which has consequently resulted in a decrease in the number of physiologic vaginal births. In 2016, the cesarean birth rate dipped slightly to 31.9%, the lowest since 2007 but was only slightly lower than the 32% rate noted in 2015 (Martin et al., 2018). As such, nearly one-third of all U.S. babies are born through a major abdominal surgical procedure.

The additional expenses associated with cesarean births compared to vaginal births may cost an estimated $2.5 billion more per year without any noted improvement in the incidence of maternal or neonatal mortality (Sakala & Corry, 2008), and cesarean sections continue to rank as one of the most common in-patient major surgeries performed in the U.S. (Boyle et al., 2013; Edmonds & Jones, 2013; Guise et al., 2010). With such a notable number of U.S. babies born by cesarean, it is not surprising that cesarean birth is often viewed as routine by not only healthcare providers but by many childbearing women as well; the perception that cesarean birth is as safe as vaginal birth is commonplace (Main et al., 2011).

Consequences. Cesarean births are associated with increased morbidity compared to vaginal births (Main et al., 2011). Although, cesarean birth is certainly a viable option when complications prevent a vaginal birth, it is considered major abdominal surgery and is not risk free for mothers or newborns (Menacker & Hamilton, 2010). The potential serious risks of

surgical birth are often not emphasized (Main et al., 2011). Cesarean births can precipitate short-term and long-term physiological, psychological, and emotional sequelae. Potential short-term maternal complications include hemorrhage, wound infections, surgical injury, longer hospitalizations, hospital readmissions, and difficulties establishing breastfeeding (Main et al., 2011; Menacker & Hamilton, 2010; Sakala & Corry, 2008).

Data delineating long-term consequences associated with cesarean births are limited. Long-term sequelae of cesarean births include chronic pain, surgical adhesions, ensuing fertility issues, complications in subsequent pregnancies including placental abnormalities, postpartum depression, and post-traumatic stress disorder, which can precipitate intentional infertility (American College of Obstetricians and Gynecologists et al., 2014; Main et al., 2011; Sakala & Corry, 2008).

In a meta-synthesis of ten qualitative studies published between 2000 and 2010, 3,721 women's cesarean birth experiences were examined by (Puia, 2013). The themes identified by (Puia, 2013) suggested that the birth experience remains significant to women even in emergent situations but may be disregarded by healthcare providers who are focused on achieving a healthy outcome for both mother and fetus. For some women a cesarean birth signals the loss of a desired vaginal birth experience that was prepared for and planned for months. This may be accompanied by various emotions as women accept the demise of their intended birth expectations.

Separation of mom and newborn following a cesarean birth is not uncommon in many hospitals. This delays immediate or early initiation of skin-to-skin contact between mom and newborn and interrupts the natural release of oxytocin that takes place during the hour or so following physiologic birth (Buckley, 2015). Placing the newborn skin-to-skin on the mother's

chest triggers the simultaneous release of oxytocin, known as the love or bonding hormone, in both the mother and the newborn. This promotes feelings of euphoria and love influencing the biologic bonding between them (Kennell & McGrath, 2005). This skin-to-skin contact facilitates peak oxytocin release benefitting newborn thermoregulation and breastfeeding initiation, decreasing maternal and newborn stress, and stimulating stronger uterine contractions which can decrease postpartum hemorrhage risk (Buckley, 2015). Decreased early contact with the infant following birth not only can initially contribute to decreased birth satisfaction and delayed breastfeeding initiation but can also result in long-term morbidity related to postpartum depression and post-traumatic stress disorder (Main et al., 2011).

When the normal physiology of childbearing is not supported, the release of natural occurring hormones can be inhibited which interferes with maternal and neonatal adaptation during the postpartum period (Buckley, 2015). The interruption can interfere with breastfeeding as well as maternal brain adaptations that promote maternal responsiveness to the newborn (Prior et al., 2012; Swain et al., 2008). These factors may impact the postpartum recovery of a new mother and may affect the symptoms experienced as well as her perception of these symptoms.

Recovery from cesarean birth can take weeks longer than recovery from a vaginal birth. Symptoms and concerns reported more often by women after cesarean birth compared to women after a spontaneous vaginal birth include extreme tiredness, breastfeeding issues, urinary tract difficulties, anemia, abdominal pain, abnormal bleeding, headache, constipation, and depression (Borders, 2006). Any of these issues can interfere with a woman's ability to care for herself or her newborn while recovering from a surgical birth.

Postpartum Adaptation

Women receive much attention from healthcare providers during pregnancy and childbirth, but once discharged from the hospital following birth, many do not return to their healthcare providers for follow-up until approximately four to six weeks later. Becoming a new parent can be a time of increased stress as women and their families juggle many responsibilities. First-time mothers must reconcile the reality of having a new baby in the home 24 hours a day from any unrealistic expectations they may have held previously. Newborn feeding schedules can interrupt nocturnal sleep often forcing new mothers to function in sleep-deprived states.

Learning to establish breastfeeding may take several weeks and can precipitate questions and concerns. Providing around-the-clock newborn care is a first for most new mothers. An unforeseen cesarean birth with its longer recovery and expected post-operative symptoms adds another dimension to the postpartum adaptation. These factors contribute to the demands associated during the postpartum period. Researchers noted that women who experienced an emergency cesarean section were more than three times likely to report trauma symptoms as well as a traumatic birth experience compared to women who had an elective cesarean birth (Gamble & Creedy, 2005). The emotional and psychological sequelae following an unplanned surgical birth can disrupt recovery and may have long-term consequences if unaddressed.

Approximately 50% to 80% of new postpartum mothers will experience the “baby blues” which are non-discriminatory when it comes to age, race, or ethnicity (McCarty, 2016). Symptoms such as crying without known cause, fatigue, anxiety, insomnia, sadness, headache, depression, and anger can begin a few days following childbirth but usually resolve by tenth day (McCarty, 2016). These symptoms can be exacerbated by a sleep-deprived state that is not uncommon when caring for a newborn. For approximately 10% to 15% of women, symptoms

persist and can progress to postpartum depression. These symptoms can interfere with functioning and the ability to care for oneself or the newborn and rarely resolve without professional assistance (Sherman, 2016).

Known breastfeeding benefits exist for both mother and infant and are augmented with breastfeeding exclusivity and extended breastfeeding duration (Mass, 2011; Office of the Surgeon General (U.S.), Centers for Disease Control and Prevention (U.S.), & Office on Women's Health (U.S.), 2011). In addition to the bonding experience, which can promote maternal role transition, postpartum breastfeeding mothers experience less uterine bleeding and quicker uterine involution as well as reduced risk of developing premenopausal ovarian and breast cancer, type 2 diabetes, hypertension, cardiovascular disease, or rheumatoid arthritis (Alden, 2016b).

In the U.S., 81.1% women initially breastfed their newborns born in 2013, the most recent data available (Centers for Disease Control and Prevention, 2016). Breastfeeding exclusivity, the feeding of an infant with only breastmilk and no supplementation with infant formula, juice, cow's milk, infant food, or sugar water (Bartick & Reinhold, 2010), is recommended as optimal for the first six months of life by a number of prominent professional healthcare organizations including the American Academy of Pediatrics, American Academy of Family Physicians, American College of Nurse Midwives, American College of Obstetricians and Gynecologists, Association of Women's Health, Obstetric and Neonatal Nurses, American Dietetic Association, and the American Public Health Association (Alden, 2016b; Office of the Surgeon General (U.S.) et al., 2011), but primiparous women may experience breastfeeding difficulties in the early postpartum period which contributes to less exclusive breastfeeding and even breastfeeding cessation (Alden, 2016b). By the end of six months, only 22.3% of infants

born in 2013 were still exclusively breastfed with overall breastfeeding rates declining to 51.8% (Centers for Disease Control and Prevention, 2016). The Healthy People 2020 target goals for breastfeeding at six months is 60.6% with breastfeeding exclusivity through six months set at 25.5% (United States Department of Health and Human Services, 2014).

Chantry (2011) found that 23% of the sample of 448 primiparous women were no longer breastfeeding at 2 months even though 90% had indicated their intention prenatally to breastfeed for more than 6 months. These primiparous new mothers expressed concerns about breastfeeding pain, infant feeding difficulty, milk quantity, infant intake, and exhibited low confidence (Chantry, 2011). Establishing breastfeeding in the early postpartum period is critical, and support is often essential (Centers for Disease Control and Prevention, 2016). Professional nursing support can be a viable resource to new mothers to help facilitate progression through the most challenging first few weeks of learning to breastfeed their newborns (Alden, 2016b). Timely access to this support during this vulnerable period of breastfeeding establishment may help to promote longer durations of breastfeeding and extended breastfeeding exclusivity.

Support Following Hospital Discharge

All women usually receive some form of discharge teaching prior to leaving the hospital; although, nurses and new mothers may differ on the priority of teaching content. New mothers' priorities for information focused on self-care in (Ruchala, 2000) study, while nurses tended to teach most often about infant care. During delivery of discharge education, 67% of postpartum nurses surveyed reported spending less than 10 minutes reviewing potential postpartum warning signs with women on the day of hospital discharge (Suplee, Bingham, & Kleppel, 2017). Moreover, multiple distractions exist during a new family's hospital stay. Distractions can precipitate preoccupation and easily prevent new mothers from being able to fully focus when

the information pertinent after discharge is presented by the nurse. In some instances, this presentation and review of information may even be interrupted by the newborn, other hospital personnel, or visitors. Therefore, recall of the instructions once discharged may prove challenging. After arriving home, the reality of caring for a newborn may precipitate additional questions that may not have been addressed or even contemplated while hospitalized.

Once mother-newborn dyads are discharged from the hospital, professional healthcare attention is focused on the newborn. Pediatric healthcare providers often require that newborns be evaluated within a few days following hospital discharge, yet women are often not seen for postpartum care until four to six weeks following childbirth, when a customary follow-up appointment is scheduled (Borders, 2006). The timing and content of postpartum care post-hospital discharge is not standard in the U.S., and up to 40% of women do not return for follow up healthcare after giving birth (American College of Obstetricians and Gynecologists, 2016). U.S. postpartum care is often fragmented and inconsistent (American College of Obstetricians and Gynecologists, 2016), so when concerns arise, women must take the initiative to seek healthcare assistance. Generally, healthcare providers do not routinely initiate contact with new mothers after hospital discharge.

Functional status after childbirth, defined as a mother's ability and readiness to assimilate her new role as mother with other responsibilities of self-care, household, job, social and community responsibilities, (Fawcett, Tulman, & Myers, 1988; Tulman & Fawcett, 1988) may take longer than the usual six weeks traditionally thought needed for childbirth recovery. Women may find it difficult and perhaps impossible to provide care for their newborns without additional assistance due to extreme tiredness exacerbated by interrupted sleep and low energy levels (Borders, 2006; C. A. McVeigh, 1997; Tulman, Fawcett, Groblewski, & Silverman, 1990).

This need creates challenges for all women but especially for those who have minimal resources or a limited support network.

New mothers benefit from active support systems during this transitional time, but not all new mothers enjoy support systems that are readily available throughout an unforeseen extended recovery precipitated by an unplanned surgical birth. Mobilizing extra support from family, friends or neighbors for this longer recovery period may prove challenging for many. Social support defined is the help offered and accepted from others (Fahey & Shenassa, 2013). Emotional support (feeling loved, supported, and encouraged) and instrumental support (supplying of material needs or tasks) are vital during the postpartum period (Fahey & Shenassa, 2013). Mothers have identified instrumental support as key to their recovery both physically and emotionally (Negron, Martin, Almog, Balbierz, & Howell, 2013).

Questions related to newborn care and self-care often arise for novice mothers. Experiencing doubts about being able to recognize problems or provide "correct" care for either self or the newborn are not uncommon. Consequently, as new mothers have concerns, they frequently seek information from those nearest to them who may or may not offer accurate advice. If new mothers happen to seek information from the internet or other electronic sources, different resources may provide contradictory data which can lead to confusion about what information is correct and optimal. Therefore, daily access to a Registered Nurse with maternity experience may offer a reliable resource for new mothers during this period fraught with many firsts, many concerns, and many questions as countless factors can impact recovery from childbirth for women.

Nurse Navigators

The concept of nurse navigation evolved from the original lay patient navigation pilot program developed by Harold P. Freeman in 1990 with a grant from the American Cancer Society. A primary goal of the program hoped to decrease cancer health disparities among marginalized populations by helping remove barriers to care from the time of initial suspicion of cancer to definitive diagnosis with timely treatment (Freeman, 2012; Wilcox & Bruce, 2010). Common barriers that historically interfered with access to care included lack of health insurance, lack of financial resources, complex and disconnected healthcare systems, cultural and communication difficulties, as well as patient fear and distrust (Freeman, 2012). A 2001 report released by the President's Cancer Panel indicated that access to cancer care barriers existed not only for the poor but across all American socioeconomic levels ("Oncology Nurse Navigator Core Competencies," 2013).

The concept of patient navigation has since expanded to include other chronic diseases and functions as an approach to help remove obstacles to receiving appropriate care "across the entire health care continuum, including prevention, detection, diagnosis, treatment, and survivorship to the end of life" (Freeman, 2012, p. 1614). This supportive care ultimately can improve outcomes for vulnerable patients (Freeman, 2012).

Patient navigation can be facilitated by laypersons, healthcare professionals, and even patients themselves when they are provided with tools and resources (Gilbert et al., 2011). Due to the nature of their education, training, and experience, professional navigator roles can be filled by social workers, registered nurses, and advanced practice registered nurses who are able to provide a high level of assistance, connection to resources, and support (Gilbert et al., 2011). Nurses with clinical expertise can function in a navigator role because they possess the ability to

clinically assess, communicate, educate, support, manage symptoms, anticipate needs, collaborate with clinicians, and initiate referrals, all contributions that provide tangible benefits for patients (Gilbert et al., 2011; Wilcox & Bruce, 2010). (Gilbert et al., 2011) fittingly portrays the value of a nurse in this navigator role:

> The nurse's knowledge and ability to intervene have a direct impact on the experience and outcomes of patients, including symptom management (e.g. pain, fatigue, insomnia), assessment of functional status (e.g. role functioning, ability to carry out usual activities) and psychosocial health (e.g. anxiety, depression, coping) . . . (p. 232)

Although this reference is to the nurse navigator's supportive care role within the cancer population, these benefits of a nurse navigator could be easily extended to a variety of patient care situations including vulnerable women recovering from childbirth during the postpartum period.

When the Oncology Nursing Society attempted to create standardization for the role of the Oncology Nurse Navigator, the Society met challenges due to the many existent variations of the role, the variety of education levels of persons functioning in the role, and the type of facility or community where the navigation was provided for patients ("Oncology Nurse Navigator Core Competencies," 2013). The Oncology Nurse Navigator evidence-based core competencies were delineated and consensus gained through a peer-review process. The competencies provide foundational concepts in the functional areas of professional role, education, coordination of care, and communication, and these outlined competencies serve to assist any nurse navigator or organization with development or expansion of patient navigation programs ("Oncology Nurse Navigator Core Competencies," 2013).

Nurse navigators help to address patients' psychosocial concerns as well as assist patients with informed decision making and problem solving (Wilcox & Bruce, 2010). Utilizing a nurse navigator during the postpartum period (termed a Postpartum Nurse Navigator [PPNN] for this study) can provide new mothers with quick access to a knowledgeable clinical resource to assist with postpartum health maintenance as well as address commonplace questions and concerns.

The ability of a Postpartum Nurse Navigator to reassure that a particular symptom or circumstance is commonplace can prevent the burden and cost of an unnecessary visit to the healthcare provider or the Emergency Department (ED) especially significant for new mothers with newborns. Conversely, confirmation by a PPNN that a certain sign or symptom is a potentially serious complication and warrants further evaluation can prompt quick delivery of needed medical care, which may mitigate and perhaps eliminate subsequent sequelae, important given that nearly 40% of U.S. maternal deaths occurs during Days 1 through 41 after childbirth (Creanga et al., 2017). A PPNN can use her clinical skills and expertise to assess and then even collaborate with a postpartum woman's healthcare provider should a situation arise that requires emergent medical attention.

A PPNN offering daily assistance to first-time mothers as they navigate the postpartum experience may offer benefits. Implementation could serve as a prime example of patient-focused care during the vulnerable postpartum period and may impact maternal/newborn health outcomes.

Specific Aims of the Study

Aim 1: To determine satisfaction with a nurse-navigated mobile messaging intervention in the early postpartum period with first-time mothers who have unplanned cesarean births.

Aim 2: To investigate the relationship between a daily interactive postpartum nurse-navigated mobile messaging intervention until four weeks' post-birth and the postpartum recovery symptom experience for first-time mothers who have unplanned cesarean births.

Aim 3: To test a daily interactive postpartum nurse-navigated mobile messaging intervention until four weeks' post-birth and explore the relationship between the intervention and perceived availability of social support among first-time mothers who have unplanned cesarean births.

Guiding Theory

This study was theoretically guided by Symptom Management Theory [SMT] (Dodd et al., 2001). The three main concepts of the theory include *symptom experience, symptom management strategies*, and *symptom outcomes/symptom status* (Larson et al., 1994). In 200l, Dodd et al. revised the model (Appendix L) and situated it within the influencing nursing science domains of person, health/illness, and environment. Some of the major assumptions of the theory include: the symptom experience is based on the perception and self-report of the individual experiencing the symptom, all bothersome symptoms need to managed, the model of SMT can be applied even if a symptom has not been experienced and is only a risk, and symptom management is an active and changing process that is guided by individual outcomes and effects from the nursing domains of person, health/illness, or environment (Dodd et al., 2001). Further elaboration of the theory's tenets is found in Chapter 3, Methods.

Symptom experience and *symptom management strategies* were the concepts of focus from SMT in this study. *Symptom outcomes/symptom status*, the other key concept in SMT, was not be examined for the purposes of this study. The perceived availability of social support, a factor from the environmental domain of the SMT model, was explored as well.

Definitions of Key Concepts

Cesarean birth – birth of a fetus via an opening created by surgical incisions through the abdominal wall, abdominal cavity, and uterine wall (Lowdermilk et al., 2016). The term cesarean birth connotes the same meaning as cesarean section or cesarean delivery, also referred to as a C-section.

Mobile Messaging – the ability to use an electronic or cellular device to communicate a message to an individual or group who possess electronic or cellular devices, also referred to as text messaging and/or texting.

Nurse-Navigated Mobile Messaging – For this study, interactive mobile messaging was implemented by a Postpartum Nurse Navigator (PPNN) during a specified daily time frame. The PPNN responses were guided by clinical expertise and decision-making protocols and were individualized to each subject. The daily mobile messaging by the PPNN was individually focused for each subject and address subjects' specific questions. Automated text messages were not used for this study.

Postpartum – the recovery period of time between childbirth and the return of the woman's reproductive system to a nonpregnant state (Alden, 2016c) an approximate six to eight week period of time that begins with the birth of the baby and the subsequent expulsion of the placenta (Fahey & Shenassa, 2013).

Postpartum Nurse Navigator (PPNN) – defined for this study as a professional registered nurse with maternity specific clinical knowledge who offers daily, individualized assistance to women following childbirth via mobile messaging until four weeks' post-birth. Using the nursing process, a PPNN assesses symptoms, determines priority needs, provides education and resources to facilitate informed decision making, assists with navigation through the postpartum

symptom experience, makes healthcare referrals as warranted, and offers timely access to quality health and psychosocial care during the postpartum recovery and adaptation period. Definition adapted from the Oncology Nursing Society's core competencies for Oncology Nurse Navigators ("Oncology Nurse Navigator Core Competencies," 2013).

Postpartum symptom experience – a woman's perception of experienced symptoms, appraisal of their significance, and her reactions to the symptoms during the postpartum recovery and adaptation period. Adapted from (Dodd et al., 2001).

Primigravida – "a woman who is pregnant for the first time" (Alden, 2016a, p. 283).

Primipara – "a woman who has completed one pregnancy with a fetus or fetuses who have reached 20 weeks of gestation" (Alden, 2016a, p. 283).

Primiparous – having given birth for the first time ("Primiparous," 2016).

Symptom – "a subjective experience reflecting changes in the biophysical functioning, sensations, or cognition of an individual" (Dodd et al., 2001 p. 669).

Symptom experience – "an individual's perception of a symptom, evaluation of the meaning of a symptom, and response to a symptom" (Dodd et al., 2001, p. 671).

Symptom management strategies – "the specifications of what (nature of the strategy), when, where, why, how much (intervention dose), to whom (recipient of intervention) and how (delivered)" (Dodd et al., 2001, p. 673) as well as who (delivers). Symptom management strategies attempt to prevent, defer or diminish the symptom experience (Humphreys et al., 2008).

Symptom status outcomes – the specific and measurable outcomes that indicate whether a symptom is less frequent, less severe, or less distressing and are assessed after a symptom

management strategy has been implemented (Humphreys et al., 2008) and can influence and be influenced by the symptom experience and symptom management strategies (Dodd et al., 2001).

Term gestation – birth occurring after 37 weeks of gestation.

Unplanned cesarean birth – birth of a baby via a surgical operation (cesarean section) that resulted when a planned and expected vaginal birth did not occur. Defined for the purposes of this study as a cesarean section operation that was not scheduled prior to a subject's hospital admission, occurred in either an emergent or non-emergent fashion, and occurred prior to or after labor contractions began.

Research Questions

Research Question I: During the initial postpartum period, do first-time mothers who have unplanned cesarean births express satisfaction with the experience of a daily, interactive mobile messaging from postpartum nurse navigators?

Research Question II: Does the postpartum symptom experience of primiparous women who have an unplanned cesarean birth differ between those who receive a daily nurse-navigated mobile messaging intervention until four weeks' post-birth and those who do not?

Research Question III: Does perceived availability of social support for first-time mothers who receive a daily nurse-navigated mobile messaging intervention until four weeks' post-birth vary from those who do not?

Assumptions

Assumptions are beliefs based on reason and viewed to be true without verified proof (Ellis & Levy, 2009; Polit & Beck, 2008). Although assumptions cannot be controlled by the researcher, they can bear relevance on a study and should be identified and considered (Ellis & Levy, 2009). The following assumptions were made in this study. The researcher assumed that

subjects would want to share their postpartum symptom experience. This assumption was based on the researcher's anecdotal experiences that many women willingly share their childbirth experiences candidly. The researcher assumed that subjects would willingly respond to the demographic questionnaires and instrument surveys used in the study with honest and truthful responses. This assumption was based on the efforts implemented when designing the study to protect subjects' confidentiality and anonymity.

The assumption was made that unplanned cesarean surgical first-births may give rise to unanticipated recovery occurrences during the postpartum period. This assumption was based on the fact that unexpected surgical births by nature would likely precipitate symptoms during the postpartum period that were not anticipated beforehand by women. Another assumption was that first-time mothers would be willing to accept nurse mobile-messaging support following childbirth. This assumption was based on the researcher's past maternity nursing experience with new mothers who in the initial days following childbirth often have numerous questions about their own care, newborn care, and breastfeeding.

An assumption associated with the post-positivist paradigm, which was the quantitative approach taken in this study was that reality is objective, ordered, non-random, able to be observed and not a figment of the human mind (Polit & Beck, 2008). By delineating the study's assumptions, they can be considered when examining the study's findings (Ellis & Levy, 2009).

Delimitations

Primiparous women who had vaginal births and women who had any previous birth experience including a fetal loss after 27 weeks of gestation were excluded from this study in an effort to control for the potential confounding influences of non-surgical birth, prior birth, and a previous experience of a third trimester stillbirth. Women who did not speak, read, or write

English were excluded due to the nature of the designed mobile messaging intervention and the inability for this the PPNN to translate and back-translate during each texting interaction.

Women who did not have access to the internet at home or through a community library or community business and did not have use of an electronic device with texting capability were not invited to participate in the study. After the initial data collection, subjects required the ability to access the internet, either through their personal electronic device or via a community resource such as a public library computer, in order to complete the study's demographic questionnaire and two instruments at the 2 weeks and 4 weeks' post-birth follow-ups. All subjects were required to have daily access to an electronic device (cell phone or electronic tablet) with texting capability in order to be able to receive and reply to the interactive mobile messaging intervention with the PPNN in case they were randomly assigned to the intervention group.

Significance and Summary

Childbirth and the postpartum recovery period bring about many transitions for first-time mothers and can precipitate many emotions. Many women are adjusting their routine schedules to meet the demands of a newborn while also learning to breastfeed and simultaneously attend to their own self-care needs. These first-time circumstances can lead to exhaustion and feeling overwhelmed. A sleep-deprived state, common during this time, can exacerbate the challenges. Those who have an unexpected cesarean birth may also contend with the post-operative symptoms, such as abdominal incisional discomfort, generalized pain, constipation, and difficulty with mobility, in addition to the expected childbirth recovery symptoms. These women will face a longer recovery compared to recovery from an uncomplicated vaginal birth.

Nursing care of mothers during the postpartum period and postpartum health has historically commanded the least attention of the childbearing cycle compared to pregnancy and birth both clinically and in the research arena. Although healthcare of women during the time of pregnancy and childbirth is intensified, once women are discharged from the hospital, they often do not follow-up with a healthcare provider for at least four to six weeks following birth if they return for follow-up at all. Up to 40% of women do not return for follow-up care because of lack of maternity leave, child care, or transportation, or they are too overwhelmed with infant care obligations (American College of Obstetricians and Gynecologists, 2016; "Many nurses lack knowledge of health risk to mothers after childbirth," 2017). Therefore, an extended period of time can elapse between hospital discharge and subsequent contact with the healthcare provider unless a woman or her family determines that more immediate healthcare is needed and choose to seek care. With the potential for complications that might require prompt healthcare and even hospital readmission the highest in the first 30 days following childbirth (Clapp et al., 2016) and especially with nearly 40% of U.S. maternal deaths occurring on postpartum Days 1 through 41 (Creanga et al., 2017), attention to the postpartum recovery period is critical.

Following hospital discharge, first-time mothers often have questions related to their newborn or their own recovery and whether the matter should be expected or of concern requiring further evaluation. If they are also breastfeeding their newborn, questions may arise that were not concerns when they had professional nurse and lactation support while still in the hospital.

No evidence of testing the concept of utilizing nurse navigators to provide interactive text messaging via mobile devices for a maternity postpartum population of first-time mothers was identified in the literature. Convenient access to a professional maternity nurse may offer a

viable option to provide support to new mothers and may foster maternal health which can indirectly or directly impact newborn health during the vulnerable postpartum period. Maternal health can also have an influence on both short and long-term family health (Cheng et al., 2006). The availability of a professional nurse via texting can begin to bridge the existing gap from hospital discharge until scheduled follow-up care, often not until four to six weeks after birth.

This study tested the novel idea of using a maternity nurse in the role of Postpartum Nurse Navigator (PPNN) to offer daily support, education, problem-solving assistance, reassurance, and connection to needed resources through technology-based mobile messaging (texting) to women in the intervention group during their postpartum recovery and adaptation. Use of this technology offered first-time mothers handy access to reliable information from a healthcare nursing professional without the need to ever leave the comfort of their home environment. The potential for healthcare cost savings existed when personal attention from the PPNN addressed concerns and prevented unnecessary trips to healthcare providers or EDs. Even more importantly, the direct and indirect potential cost savings cannot be calculated when potentially serious postpartum complications were mitigated due to the early recognition by the PPNN of symptoms that warranted referral for prompt healthcare attention.

Investigating whether this nurse support influences the first-time mothers' postpartum symptom experience or their perception of social support offered insights for consideration for future postpartum support programs for mothers and newborns. The potential long-term influence of facilitating a healthy start for newborns and an uncomplicated childbirth recovery for new mothers cannot be undervalued or ignored. The findings from this study add to the limited extant literature/evidence on facilitating women's health during the postpartum period. The findings help inform the development and refinement of the PPNN role.

Chapter Two: Literature Review

This chapter will include the review of the literature on transition to motherhood, unplanned cesarean birth, postpartum symptom experience, postpartum social support, and nurse navigators. The databases utilized for this literature search comprised CINAHL Complete, PubMed, PsycINFO, ONESEARCH, the Cochrane Library, and the Social Sciences Citation Index. Keywords utilized included postpartum, cesarean, social support, postpartum symptoms, symptom management, unplanned cesarean, emergency cesarean, postpartum support, nurse support, telephone support, texting support, mobile messaging, nurse navigator, and maternity nurse navigation. All literature reviewed was written in English, and searches were not intentionally delimited by year. The gaps noted in the literature will be outlined to support the need for this proposed research.

Transition to Motherhood

In exploring first-time mothers' experiences at six weeks postpartum, mothers reported not feeling prepared for the realities of motherhood including the difficulties associated with providing round-the-clock newborn care, the extreme fatigue experienced, the lack of time for other activities, and the crucial need for support from significant others (C. McVeigh, 1997). Interestingly, 41% of the 88 new mothers shared they had no additional assistance following their baby's birth, and 22% identified lack of social support as an handicap in their postpartum recovery (C. McVeigh, 1997).

Childbirth can impact the functioning of a new mother. Studies examined the functional status of mothers and at six weeks postpartum none of the mothers reported functioning at full capacity (C. A. McVeigh, 1997; Tulman et al., 1990). Functional status was defined "as the woman's readiness to assume infant care responsibilities and resume her usual activities"

(Tulman et al., 1990, p. 70). Women experienced interrupted sleep and lower energy levels which contributed to her well-being and return to full functional status (Tulman et al., 1990).

The transition to motherhood can be a time of significant change for women. Postpartum women must adjust to caring for a new baby while managing post-birth symptoms that may interfere with optimal functioning.

Unplanned Cesarean Birth

Data concerning long-term consequences related to cesarean births is not abundant. Possible physical and psychological long-term costs of cesarean births including chronic pain, surgical adhesions, subsequent fertility issues, complications in subsequent pregnancies, and neonatal respiratory problems including the development of asthma later in life have been identified (Main et al., 2011; Sakala & Corry, 2008). Cesarean births can lead to complications surrounding placental implantation in subsequent pregnancies which increases the risk for substantial hemorrhage, bowel and bladder injury, hysterectomy, intensive care admission, blood transfusions and even death (Main et al., 2011; Sakala & Corry, 2008).

Initial psychological sequelae can result from decreased early contact with the infant following birth, decreased birth satisfaction, and delay of breastfeeding initiation but can also include long-term morbidity related to postpartum depression and post-traumatic stress disorder resulting in voluntary infertility (Main et al., 2011). In a meta-synthesis of ten qualitative studies published between 2000 and 2010, 3,721 women's cesarean birth experiences were examined by (Puia, 2013). Women identified the following six themes: scared to death, in your hands, out of control, broken body and soul, empty heart and arms, and shattered dreams (Puia, 2013). Women reported they did not feel included in the decision making and therefore felt left out and out of control during emergency cesareans leaving them to reconcile the loss of previously

planned birth expectations while the healthcare team seemed to be focused only on the goal of a physically health mother and baby (Puia, 2013). These themes suggest there is more to birth than the outcome of a healthy mother and baby.

Gamble and Creedy (2005) recruited 400 women in the third trimester of pregnancy for their study examining the influence of negative birth experiences on the development of acute trauma symptoms post-birth. Women were interviewed within 72 hours of birth prior to hospital discharge and by telephone at four to six weeks post-birth. Of 348 women subjects screened post-birth, 103 (30%) reported experiencing a traumatic birth regardless of their mode of delivery with emergency cesarean delivery influencing the development of acute trauma symptoms in approximately 73% of the women (Gamble & Creedy, 2005). In women who developed acute post-traumatic stress disorder symptoms post-birth, one-third of the women delivered by emergency cesarean birth (Gamble & Creedy, 2005).

Experiencing an unplanned or emergency cesarean birth not only impacts physical symptoms experienced post-birth but can precipitate unexpected emotional and psychological symptoms during the postpartum period. Unanticipated postpartum symptoms can influence birth recovery as well as a women's ability to care for herself or her newborn.

Postpartum Symptom Experience

Many women experience a variety of symptoms following childbirth. Of the 200 Canadian women interviewed at eight to ten weeks postpartum, 96% stated the presence of at least one physical symptom (Ansara, Cohen, Gallop, Kung, & Schei, 2005).

In a study of 2413 Swedish women (44% primigravidas) who completed a demographic questionnaire prenatally around 16 weeks gestation and then completed mailed questionnaires about postpartum physical symptoms experienced at four to eight weeks and at a year following

childbirth, tiredness was the most commonly reported symptom: 63.8% at four to eight weeks postpartum and still 57.8% one year after childbirth (Schytt, Lindmark, & Waldenström, 2005). Post-operative pain was reported by one-third of the primiparas who had cesarean sections at 4 to 8 weeks postpartum (Schytt et al., 2005). Although most primiparous women considered their problems minor and not major, more than 20% were bothered by headaches, neck and shoulder pain, low back pain and dyspareunia (painful sexual intercourse) at four to eight weeks postpartum, and more than 10% complained of minor and 4% complained of major problems with sleeping, sore nipples, breast engorgement, hemorrhoids, and constipation (Schytt et al., 2005). Twelve percent of primiparas reported tiredness as a major problem and 9.1% reported dyspareunia to be a major problem at four to eight weeks after childbirth (Schytt et al., 2005). Many of these same symptom complaints have been noted by other researchers as well (Ansara et al., 2005; Saurel-Cubizolles, Romito, Lelong, & Ancel, 2000; Thompson et al., 2002).

In spite of the symptom complaints, 92% primiparous women rated their health as ‘very good’ or ‘good’ at two months post-birth perhaps suggesting that physical symptoms following childbirth is expected to a certain extent and only temporary (Schytt et al., 2005) . One year after childbirth only 13% primiparas reported no symptoms while more than 10% of the sample of both primiparas and multiparas reported four or more symptoms (Schytt et al., 2005).

Interestingly this study did not explore psychological symptoms. A reported limitation by the researchers was the differing time intervals assessed, a four week time frame from four to eight weeks postpartum and only the one week prior to completing the questionnaire at one year after the birth (Schytt et al., 2005). Additionally, the questionnaire utilized by researchers at one year differed from the questionnaire used to assess the four to eight postpartum time frame. The questionnaire utilized at one year was developed by the researchers after the first postpartum data

collection and included a more specific list of symptoms; however, this questionnaire did not list some of the symptoms initially reported by subjects thus interfering with follow-up at one year (Schytt et al., 2005). This may explain why no information was provided regarding whether post-operative pain was still a concern for the one-third of primiparous women who had cesarean births that reported this pain at four to eight weeks postpartum.

These results from (Schytt et al., 2005) were similar to the findings from a longitudinal study in France and Italy with over 50% of women (589 in France and 697 in Italy) reporting backache, anxiety, and extreme tiredness 12 months after their childbirth (Saurel-Cubizolles et al., 2000). Symptoms were noted to increase from 5 months postpartum to 12 months in both countries (Saurel-Cubizolles et al., 2000).

Researchers examined qualitative data from comments about postpartum issues taken from the 2000 Pregnancy Risk Assessment Monitory System (PRAMS) survey submitted by new mothers 2 to 9 months after birth (Kanotra et al., 2007). Of the 15,914 women who completed the survey from the 10 states chosen for the sample (their data was available at the beginning of the study), only 21% or 3,417 added comments, and only 9.5% (324) of these women mentioned postpartum challenges (Kanotra et al., 2007). The women commenting on postpartum concerns were more likely to be 25 years or older, white, non-Hispanic, more than a high school education, married, and not receiving Medicaid insurance, and 42.9% of the respondents were primiparas (Kanotra et al., 2007). From the qualitative analysis, six themes emerged. Almost one-third of the women identified the necessity for social support following hospital discharge, 23.5% cited breastfeeding concerns, and 21% desired more instruction on how to care for a newborn (Kanotra et al., 2007). Women mentioned that support groups for new mothers, nurses, doctors, or experienced mothers to assist with alleviating fears would have been beneficial

during the early postpartum period, and mothers who received support from established support programs commented that they were invaluable (Kanotra et al., 2007). A particularly striking comment from one respondent regarding desire for more newborn care education summarized needs that are likely desired of other new mothers:

> I wish someone, a nurse or doctor, would have given me more information on what it would be like when I brought the baby home. Maybe even some information packet on crying, fevers, vomiting, rashes and etc…You can't always get a hold of your doctor and you can't afford to go to the Emergency Room all the time. I felt like no one cared about me or the baby after you go home. (Kanotra et al., 2007, p. 553)

While this study reported noteworthy concerns of mothers, a large proportion of respondents chose not to comment, so the findings are not necessarily representative of the sample, which is a limitation (Kanotra et al., 2007).

In a critical review of postpartum health care in the U.S., Cheng et al. (2006) noted a high prevalence of fatigue and tiredness among postpartum women and fatigue was noted to positively correlate to postpartum symptoms of depression and breastfeeding issues. Perineal, cesarean incisional, back, and head pain were found to still be significant at 2 months postpartum for a number of women (Cheng et al., 2006). Certainly pain of any type can potentially interfere with a mother's timely attention and care of her newborn (Cheng et al., 2006). In the *Listening to Mothers III: New Mothers Speak Out* follow-up survey, researchers found that 56% women still experienced pain that interfered to some degree with their normal activities 2 months after their birth (Declercq, Sakala, Corry, Applebaum, & Herrlich, 2013).

The overall symptom experience was examined during late pregnancy (Beebe, Gay, Richoux, & Lee, 2017). These researchers also investigated the overall symptom experience in

152 women at one, two, and three months postpartum, but those results have not been published in the literature yet (K. Lee, personal communication, January 6, 2016). Postpartum symptom outcomes previously examined by researchers often focused on a specific symptom or a group of symptoms while information related to the overall symptom experience in women during the postpartum period has not been reported.

Social Support for Postpartum Women

Social support encompasses assistance that is offered to and accepted from others (Fahey & Shenassa, 2013). Feeling loved, supported, and encouraged, considered emotional social support, and the supplying of material needs or tasks which is instrumental or tangible social support have been identified as significant needs during the postpartum period (Fahey & Shenassa, 2013). In a qualitative study to ascertain mothers' views on social support during the postpartum period, 33 mothers of diverse ethnicities and races, who were six to 12 months postpartum and who had previously participated in a postpartum depression randomized trial, were recruited to be participants in one of four focus groups (Negron et al., 2013). The mothers' ages ranged from 22 to 43; although the sample was racially diverse, mothers were assigned to homogenous focus groups to better capture group member's shared experiences (Negron et al., 2013). Four major themes were identified by participants: mother's major needs and challenges postpartum, social support expectations and providers of support, how mothers mobilized support, and barriers to mobilizing support (Negron et al., 2013). Being able to accomplish self-care needs such as eating, sleeping, and bathing as well as the household responsibilities of cooking and cleaning strengthened mothers' capability to deal with expected postpartum physical and emotional stressors, while discomforts associated with breastfeeding and pain related to cesarean delivery created hindrances to recovery (Negron et al., 2013).

Mothers identified instrumental support as vital to both their physical and emotional recovery (Negron et al., 2013). Support was expected from families and lobbied for when needed in African American and Latina women, while white women's family members seemed to be less involved so they arranged assistance from nurses and other caregivers (Negron et al., 2013). Latina Spanish-speaking women had limited social support networks and had to depend on their partners to meet their support needs (Negron et al., 2013). African American and Latina mothers expressed that support from their families and others should be offered without having to ask for it, and mothers from all race/ethnicities perceived having to ask for help as an indication that were not capable to handle parenting and associated recovery demands (Negron et al., 2013).

Other barriers that interfered with mothers being able to assemble the support they needed included independence and perceived criticism feeling like they would be burdensome to others by doing so (Negron et al., 2013). The researchers suggested that augmenting support from family should be the target of future postpartum interventions (Negron et al., 2013).

Sixty-two primiparous women interviewed in their homes at six weeks postpartum by research midwives identified material support as a tremendous need in the postpartum period following hospital discharge, while they considered emotional support as most important in the early postpartum period, one to four days following birth (Razurel et al., 2011). The postpartum women in this study expressed dissatisfaction with the social support given by health professionals indicating it did not meet their needs during this early postpartum period (Razurel et al., 2011). Study participants shared that healthcare professionals did not seem to listen, gave contradictory information, and offered no solutions for some of the concerns encountered with their newborns or breastfeeding during this time (Razurel et al., 2011).

In a systematic review of 22 randomized controlled trials of postpartum support interventions tested to improve mental health, physical health, quality of life, and parenting, no evidence was noted that the support improved these outcomes in low-risk populations of postpartum women (Shaw, Levitt, Wong, Kaczorowski, & The McMaster University Postpartum Research Group, 2006). Interventions included nurse home visits, nurse telephone calls, telephone-based and community peer support from trained mothers, follow-up visits with midwives or physicians, education by health professionals, written instructions, self-help manuals, and individualized debriefing sessions by trained midwives (Shaw et al., 2006).

Postpartum women desire social support following childbirth. The type of social support that best meets women's needs, whether emotional, instrumental, or even informational, depends on the timing of the support or when during the postpartum period it is offered.

Electronic Support

Telephone support. In a Cochrane review of telephone support during pregnancy and he first six weeks postpartum, authors concluded from 27 randomized trials that included 12,256 women that although the evidence was promising, it was not conclusive or consistent to recommend telephone support for pregnant or postpartum women (Lavender, Richens, Milan, Smyth, & Dowswell, 2013). No studies compared different types of telephone support such as personal calls verses text messaging, and the two trials that utilized text messages, the messages sent to women were automated (Lavender et al., 2013).

Dennis and Kingston (2008) conducted a systematic review of telephone support for women during pregnancy and the early postpartum period and evaluated the postpartum outcomes of breastfeeding duration and exclusivity and symptoms of postpartum depression. A beneficial effect of telephone support as a primary versus adjunct intervention was noted on

breastfeeding exclusivity at 0 to 4 weeks and 9 to 12 weeks but not at 5 to 8 weeks or 17 to 24 weeks, on increasing breastfeeding duration, and on decreasing symptoms of postpartum depression (Dennis & Kingston, 2008). Potential weaknesses noted in the 14 trials reviewed included that the majority of the trials did not report the efforts expended to ensure the standardization of the telephone intervention delivery, maternal evaluation of the acceptability of the intervention was not explored, and only a few of the supportive interventions were appropriately theoretically based, which may have contributed to less noted intervention effectiveness (Dennis & Kingston, 2008). The findings suggested that telephone support may be beneficial for new mothers.

In a study offering a free 24-hour telephone hotline staffed by midwives to 353 women in Lebanon, 84 women (24%) used the service, with 60% of these women calling the hotline at least one more additional time after their initial contact (Osman, Chaaya, El Zein, Naassan, & Wick, 2010). This service was available to women for four months after childbirth, and utilization of the service was noted to be highest during the first four postpartum weeks (Osman et al., 2010). Routine infant care questions accounted for 60% of questions related to infants with 23% of the questions related to concerns with infant crying or fussiness (Osman et al., 2010). The most common maternal related questions involved breastfeeding concerns (66%); all callers reported satisfaction with use of the service (Osman et al., 2010).

Use of telephone support during the postpartum period has demonstrated positive outcomes, although the evidence has not been found to be consistent. Lack of standardization of types of telephone support contribute to the difficulty in determining effectiveness.

Mobile messaging support. Communicating via mobile messaging is commonplace. The number of U.S. cell phone owners now equals 95% with smart phones accounting for 77%

of the total. Even 92% of those earning less than $30,000 own a cell phone with 67% in this demographic owning the more costly smart phone ("Mobile Fact Sheet," 2017). Cell phone use does not appear to be limited by race or income, and nearly one-third of Americans indicated that live in a household with three or more smart phones ("Mobile Fact Sheet," 2017). Furthermore, many people conveyed that cell phones were the primary device used to access the internet (Pew Research Center, 2015). In a Community Engagement Studio funded by Vanderbilt Institute for Clinical and Translational Research (VICTR), low-income African American and Latino women shared they preferred phone communication, had access to unlimited texting, and voiced no concerns about data usage (J.C. Phillippi, personal communication, December 2015).

With cell phone use becoming more commonplace and a preferred mode of communication with many users, the use of mobile technology continues to rapidly expand in the healthcare arena. In a telephone survey of 2,252 adults in 2013, 81% of respondents reported using their cell phones to send and receive text messages making texting the most common reason owners used their cell phones (Duggan, 2013). In a 10-question survey of 101 postpartum patients, average age 30 years, 97% had the ability to send text messages and 69% would feel comfortable texting questions of a nonurgent nature to their physician, yet only 26.7% indicated a willingness to pay for a text or email service (Welch & Thomas, 2014).

In a systematic review of 48 studies using text messaging for maternal and infant health, none of the studies reviewed for the postpartum and infant care period included populations of postpartum women (Poorman, Gazmararian, Parker, Yang, & Elon, 2015). Interventions in these studies targeted behavior change (weight loss), health promotion (increasing physical activity and vaccination rates), or health improvement (depression) for study populations of adult men and women, students, pregnant women, and parents (Poorman et al., 2015). Text messaging

positively impacted outcomes in some of the randomized controlled trials showing significant differences between the intervention and control groups in weight loss, decrease in BMI, increase in activity, experience of more positive thoughts, and receipt of the influenza vaccine (Poorman et al., 2015). None of the interventions in studies included in the review used text messaging as a way to offer maternal social support. Motivational messages seemed to demonstrate more long-term success over informational or educational messages (Poorman et al., 2015).

Many of the studies identified in the literature that employed mobile messaging use in healthcare incorporated automatic text messages to subjects. Very few studies used two-way texting, and no studies identified used interactive mobile messaging in real time to deliver patient-focused support to postpartum mothers. A systematic review of 75 controlled trials identified no studies utilizing mobile messaging with postpartum women, and mobile messaging in the studies reviewed targeted health behavior change or disease management (Free et al., 2013). One program TEXT4baby sent standardized messages during pregnancy and after childbirth. The postpartum messages primarily targeted newborn care with emotional support for women (Whittaker et al., 2012). The focus of the TEXT4baby program was to reinforce and supplement the education participants received from healthcare providers and to inform new mothers options for improving the health of themselves and their babies (Evans, Abroms, Poropatich, Nielsen, & Wallace, 2012; Jordan, Ray, Johnson, & Evans, 2011). The content of TEXT4baby automated messages sent during the postpartum period contained educational information correlated with the age and development of the baby (Jordan et al., 2011).

The use of mobile messaging demonstrated positive outcomes in some studies. No studies were identified that used interactive texting with a healthcare professional in real-time to provide support to first-time mothers following an unplanned cesarean birth.

Nurse Navigators

In a randomized controlled trial of 251 newly diagnosed primary breast, colorectal, and lung cancer patients where 118 patients received enhanced usual care and 133 patients received nurse navigator support for 4 months, researchers found that the intervention group patients scored significantly higher on the three subscales of the Patient Assessment of Chronic Illness Care instrument and reported fewer problems with care particularly psychosocial care (Wagner et al., 2014). No significant differences between groups were noted in quality of life, functional assessment of cancer therapy, or cumulative costs after diagnosis, although nurse navigator patients reported more positive experiences with less care problems without increased costs (Wagner et al., 2014).

Researchers found that in a non-equivalent control group pretest-posttest designed study of 78 participants with cancer in Korea, significant differences existed in physical and social functioning with the nurse navigator patients faring better after the 12-week care coordination program (T. Lee et al., 2011). Other significant findings included more satisfaction with care and less hospital days for the intervention group of nurse navigator patients (T. Lee et al., 2011). A definite limitation of the study was the noted attrition rate of 47.0% in the intervention group and 60.9% in the control group (T. Lee et al., 2011).

Patients in the cancer populations have reported satisfaction and positive experiences with nurse navigator support. No research studies using nurses to assist women while navigating symptoms following childbirth were identified.

Summary and Gaps in the Literature

Much postpartum health research has focused on specific symptoms such as postpartum depression or fatigue. These are vital to explore, but there are numerous other postpartum health issues that need to be examined. No published studies were identified that investigated the overall postpartum symptom experience. Research is needed to provide evidence to support and develop interventions that support new mothers' health and postpartum recovery.

Mobile messaging is widely used, has been tested among postpartum women, and can reach most mobile phones regardless of phone type or cellular service provider (Chilukuri et al., 2015; Rhyne & Borawski, 2014). The use of nurse-navigated, interactive, customized, patient-centered texting to support postpartum health in women following childbirth was not identified in the literature. The potential exists to use this technology to connect with women following childbirth who may have less access to convenient care, such as those living in rural areas as well as those residing in underserved healthcare regions. A mobile messaging intervention can decrease accessibility barriers as well as patient burden of unnecessary trips to a healthcare provider. As such, it offers an available and viable option as a communication tool between healthcare providers and patients.

Sub-optimal maternal health affects newborn health (Cheng et al., 2006). Studies have shown that women desire support in the postpartum period. Using a nurse in the role of Postpartum Nurse Navigator is novel and has not been tested in a postpartum population before. The science exists in oncology. Daily mobile messaging to women in the early postpartum period is patient-centered because it is individualized and focused specifically on the new mothers' concerns and needs. It can offer continuity of care between the existing gap from hospital discharge to the women's return for a routine follow-up visit with the healthcare

provider after childbirth. These factors can help to support and promote postpartum health. This study can contribute and add to what is known in the area of postpartum care for women who have unplanned first-birth cesareans.

Chapter Three: Methods

In this chapter, the philosophical stance, the theoretical framework, the research design, and the specific methods for conducting this study are presented. The instruments used in data collection, the strategies for maintaining intervention fidelity, the measures employed for the protection of human subjects, and the data analyses used to examine the study results are described.

Philosophical Stance

This philosophical stance for this study falls within the post-positivist paradigm. The post-positivist worldview is often referred to as the scientific method. "The knowledge that develops through a post-positivist lens is based on careful observation and measurement of the objective reality that exists 'out there' in the world" (Creswell, 2009, p. 7).

From a post-positivist perspective, research inquiry uses a theoretically-guided framework, and collected data supports or refutes the guiding theory (Creswell, 2009). The focus remains objective. The obligation exists to observe and measure reality as well as to investigate cause and effect (Keele, 2010; Powers & Knapp, 2011). Explanations are sought for any associated conditions connected to the phenomenon of interest, and any observed causal relationships are described (Creswell, 2009).

This is the appropriate stance for this study because the study was theoretically-guided by the Symptom Management Theory (Dodd et al., 2001). In this study, the investigator measured the postpartum recovery symptom experience and perception of social support for first-time mothers who had unplanned cesarean births by using previously validated objective measurement instruments that the subjects completed without assistance. Differences between the intervention and control groups were explored through the statistical analyses.

Theoretical Framework

The Symptom Management Theory (SMT) (Dodd et al., 2001) served as the guiding theoretical framework for this research study. The Theory of Unpleasant Symptoms [TOUS] (Lenz & Pugh, 2008) was also considered as a potential theoretical framework. The outcome concept for TOUS is performance. Since symptom experience rather than performance was chosen as the outcome of interest for this study, the investigator determined SMT was a more fitting theoretical guide.

A model for Symptom Management was first introduced in 1994 by the Symptom Management Faculty Group from the University of California, San Francisco's School of Nursing. The three major concepts of SMT are *symptom experience*, *symptom management strategies*, and *symptom outcomes/symptom status* (Larson et al., 1994). The bidirectional arrows between the three major concepts within the model represent a simultaneous interaction between all of the concepts (Humphreys et al., 2008). The authors conceptualized symptom experience as affecting and being influenced by both symptom management strategies and symptom status outcomes (Humphreys et al., 2008). Awareness of a symptom or symptoms can precipitate use of self-initiated strategies which can alter the individual's perception of the symptom(s), although self-management may not relieve more distressing symptoms causing the individual to seek additional sources for symptom management strategies (Humphreys et al., 2008). If symptoms do not stabilize or resolve, the iterative cycle continues (Humphreys et al., 2008).

In the revised 2001 model (Dodd et al., 2001) [Appendix L], the entire original model is positioned strategically within spheres of the domains of nursing science – person, health/illness, and environment. These domains are depicted as contextual variables influencing all three

dimensions or concepts of the model (Dodd et al., 2001). Contextual variables from the person domain include influences from the demographic, psychological, sociological, and/or physiological perspectives of the individual. Variables such as the individual's health risk factors, health state, disease, or injury emanate from the health/illness domain. Influencing environmental domain variables are derived from the individual's physical, social, ethnic, and cultural environments (Dodd et al., 2001).

The model of symptom management is based on the following assumptions: the symptom experience is based on the perception and self-report of the individual experiencing the symptom, all bothersome symptoms need to be managed, individuals can be at-risk of symptom development based on the influence of a contextual variable(s) from the nursing science domain and strategies to allay symptoms can be initiated prior to experience of the symptom, the interpretation of a symptom experience by a caregiver of a nonverbal individual is presumed to be correct for purposes of implementing management strategies, symptom management strategies may be aimed at the individual, the family, an associated group, or other significant environment, and symptom management is an active and changing process that is guided by individual outcomes and effects from the nursing domains of person, health/illness, or environment (Dodd et al., 2001).

Theoretical Definitions

The definitions of the concepts of SMT as described by the theorists follow. Symptom experience is defined as an "individual's perception of a symptom, evaluation of the meaning of a symptom and response to a symptom" (Dodd et al., 2001, p. 671). The relationships between these three components of symptom experience, perception, evaluation, and response, are bi-directional as depicted in the Symptom Management Model shown in Appendix L. This bi-

directionality indicates that any one or more of the symptom experience components can influence or modify another. The components are considered iterative and can happen concurrently. The perception, evaluation, and response to a symptom may differ depending upon the context in which the symptom is experienced (Humphreys et al., 2008). The theorists recommend self-report of symptoms by the individual as the best way to measure symptoms (Dodd et al., 2001).

The concept of symptom management strategies is defined by outlining the specifications of the intervention in terms of what it is, when, where, why, and how it is delivered, how much or the dose, who receives it, and who delivers the strategy (Dodd et al., 2001). The strategy management is aimed at the symptom experience of the individual in an effort to achieve particular outcomes, and the strategy can be altered as needed for desired results (Dodd et al., 2001). The goal of symptom management strategies is to prevent, postpone, or diminish the symptom experience and negative outcome through biomedical, professional, and self-care strategies (Humphreys et al., 2008; Larson et al., 1994). Effective strategies decrease the frequency of the symptom experience, lessen the severity of the symptom, and alleviate they symptom distress (Portenoy et al., 1994).

The third and final major concept of SMT is symptom status outcomes which is influenced by and can influence the symptom experience and symptom management strategies. This concept focuses on eight factors: symptom status, functional status, emotional status, mortality, morbidity and co-morbidity, quality of life, costs, and self-care. No directionality is noted between any of these factors and symptom status because any of these factor outcomes can be associated with any other factor outcome, and all can be related to symptom status (Dodd et al., 2001). Symptom status outcomes are specific and measurable outcomes that indicate whether a

symptom is less frequent, less severe, or less distressing and are assessed after a symptom management strategy has been implemented (Humphreys et al., 2008).

The concepts of symptom experience and symptom management strategies were examined in this research study. This study focused on testing an intervention, the symptom management strategy, to investigate the relationship between the strategy and the postpartum symptom experience. The concept of symptom status outcomes was not tested or included in the scope of this particular study as it was not the intent of this study to test all concepts of the theory but to focus on the outcome of postpartum symptom experience. The potential influencing factor of perception of social support, (a contextual variable derived from an individual's social environment and situated within SMT's environmental sphere), was also explored.

Feasibility Work

Initially a trial of the study was implemented to test the feasibility of the mobile messaging intervention since no data in the literature were identified to use as a reference for the structuring of the interactive texting intervention. Two subjects, who met the study's eligibility requirements, were consented and enrolled for this trial. Each subject was assigned to a primary PPNN, and the daily, interactive texting was implemented until each subject reached four weeks' post-birth.

An issue was identified with the receipt of text messages from the PPNN's electronic tablet with iOS mobile technology as one of the subjects was using a cellular device with Android mobile technology. This provided the opportunity to seek solutions and determine how to ensure text messages from the PPNN could be received by users of Android cellular devices. In an effort to solve this technological limitation, consultations occurred with the Informational Technology department experts at the PI's place of employment, with supervisors at the cellular

device company who was provided cellular service for the electronic tablets used by the PPNN, and with the customer service representatives and technological service representatives from the company who manufactured the iOS electronic tablets used by the PPNNs. The workable solution identified involved employing use of a mobile application for texting for subjects using Android cellular devices. After an extensive search and testing of three mobile applications by the PI and the PPNNs, TextPlus was the mobile application selected.

The PI, the two PPNNs, and the PI's advisor met at the conclusion of the four-week feasibility study to evaluate the mobile messaging intervention. It was discovered that the time required to text the script every day to assess all parameters for well-being as outlined in the *Mobile Messaging Protocols/Decision Trees* (Appendix H) was not feasible in the time allotted for daily texting and interfered with addressing a subject's other concerns and questions. It was determined that the PPNNs could paraphrase the content of the script when reviewing with subjects and use the *Mobile Messaging Protocols/Decision Trees* to guide texting responses. Going forward, the overall assessment of well-being was completed initially with the subject. During subsequent texting sessions, follow-up on all aspects of well-being occurred whenever the subject presented a concern and when warranted. Concerns raised by subjects were addressed during the daily, interactive texting session with follow-up related to the concern during the subsequent texting session. During enrollment, intervention subjects were informed of the well-being parameters that the PPNN would be inquiring about during the texting sessions.

When a subject presented a concern not addressed in the *Mobile Messaging Protocols/Decision Trees* (Appendix H), the PPNN would notify the PI and together they used their clinical maternity nursing expertise to make joint decisions related to the mobile messaging content response to the subject and to determine if a healthcare provider referral was indicated.

It was recognized that the PPNNs needed resource information for hospital and community lactation assistance, so that this could be shared with subjects. Additionally, the actual time of day for the daily two-hour time periods for texting with subjects was adjusted based on the feedback received from the subjects.

The knowledge gained from the feasibility study proved to be invaluable. It provided an opportunity to ascertain what modifications were needed to enhance the implementation of the mobile messaging intervention prior to the initiation of the study.

Research Design

The study design was an experimental repeated measures pretest/posttest design with random assignment to the control group or the treatment/intervention group. Data collection points occurred at Time 1 [T1] (2 to 4 days' post-birth) or baseline, Time 2 [T2] (2 weeks [14 to 21 days' post-birth]), and Time 3 [T3] (4 weeks [28 to 35 days' post-birth]). This research approach was suitable for examining intervention effects and because the proposed research questions required testing of theory and causal relationships (Brink & Wood, 1998; Wood & Ross-Kerr, 2006). This research strategy can be used to refine theory as well (Brink & Wood, 1998; DePoy & Gitlin, 2005). Randomization, the presence of a control group, and the planned manipulation of the independent variable (the intervention) comprise the three necessary features for a true experimental design (Brink & Wood, 1998; DePoy & Gitlin, 2005; Wood & Ross-Kerr, 2006).

Subjects were randomized (1:1) via the use of a computer-generated, permuted block program in blocks of four. Primiparous women who had an unplanned cesarean birth at a large, southeastern medical center 0-4 days prior to enrollment and who agreed to participate in the study, were randomly assigned via a computerized randomization model to either the

intervention or control group if they met the study's inclusion criteria, consented to participate, and completed the initial instruments for data collection. Subjects randomly assigned to the intervention received the nurse-navigated mobile messaging intervention, and subjects assigned to the control group received usual care.

Random assignment enhanced the likelihood that all subjects regardless of group assignment, whether intervention or control group, were similar at the initial data collection point because it increased the probability that the two groups were theoretically equivalent on the pretest prior to implementation of the intervention (DePoy & Gitlin, 2005). Random sample selection was not used for this study because access to the entire population of primiparous women who have unplanned cesarean birth was not available or feasible. Randomization addresses bias and helps to neutralize the threats of history and maturation to internal validity as both the intervention and control group are likely to be influenced by external events and the passage of time equally (DePoy & Gitlin, 2005).

The repeated measures pretest/posttest design allowed subjects to serve as their own controls, and a pretest determined the similarities of the groups prior to the implementation of the intervention. Since subjects in both the intervention and control groups were exposed to the same external world events as well as transitioning to the role of parent as first-time mothers, recovering from major abdominal surgery, caring for a newborn round-the-clock and most likely maturing similarly during the study period, the threats of history and maturation were unlikely to impact one group more than the other. To decrease the threat of mortality, a larger than required for power sample size was needed to account for potential attrition. Unless subjects happened to meet socially and commenced to conversing about participating in a study, subjects had no

knowledge of other study subjects as there was no intentional gathering of subjects. Therefore, the threat from diffusion of treatment was not likely during data collection.

Research Questions and Hypotheses

Research Question I

During the initial postpartum period, do first-time mothers who have unplanned cesarean births express satisfaction with the experience of a daily, interactive mobile messaging from postpartum nurse navigators?

Hypothesis 1 (H_A). Participants who receive a daily, interactive mobile messaging intervention during the initial postpartum period from postpartum nurse navigators will indicate satisfaction.

Research Question II

Does the postpartum symptom experience of primiparous women who have an unplanned cesarean birth differ between those who receive a daily nurse-navigated mobile messaging intervention until four weeks' post-birth and those who do not?

Hypothesis 2 (H_A). Scores on the Memorial Symptom Assessment Scale (MSAS) will be lower in the intervention group than in the control group.

Research Question III

Does perceived availability of social support for first-time mothers who receive a daily nurse-navigated mobile messaging intervention until four weeks' post-birth vary from those who do not?

Hypothesis 3 (H_A). Scores on the Interpersonal Support Evaluation List (shortened version) [ISEL-12] will be higher in the intervention group compared to the control group.

Quantitative Procedures and Methods

Use of REDCap

REDCap (Research Electronic Data Capture), hosted at Vanderbilt University, is a secure, web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources. REDCap servers are housed in a local data center at Vanderbilt University, and all web-based information transmission is encrypted. REDCap was developed specifically around HIPAA-Security guidelines and is recommended to researchers by both the Vanderbilt Privacy Office and Institutional Review Board (Harris et al., 2009; "REDCap: Research Electronic Data Capture," 2016). The use of REDCap, allowed subjects to directly enter all survey data themselves, which eliminated the inherent risk of error associated with manual data entry.

The PI engaged in REDCap training sessions to gain knowledge about setting up the project within the REDCap environment. The PI also had access to the Vanderbilt University REDCap administrative team as well as a REDCap research project specialist at Vanderbilt University School of Nursing, who provided assistance and guidance throughout the entire project.

Both instruments, the MSAS and the ISEL-12, were available for download into the project from the REDCap Shared Library resource. All other data collection tools including the screening tool and consent form were created by the PI and entered as surveys within the REDCap project. After the REDCap versions of the Institutional Review Board (IRB) approved

data collection tools were created by the PI, they were submitted and approved for use by the IRB.

Sample

The study's population included women who experienced an unplanned or unexpected first-birth cesarean section at term gestation (37 weeks or greater) at a large southeastern medical center zero to four days prior to study enrollment. The sampling frame included women who met these initial criteria and agreed to speak with the PI about participating in the research study.

Inclusion criteria. English speaking primiparous women participants between the ages of 18 and 34 years who had an unplanned cesarean birth of a single fetus at 37 weeks or greater gestation during the prior zero to four days were screened by telephone by the PI for eligibility using the *Telephone Screening Questionnaire* (Appendix A). The criterion, ages 18 to 34 years, included adult women who fall below the age criteria for "advanced maternal age"; this was a deliberate decision due to the increased risks to mother and fetus after 35 years of age (McCarty, 2016; Tucker, 2016). Women who have infants born after the completion of 37 weeks of gestation are considered term (Link, 2016). Women needed to anticipate simultaneous discharge from the hospital to home with their newborn infant within two to four days of birth to be eligible.

Subjects needed to be able to read, write, and speak English because otherwise, communication with the PPNN and implementation of the mobile messaging intervention would require technological translation and back-translation resources not available in this study. Women needed to possess or have daily access to an operational cellular device, phone or electronic tablet, with texting and email capability because this was needed for the mobile messaging implementation. Women also needed to possess an email address and the ability to

access the internet so they could complete the data collection surveys electronically as this was the only option for completion of the follow-up surveys at T2 and T3. Public sources for internet access, such as a community public library, are available, therefore participants who did not have internet access in their home were included.

Exclusion criteria. Women who experienced any high-risk prenatal factor during their pregnancy that required consultation or care by a perinatologist, an obstetrician who specializes in the care of women with high-risk, complicated pregnancies ("Perinatology definition," 2016), were excluded from participation in this study in an effort to eliminate any potential confounding postpartum influences resulting from intensified medical attention received during pregnancy. Women were not included in the study if they had a prior history of a third trimester, defined as 27 weeks gestation or greater (Link, 2016), pregnancy loss or if they had a current chronic illness such as, but not limited to, hypertension, diabetes, clotting disorders, lupus, or cancer for which they had received treatment for 6 months or longer. Subjects who were receiving medical treatment for a mental health concern were excluded from the study.

Sample size. A power analysis was conducted utilizing G*Power 3.1.9.2 (Buchner, Erdfelder, Faul, & Lang, n.d.; Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007). Parameters chosen: significance level alpha = .05, power level = .80, and a small population effect size = 0.14. Choosing a small effect size requires collection of a bigger sample size and lends more precision and accuracy to the ability to detect an intervention effect if it exists within the population (J. Cohen, 1988). To plan *a priori* sample size according to effect sizes stipulated by Cohen, a small effect was chosen. A population effect size of 0.14 is slightly larger than J. Cohen's (1988) suggested 0.10 small effect size for behavioral sciences but still remains conservative for this study and is somewhat smaller than Cohen's suggested 0.30

for a medium effect size. Using the outlined parameters for alpha, power, and effect size, the total sample size needed to sufficiently power this study was determined to be 82. The plan was to recruit between 45-50 participants for each group to anticipate and account for attrition.

Due to time constraints, data were analyzed after 41 of 44 enrolled subjects completed the study. The study at this stage is underpowered, and therefore, the probability of detecting any differences between the control and intervention groups is very low. Low statistical power can fail to show any relationship between the intervention/independent variable and the dependent variables even when one exists (Polit & Beck, 2008).

Protection Measures for Human Subjects

Approval for this study was obtained from the IRB of Vanderbilt University (Appendix M). Oversight of the study was transferred by the University of Tennessee, Knoxville's (UTK) IRB's to Vanderbilt University's IRB through an executed reliance agreement between the two IRBs (Appendix N). Once the PI determined that the subjects met the inclusion criteria, the purpose of the study and its potential risks and benefits were reviewed with potential subjects, and the specifics of the intervention were explained to all subjects. Subjects were informed that their participation was voluntary and that they could withdraw their consent to participate in the study at any time without penalty or loss of usual benefits to which they were otherwise entitled if they decided to no longer participate. This was also noted on the Consent Form (Appendix B). After all questions were addressed to a subject's satisfaction, consent for participation was obtained prior to any data collection.

Included in the initial consent that was reviewed and signed by subjects was the option to withdraw consent to use previous collected data if the subject decided to leave the study.

Information collected prior to a subject's withdrawal from the study was deleted per the subject's request.

Confidentiality. Study data were collected, managed, and stored using REDCap electronic data capture tools hosted at Vanderbilt University (Harris et al., 2009) accessible only to the study personnel approved for access. The REDCap electronic system is password protected with an additional security measure requiring a time-sensitive code that must be used to access the system when outside of Vanderbilt University's network.

Data collection instruments contained no subject identifiers. The only subject identifiers entered into REDCap were the subject's email address. A nickname and cellular phone number was collected for subjects assigned to the intervention group. The email address was required for REDCap to have the ability to email the unique link to the subject to access REDCap for data input. The cellular phone number was collected for mobile messaging purposes for the intervention group. Each intervention group subject's nickname and contact information was made available to the PPNN for the purpose of implementing the intervention.

The signed electronic consent forms are stored within a separate project housed in REDCap that is distinct from the study data and will be retained per IRB time requirements of a minimum of three years. Data downloaded into SPSS files for analyses contained only the record ID for each subject. A copy of the unidentified SPSS data files was stored on the PI's password protected computer. Texting data was stored on the PPNN's password-protected device used exclusively for this study, and then the de-identified data was transferred to an electronic storage cloud at the University of Tennessee, Knoxville after completion.

Potential study risks. Participation in this study posed minimal risks to subjects. No foreseeable risks beyond those encountered in everyday life were anticipated. However, the

completion of the data collection instruments could have posed uneasiness or psychological discomfort was a possibility, and the daily texting from the PPNN could have been perceived as bothersome if subjects felt an obligation to respond and did not wish to do so.

Efforts for mitigating psychological risk. The Family and Children's Service Crisis Line number was included as a resource on the consent form and in the reminder emails sent with the unique link to access REDCap for data collection at all three time phases of data collection in case any subject became emotionally upset or distressed. Subjects were instructed that they could contact this number, 24 hours a day, should they experience any type of concern or distress. The Family & Children's Service Crisis Line is a community number available to any person with any problem at any time. If any subject felt that they were unable to call the Crisis Line and contacted the PI, then the PI would have assisted the subject in connecting with the Crisis Line resource to ensure the subject was safe. No subjects contacted the PI with any concerns during the study's duration.

Benefits. A possible benefit for subjects in the intervention group was perhaps inherent in the intervention itself. Subjects who were navigating the postpartum period as first-time mothers had the ability to get their concerns and questions addressed daily since they had access to a professional nurse resource, a PPNN, until four weeks' post-birth.

A potential over-all benefit for society was that subjects contributed to the clinical knowledge of the postpartum symptom experience for primiparous women who have unplanned cesarean births. Subjects in the intervention group contributed to the research and clinical knowledge of using mobile messaging technology during postpartum recovery and adaptation. The information gained from this study offered insight for future planning of interventions to assist women who have unplanned cesarean births during the postpartum recovery period.

Data Source

Setting. Subjects were recruited from a large medical center located in the southeastern U.S. where more than 4250 births have occurred annually since 2015. The overall hospital cesarean rate is 31% to 36% (M. Robinson, personal communication, March 14, 2016, January 30, 2017, and March 20, 2018). The postpartum unit consists of 32 private rooms, and a newborn nursery is located within the unit.

Subjects completed T1 data collection surveys in their private hospital room if they had not yet been discharged home or in the setting of their choosing if they had already been discharged from the hospital. For the subsequent T2 and T3 data collection time points, subjects completed the surveys in a location of their choosing as the surveys were accessible through any computer or cellular device with internet access by using the unique link sent to the subject's provided email address.

Recruitment. Four postpartum nurses from the facility where subjects gave birth to their babies were recruited and agreed to serve as nurse liaisons to identify potential subjects. A script (Appendix I) was available for the nurse liaisons to use when approaching English speaking, primiparous women who had experienced an unplanned cesarean birth zero to four days previously. The nurse liaisons requested permission for the PI to contact the potential subject with information about the study. If the potential subject agreed, the nurse liaison forwarded the PI the potential subject's contact information. A recruitment flyer (Appendix K) was created when enrollment of subjects decreased as an effort to share awareness of the study and increase the number of potential subjects. The recruitment flyer was made available to other postpartum unit staff for general distribution to any patient who had a cesarean delivery. All potential subjects were recruited by the nurse liaisons.

Enrollment. After receiving the contact information, the PI contacted the potential subject and completed a telephone screening to determine if the potential subject met the eligibility criteria for participation by administering the *Telephone Screening Questionnaire* (Appendix A). For any potential subject that met the eligibility requirements and desired to participate a convenient time was arranged to meet with the subject in the hospital room prior to hospital discharge on postpartum day two or three. This process occurred for the first four months of the study. When an increasing number of potential subjects, deemed eligible, were discharged on postpartum day two, leaving before study enrollment could occur, permission was sought and obtained from the Institutional Review Board (IRB) to implement an electronic consent process from zero to four days' post-birth.

Prior to consent, information about the study was provided. Consent for study participation was obtained by the PI in-person initially and in-person or electronically after subsequent approval by the IRB. The method used for obtaining consent was determined by the subject's preference.

Attrition occurs when subjects choose not to complete the electronic surveys within the designated data collection time frame for T1, T2, or T3 or voluntarily withdraws from the study. Electronic email reminders were sent to the subject via REDCap with the survey electronic link on the first day when data collection was due for T2 and T3 and continued every other day until the surveys were completed or until the window for data collection expired one week later. If a subject did not complete data collection at T1, T2, and T3, they were not included in the data analyses.

The Nurse-Navigated Mobile Messaging Intervention

For this study, the symptom management strategy was the daily availability a professional maternity nurse resource, termed Postpartum Nurse Navigator (PPNN), who assisted with symptom management navigation until four weeks' post-birth for primiparous women who had unplanned cesarean births. The strategy was operationalized by two Registered Nurses (RN) who served as the PPNNs. The initial requirement for a PPNN for the study was that a PPNN must be a licensed RN with at least one to two years of maternity experience. The PPNNs in the study possessed more than 24 years and 50 years of maternity nursing experience respectively, and both PPNNs were certified lactation consultant and childbirth educators.

The PPNNs used daily, interactive mobile messaging to assess the intervention group subjects' general well-being. The PPNNs addressed new mothers' questions, helped identify problematic symptoms that required treatment, made referrals to healthcare providers and even lactation consultants if warranted, and offered reassurance and professional advice about topics such as breastfeeding, newborn care, and postpartum surgical birth recovery care. Based on the subjects' text responses and individual needs, the PPNN used her clinical expertise and the *Mobile Messaging Protocols/Decision Trees* (Appendix H) which were inclusive of decision trees to assess symptoms, guide decision making and assist subjects with navigating their postpartum symptoms. The PPNN had the flexibility to initiate a phone call to the subject with the subject's consent if the PPNN believed a verbal conversation was indicated.

The *Mobile Messaging Protocols/Decision Trees* served as a resource and guide in conjunction with the PPNN's clinical expertise (what it is and who delivers it). The *Mobile Messaging Protocols/Decision Trees* were guidelines for the most common postpartum issues but did not address every potential postpartum concern. The PPNNs were free to use their

clinical expertise and any other available resources as needed during the texting interactions. For circumstances in which a PPNN desired additional input, she contacted the author and PI of this study, and they jointly determined the most appropriate nursing action for the situation. For any situation requiring immediate attention, subjects were instructed during consent and the PPNNs reinforced this to intervention subjects via texting interactions to contact their healthcare provider, the local hospital's ED, or call 911. The intervention strategy was implemented to address participant postpartum concerns (why it is delivered).

Mobile messaging technology is readily available and used widely by many irrespective of socioeconomic situation and was used to deliver the intervention by the PPNNs and to receive the intervention by the subjects. Intervention group subjects (who receives it) were postpartum primiparous women who met the study's inclusion criteria. The mobile messaging occurred between a PPNN and the intervention group subjects via cellular phones or electronic tablets (how it is delivered). The PPNNs used password protected electronic tablets that were dedicated specifically for study use.

Intervention subjects were assigned to a primary PPNN based on time preferences and PPNN availability. Intervention subjects communicated with one primary PPNN throughout the duration of the intervention, but were informed of the availability of a secondary PPNN and the option to contact the other PPNN if desired. No interventions subjects chose to contact the other available PPNN during the study period.

Each PPNN contacted their assigned subject daily during a specified two-hour time window (how much or the dose). The duration of each daily texting session after the initial assessment of general well-being was determined by the questions and needs of each subject. When a texting session with a subject neared the two-hour duration, PPNNs would prioritize

with the subject and address the most pressing questions or needs. Instructions were given to follow-up with the healthcare provider, if needed, until the next texting session. The *Mobile Messaging Encounter Form* (Appendix G), created by the PI, was used by the PPNN to document a summary of the daily texting interaction with each subject.

Subjects could also contact the secondary PPNN if needed during the other daily two-hour time period. Each PPNN was available daily; one during the morning and one in the afternoon/evening hours. Time adjustments were implemented when needed to accommodate PPNNs work schedules and were communicated a day in advance during the scheduled texting session between the PPNN and her assigned subjects. An alternate time for mobile messaging between the subject and the PPNN was scheduled when these time adjustments were necessary.

Based on formative feedback collected from subjects during the study via a final survey about mobile messaging with the maternity nurse, the two-hour time windows for the PPNN availability were adjusted strategically when new subjects were enrolled in an effort to best accommodate new mothers' schedules. Initially, 7:00 am to 9:00 am was set for the morning time frame and 5:30 pm to 7:30 pm for the afternoon/evening. After initial feedback from the pilot study, these times were changed to 9:00 am to 11:00 am for the morning and 6:30 pm to 8:30 pm for the afternoon/evening. A final time adjustment to 10:00 am to 12:00 pm for the morning and 4:30 pm to 6:30 pm for the afternoon seemed to work for new mothers' schedules and were well-received by subjects in the intervention group. Intervention subjects communicated with one primary PPNN throughout the duration of the intervention, but were informed of the availability of a secondary PPNN and the option to contact the other PPNN if desired. No interventions subjects chose to contact the other available PPNN during the study period.

During the consent process and on the first day the intervention was initiated, subjects were given specific instructions to contact their healthcare provider, the ED, or 911 for any concerns that required immediate attention. These instructions were reiterated throughout the duration of the intervention. The subject could certainly text the PPNN if desired, but immediate availability of the PPNN outside of the daily specified time frame was not guaranteed as the PPNN intervention for this study was a daily intervention rather than a 24 hours-a-day intervention.

The daily mobile messaging for the intervention group began on the first day following hospital discharge and continued daily until the subject reached four weeks' post-birth. (when it is delivered). Previous texting interventions have differed in timing, delivery, and targeted populations from this study's postpartum population. In a study offering a free 24-hour telephone hotline for four months postpartum, the highest utilization by mothers occurred during the first four weeks following birth (Osman et al., 2010). Therefore, a determination was made by the PI with input from her faculty dissertation committee and based on her obstetrical nursing experience, that a duration of the mobile messaging for four weeks' post-birth was reasonable based on the expected functioning ability of women with a non-eventful postpartum recovery at four weeks, the time required to gather information related to intervention efficacy, and a time commitment that would potentially be viewed as acceptable from subjects. Extending the duration of the intervention delivery longer than four weeks' post-birth did not seem practical for this study since many unknowns existed, such as actual time required for implementation with multiple subjects and the related costs associated with the implementation of the intervention. Subjects were able to receive the daily text messages from the PPNN from whatever location

they chose as the intervention could be delivered to the cellular device without regard to location or availability of internet access (where it is delivered).

The PPNNs used a nickname created by each subject when communicating with the subject during texting. When a subject did not respond to a daily text, the PPNN sent a text with concluding instructions and that she would contact her again the following day. The PPNN could initiate a phone call if no response from the subject for seven days. This was not required as all subjects responded to the text message from the PPNN the day following if they had no responded during a daily texting session. PPNNs documented a summary on their daily interaction with each subject on the *Mobile Messaging Encounter Form* (Appendix G).

Intervention fidelity. The intervention was receipt of daily interactive mobile messaging with an experienced maternity nurse. The intervention was intended to be individualized based on each subject's daily needs. Measures to maintain intervention fidelity were instituted through an individualized and joint training sessions (3) with the two PPNNs employed to implement the intervention prior to commencement of this study. Intervention implementation protocols as well as the decision trees for use during the interactive mobile messaging were reviewed during these initial training sessions and again after the feasibility portion of the study.

Throughout the study time period, electronic and/or face-to-face interactions or meetings occurred routinely between the PI and each PPNN. The PI communicated with each PPNN weekly and often more frequently when the PPNN was implementing the intervention. Often communication was impromptu to address questions that developed. The PI and the PPNN used their clinical maternity nursing expertise to make joint decisions related to the mobile messaging content when the subject's question was not addressed by the protocols. Occasional instances

existed when a PPNN did not have an assigned subject. During these time intervals, the PI would maintain electronic communication with the PPNN to keep her updated regarding the progress of the study.

In regards to the implementation of the intervention, the mobile messaging intervention was delivered by the both of the PPNNs to intervention group subjects as described and intended. Subjects received text messages daily via the mobile technology from an assigned PPNN during a pre-determined two-hour window of time. Subjects responded to text messages on most days. The function of the technology worked, and no attrition occurred among the intervention group suggesting that the intervention worked as the subjects expected.

The content of the mobile messages was customized to the intervention subject based on her daily question and concerns. The PPNNs used the *Mobile Messaging Protocols/Decision Trees* (Appendix H) as guides for content when the feasibility work revealed the content was too lengthy to review within the daily allotted time interval. Additionally, intervention subjects completed all study measures, providing another indication of reassurance that study procedures occurred as projected and anticipated by subjects.

Mobile messaging guides. The introductory script and template for the protocols and decision trees developed for this study were adapted from the telephone intervention script protocol work done previously by L.H. Beebe (personal communication, January 1, 2016). The PI's knowledge, education, and nearly thirty-five years of nursing experience including experience as a maternity nurse and experience as a board-certified Women's Health Nurse Practitioner contributed to the content and design of the *Mobile Messaging Protocols/Decision Trees* (Appendix H). These decision trees were supported with information on postpartum conditions written by expert authors in the maternity field including (Davidson, 2014; Francis,

2007; Lowdermilk et al., 2016; Romm, 2002; Wheeler, 2002). Davidson's (2014) *Fast Facts for the Antepartum and Postpartum Nurse* was utilized as a base resource in the development of the decision trees. The protocol text messages and decision trees were reviewed for content accuracy by two Doctor of Philosophy prepared Certified Nurse-Midwives who are members of their professional organization, the American College of Nurse-Midwives. Intervention texting protocols with associated decision trees are listed in Appendix H. The PPNNs used the mobile messaging guides as the resources for responses to the intervention subjects.

Instruments

The *Memorial Symptom Assessment Scale* (MSAS) [Appendix E] and the *Interpersonal Support Evaluation List* shortened version (ISEL-12) [Appendix F] were the two instruments utilized at all three data collection points. Both the intervention and control group subjects completed the MSAS and the ISEL-12 instruments at T1, T2, and T3.

Memorial Symptom Assessment Scale. The *Memorial Symptom Assessment Scale* (MSAS) [Appendix E], a multidimensional instrument developed by Portenoy et al. (1994) measures prevalence, characteristics, and distress of multiple diverse symptoms chosen from a review of the literature. The MSAS has been used extensively in work done by K. A. Lee (personal communication, December 29, 2015), an author of Symptom Management Theory (Dodd et al., 2001; Humphreys et al., 2008; Larson et al., 1994). The MSAS has been used in various populations of subjects with cancer, AIDS, chronic health conditions as well as with populations of pregnant and postpartum women (Aouizerat, Gay, Lerdal, Portillo, & Lee, 2013; Beebe, Gay, Richoux, & Lee, 2017; Chang, Hwang, Thaler, Kasimis, & Portenoy, 2004; K. A. Lee et al., 2009; K. A. Lee, personal communication, December 29, 2015; Portenoy et al., 1994).

In this study, the MSAS measured the dependent variable, symptom experience. The MSAS measures the presence, severity, and distress of 32 different symptoms during the previous week. Frequency of occurrence is an additional measure for 24 of the 32 symptoms. Both physical and psychological symptom subscales can be calculated, and the MSAS can capture information related to global symptom distress. The MSAS also affords respondents the ability to also enter any additional symptoms experienced but not included on the form as well as rate the distress associated with the symptom (Portenoy et al., 1994). Permission was obtained from the author, R. K. Portenoy (personal communication, August 26, 2016) to change the time frame on the MSAS for this study from symptoms experienced within the previous week to symptoms experienced within the past few days as T1 data collection occurred 2 to 4 days following birth and only symptoms experienced after birth were desired for analysis.

A total MSAS (MSAS-T) score can be calculated by averaging the individual symptom scores of all 32 symptoms. Higher scores indicate more symptom distress, and lower scores indicate less symptom distress. In addition to a total MSAS score (MSAS-T), a psychological symptoms subscale score (MSAS-PSYCH), a physical symptoms subscale score (MSAS-PHYS), and a Global Distress Index score (MSAS-GDI) are other scores that can be calculated from the individual symptom scores. The MSAS-PSYCH subscale score is obtained by averaging the symptom scores for the six symptoms: feeling sad, worrying, feeling irritable, feeling nervous, difficulty sleeping, and difficulty concentrating. The MSAS-PHYS subscale score is calculated by averaging the symptom scores of 12 symptoms: lack of appetite, lack of energy, pain, feeling drowsy, constipation, dry mouth, nausea, vomiting, change in taste, weight loss, feeling bloated, and dizziness. The MSAS-GDI is computed from the average of the single dimension of scores for 10 symptoms: the frequency scores for feeling sad, worrying, feeling irritable, and feeling

nervous and distress scores for lack of appetite, lack of energy, pain, feeling drowsy, constipation, and dry mouth (Portenoy et al., 1994).

The MSAS-GDI and the MSAS-T have been shown to validly measure overall symptom distress (Portenoy et al., 1994). Cronbach's alpha coefficient testing internal consistency equaled 0.835 for the MSAS-PSYCH and 0.882 for the MSAS-PHYS subscales respectively in (Portenoy et al., 1994) and 0.80 for MSAS-PHYS, 0.82 for MSAS-GDI, and 0.87 for MSAS-T in (Chang et al., 2004). The MSAS was also shown to have convergent, discriminant, and construct validity by Portenoy et al. (1994). Though initially developed for a cancer population, the MSAS has been utilized in extensive diverse patient populations including patients with cancer, AIDS/HIV, congestive heart failure, chronic obstructive pulmonary disease, cystic fibrosis as well as with pregnant and postpartum women. Many of the symptoms measured by the MSAS are noted across diverse populations. The MSAS has also been translated into many different languages.

Interpersonal Support Evaluation List. The *Interpersonal Support Evaluation List* shortened version (ISEL-12) [Appendix F] (S. Cohen, Mermelstein, Kamarck, & Hoberman, 1985) was used to measure perceived availability of social support. The instrument was developed to measure perceived availability of resources for four functions of social support that might facilitate coping with stressful life events (S. Cohen et al., 1985). The shortened version of the scale measures perceived availability of social support through three subscales: appraisal support (perceived availability of someone to talk to about one's problems), belonging support (perceived availability of people one can do things with), and tangible support (perceived availability of material aid). The original scale contained 40 items and also included the subscale, self-esteem support (perceived availability of a positive comparison when comparing

one's self with others) (S. Cohen et al., 1985; "Interpersonal Support Evaluation List (ISEL)," n.d.). The modified version consists of 12 items with the four highest loading factors for each of the three subscales. No time frame is associated with the instrument, and respondents rate each item according to how true or false it describing the type social support available to them ("Interpersonal Support Evaluation List (ISEL)," n.d.). A 4-point scale is utilized, and each social support dimension is measured by four specific items and then a total score is derived from a sum across all items (S. Cohen et al., 1985). The higher the score, the greater the respondent's perception of social support. The instrument can be scored from 0 to 3 or from 1 to 4 as long as identical scales are used for repeated measures and comparison designs (Sheldon Cohen, n.d.). Six of the items are reversed scored (2 items in each subscale), and the total score of the subscales is a measure of perceived overall support ("Interpersonal Support Evaluation List (ISEL)," n.d.).

The reliability measured by Cronbach's alpha = 0.77 - 0.86 in undergraduate students and Cronbach's alpha = 0.88 – 0.90 in the general population ("Interpersonal Support Evaluation List (ISEL)," n.d.), and in four separate studies using the 12 item ISEL instrument, Cronbach alpha = 0.80 – 0.90 with the mean equaling 0.86. (Sheldon Cohen, n.d.). The ISEL demonstrates concurrent validity as it correlates positively with other support scales, the Inventory of Socially Supportive Behaviors and the Partner Adjustment Scale, and with the number of close friends; the subscales showed associations in the expected direction with related attribute measures demonstrating validity ("Interpersonal Support Evaluation List (ISEL)," n.d.).

The ISEL instrument has been widely used in the original and modified versions among multiple populations and among a variety of race and ethnicities including African American, Chinese, Taiwanese, and Caucasian women. In a study of 243 Chinese pregnant women, the

researchers reported an internal consistency of 0.85 for the Chinese version of the ISEL-16 (Chou, Avant, Kuo, & Fetzer, 2008). The ISEL-16 was one of several instruments administered to 60 depressed postpartum Taiwanese women; validity and internal consistency for the ISEL-16 was not reported for his study (Chen, Tseng, Chou, & Wang, 2000). In an initial study to validate the Postpartum Worry Scale-Revised, the ISEL-12 was one of the tools completed online by 1,231 self-identified postpartum mothers with infants up to 24 months of age (Moran, Polanin, & Wenzel, 2014). Participants were an average of 30 years, married (81.5%). Caucasian (87.4%), had no other children living at home (51.5%), some college education or higher (87%), employed greater than 15 hours per week (49.4%), and higher incomes (40.7% between $30,000 and $70,000 and 38.2% > $70,000) (Moran et al., 2014). The coefficient alpha for the ISEL-12 in this study equaled 0.87 (Moran et al., 2014).

Data Collection

Initial data collection. After informed consent was obtained by the PI at two to four days postpartum, T1 collection occurred. An electronic tablet provided by the PI or the subject's own electronic device was used to access the surveys in REDCap. The subject completed an email address form, the *Demographic Questionnaire* (Appendix C) and the two survey instruments (MSAS and ISEL-12) by directly entering all responses into REDCap. This prevented any risk of error associated with manual data input by a research team member. The PI was not present in the same room with the subject when she completed the surveys. The T1 surveys were completed prior to randomization of the subject to a group and prior to initiation of the intervention.

Randomization and concluding T1 procedures. After subjects' completion of the three instruments at the initial data collection (T1), subjects were randomized (1:1) via the use of

a computer-generated, permuted block program in blocks of four that was uploaded into the project within REDCap and then made aware of group assignment. The randomization model electronically allocated a subject to either the intervention or control arm of the study. Use of the electronic randomization model eliminated any unintended influence or biases.

For subjects randomized to the intervention group, they provided a nickname and cellular contact number that were stored within REDCap. These were necessary for the PPNN to use to initiate texting with the subject on the first day following hospital discharge. The PI and the subject determined a general time frame for contact by the PPNN, and the subject was assigned a primary PPNN. The subject was given contact information for their primary PPNN and for the secondary PPNN. The assigned PPNN was notified of newly enrolled subject to the intervention group and also the date that texting should commence with the subject based on the subjects' hospital discharge date.

During the enrollment process, all subjects, regardless of group assignment, were informed to contact their healthcare provider whenever needed during the study's duration. The subjects were also instructed to call 911 or go to an ED for any concern requiring immediate medical attention.

Subsequent data collection. Additional data collection occurred electronically via subjects' personal devices (cellular phone, electronic tablet, or computer). Subjects were able to access REDCap at any time from any location through a unique link specific to them that was sent to their email address for each specific data collection point. T2 data collection occurred at approximately 2 weeks postpartum (14 to 21 days after birth), and T3 occurred at approximately 4 weeks postpartum (28 to 35 days after birth). In addition to completing the two survey instruments (MSAS and ISEL-12) during T2 and T3, subjects also completed the *Demographic*

Questionnaire Follow-up (Appendix D), which included questions regarding any changes from initial demographic information collected as well as questions regarding postpartum contact with healthcare providers. At T3, intervention subjects were presented with the *Evaluation of Maternity Nurse Navigator Intervention* (Appendix J) after completion of the other three surveys.

Although subjects were encouraged to complete the MSAS and the ISEL-12 in one sitting, the REDCap system allows responses to be saved should an interruption occur before surveys are completed. This allowed subjects to resume the survey upon return if the eligible time period for the data collection had not expired. Once the survey was submitted, subjects were not able to access the survey again. Email notices with a unique link to access the survey in REDCap were sent to subjects on the first day of the data collection time frame and subsequently every other day until the surveys were submitted or the eligible time for completion had expired.

Compensation. After completion of the T3 surveys, all subjects who desired compensation were asked to complete a form that provided information required for reimbursement. Subjects were mailed a $30 participant compensation check approximately four to six weeks later.

Measures

Demographic characteristics. The *Demographic Questionnaire* (Appendix C) was collected at T1 and included questions about demographic characteristics as well as questions related to the subjects' birth. The *Demographic Questionnaire Follow-up* (Appendix D) was collected at T2 and T3 and included questions regarding any interim changes as well as questions regarding contact with healthcare provider. Both the intervention and control group subjects completed the instruments.

Table 3.1 outlines the independent and dependent variables. Further explanation of the study's variables follows in the subsections after the table.

Table 3.1 Study Variables

Variable	Theoretical Definition	Operationalization	Level of Measurement
Independent Variable	symptom management strategy	Daily, interactive nurse-navigated mobile messaging by a PPNN	Categorical
Dependent Variable	expressed satisfaction with the nurse-navigated mobile messaging intervention	Evaluation of Maternity Nurse Navigator Intervention survey	Continuous
Dependent Variable	postpartum symptom experience	Total MSAS score	Continuous
Dependent Variable	perceived availability of social support	Total ISEL-12 score	Continuous

The independent variable. The independent variable, symptom management strategy (a major concept of SMT and operationalized as daily mobile messaging by a Postpartum Nurse Navigator [PPNN] until four weeks' post-birth), was the intervention for the treatment/intervention group while the control group received usual care. The symptom management strategy was defined by the following parameters as outlined in SMT (Dodd et al., 2001): what it is, when it is delivered, where it is delivered, why it is delivered, how much or the dose, who receives it, how it is delivered, and who delivers it. These specific details of the intervention were presented earlier in this chapter under the subsection, "The Nurse-Navigated Mobile Messaging Intervention".

The dependent variables. The dependent or outcome variables were subjects' expressed satisfaction with the nurse-navigated mobile messaging intervention, subjects' postpartum symptom experience, and subjects' perceived availability of social support.

Expressed satisfaction with the nurse-navigated mobile messaging intervention. Intervention group subjects' expressed satisfaction with the nurse-navigated mobile-messaging intervention was measured by an evaluation survey created by the PI, *Evaluation of Maternity Nurse Navigator Intervention* (Appendix J). This survey was presented to intervention group subjects for completion once the final surveys were submitted at T3. The tool evaluated the subjects' satisfaction with the nurse-navigated texting intervention.

The survey contained two 5-point Likert scale questions and five free-text questions about the texting experience with the PPNN. The two 5-point Likert scale questions were scored from 0 to 4, with 0 = "neutral" or "no opinion", 1 = "poor" or "not likely", 2 = "fair" or "somewhat likely", 3 = "good" or "very likely", and 4 = "outstanding" or "definitely" depending on the question. The "neutral" response option was positioned between the "fair" and "good" response options, while the "no opinion" option was located between the "somewhat likely" and "very likely" response options on each respective question on the survey. Subjects were also asked preferences regarding time of day and amount per week to receive texting from the nurse and were given the opportunity to record the least helpful and most helpful aspects as well as any additional comments or suggestions.

Postpartum symptom experience. The symptom experience (a major concept of SMT) during postpartum recovery, a dependent variable, was measured by the MSAS (Appendix E) developed by Portenoy et al. (1994). The MSAS total score (MSAS-T) was the measure chosen to operationalize postpartum symptom experience. The MSAS measures dimensions of both psychological and physical symptoms. A total MSAS (MSAS-T) score can be calculated by averaging the symptom scores of all 32 symptoms. Higher scores indicate more symptom distress, and lower scores indicate less symptom distress.

Initially a symptom score is obtained for each individual symptom by averaging the scores for each dimension of severity, frequency, and distress for 24 of the symptoms and averaging the dimensions of severity and distress scores for 8 of the symptoms. If a symptom is not experienced, the score is 0 for the symptom. If a symptom is experienced, but one of the dimensions of the symptom (frequency [if applicable], severity, or distress) is not completed by the subject and therefore missing, then that particular dimension is not included when the score is averaged. The score for that symptom is calculated by averaging the scores of the completed dimensions. For missing data, the authors of the instrument arbitrarily chose a 13% missing items as the parameter used for excluding a subject from data analysis in the study where the instructions for scoring the MSAS instrument was reported (Portenoy et al., 1994). This is the equivalent of 4.16 items; so the guideline set for a subject's exclusion from data analyses for this study was 4 missing items.

The scale used for determining the score of any symptom experienced follows: the severity and frequency described by the subject is based on a 4-point categorical scale of 1 to 4, where 1 is considered 'slight' on the severity scale and 'rarely' on the frequency scale, and 4 is considered 'very severe' on the severity scale and 'almost constantly' on the frequency scale. The distress dimension associated with a symptom is rated on a 5-point categorical scale but is set to the same range as the other two dimensions to assist with calculation. Therefore, for the distress dimension of a symptom, 'not at all' is scored as 0.8, 'a little bit' as 1.6, 'somewhat' as 2.4, 'quite a bit' as 3.2, and 'very much' as 4.

Perceived availability of social support. Perceived availability of social support, (a contextual variable from the influencing environmental sphere of SMT) also a dependent variable, was measured by ISEL-12 shortened version (Appendix F), an instrument developed by

Cohen, Mermelstein, Kamarck, and Hoberman (1985). ISEL-12 consists of 12 items with the four highest loading factors for each of the three subscales, appraisal support, belonging support, and tangible support. A 4-point scale is utilized, and each social support dimension is measured by four specific items and then a total score is derived from a sum across all items (S. Cohen et al., 1985). The higher the score, the greater the respondent's perception of social support. The instrument was scored from 0 to 3 (Sheldon Cohen, n.d.). Six of the items are reversed scored (2 items in each subscale), and the total score of the subscales is a measure of perceived overall support ("Interpersonal Support Evaluation List (ISEL)," n.d.).

Both the intervention and control group subjects completed the MSAS and the ISEL-12 instruments at T1, T2, and T3. All subjects completed a total of 3 surveys at each data collection point. Intervention group subjects evaluated the nurse-navigated mobile messaging intervention with a fourth survey at T3.

Data Analysis

For all study research hypotheses, the analysis plan included generating descriptive statistics (i.e., means, standard deviations, percentages, minimums, maximums) of primiparous women who have unplanned cesarean births. Univariate and bivariate analyses were conducted on all study variables to understand the profile of the variables in the model and test statistical assumptions. The intervention and control groups were compared on all demographic and confounding variables in a between-subjects fashion using independent samples t-tests, Mann-Whitney U tests, or Chi-square according to the scale of measurement of the variable.

For Hypothesis 1, descriptive statistics were used to determine whether intervention subjects expressed satisfaction on the evaluation of the daily, interactive mobile messaging from the nurse navigators.

For Hypothesis 2 and Hypothesis 3, a mixed-effects analysis of variance (ANOVA) was the statistical analysis used to detect differences between the intervention and control groups in terms of how they changed across observations T1, T2, and T3 for the outcomes of interest. For Hypothesis 2, the outcome of interest was the postpartum symptom experience as measured by the MSAS. For Hypothesis 3, perceived availability of social support was the outcome of interest, measured by ISEL-12. Both outcomes measures were continuous variables.

ANOVA is the appropriate statistical analysis because the method accounts for individual differences and controls for variation that is measured (Munro, 2005). ANOVA is considered to be a robust test. The required assumptions for ANOVA include compound symmetry, a continuous DV that is normally distributed, mutually exclusive intervention and control groups, and homogeneity of variance among tested groups (Munro, 2005).

Due to the mix of "between-subjects" and "within-subjects, a Box's M Test of Equality of Covariance Matrices, a statistical assumption of homogeneity of covariance was done. This assumption stipulates that the covariance matrices of the "within-subjects" observations are similar to the "between subjects" groups that are being compared. The assumption for the multivariate approach is that the trajectory of the dependent variables results in a multivariate normal distribution with the variance-covariance matrices equivalent across the cells formed by the "between-subjects" effects. Box's M test can be sensitive to deviations from normality, and it tests to determine if the observed covariance matrices of the dependent variables are equal across groups. Levene's Test of Equality of Variances serve as an additional verification of this assumption ("Testing Homogeneity of Covariance Matrices," n.d.).

The methodological statistical assumptions for ANOVA were met prior to analysis of the data. An alpha value of .05 was used to assume statistical significance.

Summary

In summary, Symptom Management Theory theoretically guided this study. This quantitative study tested the relationship between a symptom management strategy, (daily, interactive nurse-navigated mobile messaging) and its relationship with postpartum symptom experience and perceived availability of social support. The sample was randomly assigned after initial data collection to the intervention or the control group. Three surveys were used at each of the three data collection time points, T1 (two to four days' post-birth), T2 (two weeks' post-birth [14-21 days]), and T3 (four weeks' post-birth [28-35 days]). Instruments included an initial demographic questionnaire at T1 and a subsequent demographic follow-up questionnaire at T2 and T3, the MSAS, measuring postpartum symptom experience, and the ISEL-12, measuring perceived availability of social support. An evaluation of the nurse-navigated mobile-messaging intervention was completed after the T3 surveys were submitted.

Descriptive statistics were used to describe the sample, to compare the intervention and control groups and answer Hypothesis 1. Univariate and bivariate statistical analyses and a mixed-effects ANOVA were used to identify differences between the intervention and controls groups and to test the Hypotheses 2 and 3 The study's findings are presented in Chapter Four.

Chapter Four: Results

The purpose of this study was to investigate the relationship between daily, interactive nurse-navigated mobile messaging support and the outcomes of postpartum symptom experience and perceived availability of social support of first-time mothers who have unplanned cesarean births. Data, used in the analyses for the preliminary findings, were collected over a seven-month time frame. Presented in this chapter is a description of the study sample, including a comparison of the intervention and control groups on demographic characteristics at enrollment, and the results of the data analyses that address the three research questions. The preliminary findings reported include the data analyses of 41 of 44 enrolled subjects (93.2%) who completed the four-week study.

The Sample

Eligibility Screening

The staff nurses on the participating postpartum unit serving as nurse liaisons for this study approached English-speaking women who had first-birth cesareans at 37 or more weeks' gestation and asked them about interest in participating in a research study. Of the 95 women approached by nurse liaisons, 69 women agreed to eligibility screening by the PI. The ages of the women screened ranged from 19 to 39 years (M=28.07, SD=4.673). Fifty-seven women (82.6%) met all eligibility requirements, and 45 eligible women (78.9%) consented to participate in the study with 44 eligible subjects (77.2%) enrolling in the study. Subject allocation noted in Figure 4.1.

Attrition

Of the 44 subjects who enrolled in the study, only three subjects (6.8%) did not complete the four-week study. One subject chose to withdraw immediately after consent without completing any instruments at T1. Two subjects in the control group were lost to follow-up

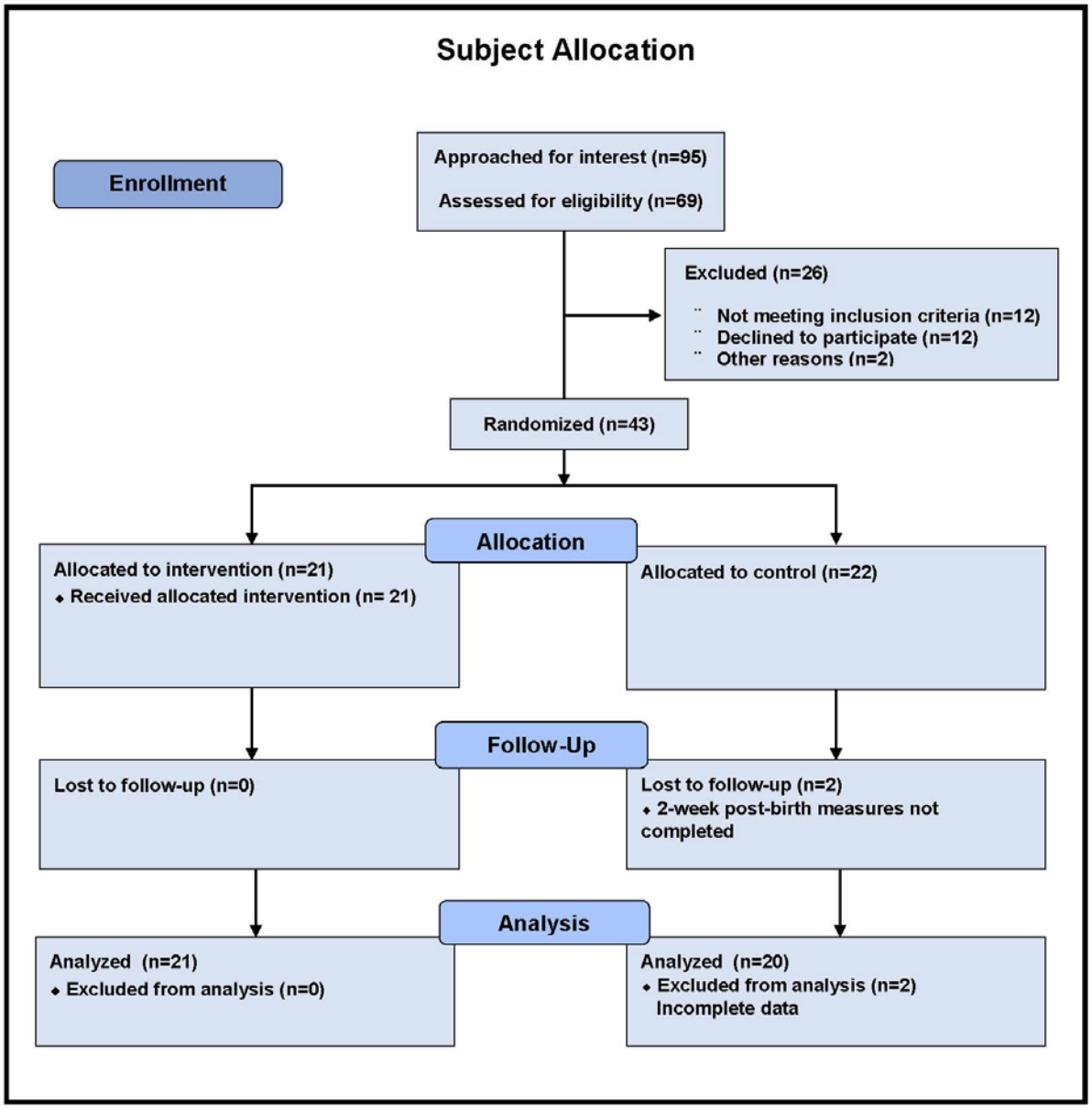


Figure 4.1 Subject Allocation

when they did not complete the T2 surveys within the allotted time period of 14-21 days' post-birth. Attrition shown in Figure 4.1.

Description of the Study Sample

The characteristics of the total sample at enrollment with the comparisons of the intervention and control groups are reported in Table 4.1. The sample (n=41) consisted of women who had a first-birth unplanned cesarean section zero to four days prior to enrollment and ranged in age from 20 to 34 years (M=27.83, SD=4.037). Race/ethnicity, highest level of completed education, family yearly income, relationship status, and newborn feeding at birth were reported categorically.

The sample was primarily comprised of white/Caucasian women. Thirty-nine women (95.1%) were in a relationship; 85.4% lived with their partner, and 63.4% were married. All but 14.6% of the women reported that their highest level of education included at least some college or trade school with 22% reporting graduate degrees.

The intervention and control groups were compared for statistical differences using Chi-square or independent samples t-tests depending on the level of measurement on all variables reported on Table 4.1. No significant differences were noted between the groups on race/ethnicity, education, employment status, relationship status, marital status, prior history of pregnancy loss, hours in labor prior to cesarean birth, attendance at pre-birth childbirth classes, newborn feeding choice at birth, or history of prior treatment for depression. The two groups differed significantly on age (M=27.83, SD=4.037, p=0.046) with the intervention group noted to be older by 2.5 years. Family yearly income was reported categorically, and a significant difference between groups (p=0.04) was noted. Upon further analysis, the significance noted was attributed to the difference found at the $20,000 to $59,999 level with 26.8% of the control

Table 4.1 Demographic Characteristics of the Sample

Variable	Total (N=41)	Intervention (n=21)	Control (n=20)	Differences between groups
	Mean ± SD or % (n)	Mean ± SD or % (n)	Mean ± SD or % (n)	*p* value *significant
Age in years (range 20-34)	27.83 ± 4.037	29.05 ± 4.307	26.55 ± 3.379	0.046*
Race/Ethnicity				0.68
American Indian/Native American	2.4% (1)	2.4% (1)	(0)	
Asian	2.4% (1)	2.4% (1)	(0)	
Black/African American	14.6% (6)	7.3% (3)	7.3% (3)	
Hispanic/Latina	7.3% (3)	2.4% (1)	4.9% (2)	
White/Caucasian	68.3% (28)	34.1% (14)	34.1% (14)	
Missing Responses	4.9% (2)	2.4%(1)	2.4% (1)	
Education				0.14
11th grade or <	2.4% (1)	2.4% (1)	(0)	
High school diploma	12.2% (5)	2.4% (1)	9.8%(4)	
Some college/trade school	17.1% (7)	4.9% (2)	12.2% (5)	
College degree	46.3% (19)	24.3% (10)	22.0% (9)	
Graduate degree	22.0% (9)	17.1% (7)	4.9% (2)	
Employed	70.7% (29)	31.7% (13)	39.0% (16)	0.31
Family yearly income				0.04*
< $20,000	17.1% (7)	12.2% (5)	4.9% (2)	
$20,000 – $59,999	34.1% (14)	7.3% (3)	26.8% (11)	*
$60,000 – $99,999	22.0% (9)	12.2% (5)	9.8% (4)	
≥ 100,000	26.8% (11)	19.5% (8)	7.3% (3)	
In a relationship	95.1% (39)	48.8% (20)	46.3% (19)	1.0
Live with partner	85.4% (35)	46.3% (19)	39.0% (16)	0.41
Relationship/marital status				0.39
Single	34.1% (14)	14.6% (6)	19.5% (8)	
Married	63.4% (26)	36.6% (15)	26.8% (11)	
Divorced	2.4% (1)	(0)	2.4% (1)	
Prior history of pregnancy loss	17.1% (7)	7.3% (3)	9.8% (4)	0.63
Hours in labor prior to cesarean	20.88 ± 12.983	19.38 ± 12.48	22.45 ± 13.632	0.46
Attended childbirth class	43.9% (18)	26.8% (11)	17.1% (7)	0.26
Newborn feeding at birth				0.14
Breastfeeding only	68.3% (28)	29.3% (12)	39.0% (16)	
Formula feeding only	7.3% (3)	7.3% (3)	(0)	
Both breast and formula feeding	24.4% (10)	14.6% (6)	9.8% (4)	
Prior treatment for depression	20.0% (8)	10.0% (4)	10.0% (4)	1.0
Missing responses	2.4% (1)	2.4% (1)	(0)	

group and only 7.3% of the intervention group reporting this level of income. Twenty-eight women (68.3%) reported exclusively breastfeeding while 10 (24.4%) reported breast and formula feeding. Only three women (7.8%) reported formula feeding only.

Missing Data

The number of missing responses on the demographic variables include two (4.9%) for race/ethnicity and one (2.4%) for prior treatment for depression; these are noted on Table 4.1. For the MSAS instrument, five different participants omitted a response for one symptom at only one time point during data collection. Per Portenoy et al., 1994, subjects should be excluded from analyses on a MSAS score when a certain amount of data is missing, and this was indiscriminately established for their study at 13% of the items, which is equivalent to approximately 4 items. For this study, the one occurrence of missing data for each of the five subjects was calculated to be 3.1% of the items, and therefore none of those subjects' scores were eliminated from analyses.

Two subjects each had one missing response on the ISEL -12 at only one data collection point. Pro-rated total scores were generated and used for these two subjects' ISEL-12 scores.

Data Analysis

Data were analyzed after 41 of 44 enrolled subjects completed the four-week study. Data collected from the three subjects who did not complete the study were omitted from all analyses.

The assumption of normality for continuous outcomes was assessed using skewness and kurtosis statistics. If either the skewness or kurtosis statistic was above an absolute value of 2.0, it was assumed to be non-normal. Box's M Test was used to test for the assumption of homogeneity of covariance. Mauchly's Test was used to test for the assumption of sphericity. Levene's Test of Equality of Variances was used to account for the assumption of homogeneity

of variance. A Greenhouse-Geisser correction was employed when sphericity was violated. Mixed-effects ANOVA was used to test for interaction effects between the treatment groups and multiple observations of the MSAS and ISEL-12. Marginal means and 95% confidence intervals for the interaction effect was interpreted. Statistical significance was assumed at an alpha value of 0.05 and all analyses were conducted using SPSS Version 22 (Armonk, NY: IBM Corp.).

Answer to Research Question I

Research Question I. During the initial postpartum period, do first-time mothers who have unplanned cesarean births express satisfaction with the experience of a daily, interactive mobile messaging from postpartum nurse navigators?

Hypothesis 1 H_A. Participants who receive a daily, interactive mobile messaging intervention during the initial postpartum period from postpartum nurse navigators will indicate satisfaction.

All 21 subjects in the intervention group completed the *Evaluation of Maternity Nurse Navigator Intervention* survey. The PI calculated descriptive statistics. Based on the evaluation scale used, 0 to 4, subjects indicated satisfaction with their overall experience with receiving texts from the maternity nurse [PPNN] (M = 3.24, SD = 1.221). Additionally, the PI calculated frequencies, and 85.7% (n=18) of subjects rated their overall experience as good or outstanding with no subjects rating their experience as poor. Only one subject (4.8%) rated their overall experience with receiving texts from the maternity nurse as fair; two subjects (9.5%) rated their experience as neutral. Frequencies are noted in Figure 4.2.

A majority of subjects indicated that they would very likely or definitely (61.9%, n=13) and 28.6% (n=6) would somewhat likely choose to receive daily text messages from a maternity nurse (PPNN) after birth (M = 2.9, SD =1.044). Only two subjects (9.5%) reported they would

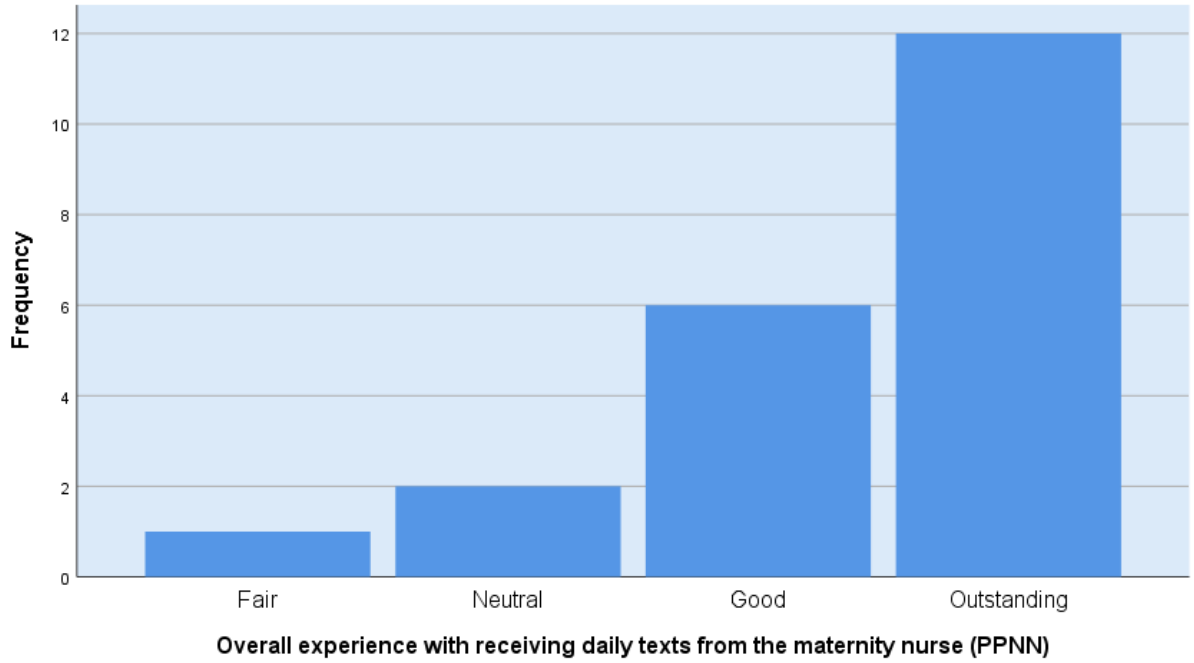


Figure 4.2 Overall experience of receiving daily text messages from the PPNN



Figure 4.3 Likelihood of choosing to receive daily text messages from a PPNN again

not likely choose to receive daily text messages from a maternity nurse after birth. Results are displayed in Figure 4.3.

Based on the findings, intervention group subjects expressed satisfaction with receiving daily text messages from the PPNN. Therefore, Hypothesis 1 was accepted.

Additional findings. The majority of women (71.4%, n=15) reported that afternoon/evening was the best time of day to receive a text from the PPNN while 19% (n=4) indicated that morning hours were preferable. Regarding the preferred frequency of receiving texts during the week from the PPNN, 42.9% (n=9) of women preferred it at least once daily with two women suggesting the frequency could then be decreased to every other day after the first two weeks. Eight women (38.1%) reported a desired frequency of two to three times per week with three women (14.3%) suggesting a frequency of once per week. One woman preferred more of an "on-demand" option so that she could text her question to get an answer when needed.

Thirteen women (61.9%) reported that knowing a professional resource was available daily to ask questions regarding concerns was the most helpful thing about receiving daily texting from the PPNN. The manner of caring conveyed by the PPNN to the subject was identified as most helpful by 23.8% (n=5) of the women. Receiving guidance (19%, n=4) as well as reassurance and encouragement (14.3%, n=3) were also noted. Comments from one subject, "*Having one source of information that I trusted instead of having to browse the net for answers was invaluable. It was so helpful to be reassured that I was on the right track about taking care of my baby. The nurse who texted me was exceptional, she was so caring and knowledgeable. It was amazing to know that I could trust someone with questions regarding both my baby's care and my own care*".

Some of the least helpful things about receiving a daily text from the PPNN included the difficulty of responding to the PPNN's text when busy with the baby (9.5%, n=2) and the limitations associated with trying to explain questions or concerns in a text message as opposed to a telephone conversation (9.5%, n=2). One subject explained, *"It's a text - she wasn't able to see first hand what was troubling us (i.e. a latch while nursing)."* Only 9.5% (n=2) of the women reported the least helpful thing about receiving a daily text from the PPNN was that on most days they had no problems, while 14.3%(n=3) reported that there was nothing that was least helpful. One subject (4.8%) declared *"Everything was helpful"* when responding to what was least helpful.

Answer to Research Question II

Research Question II. Does the postpartum symptom experience of primiparous women who have an unplanned cesarean birth differ between those who receive a daily nurse-navigated mobile messaging intervention until four weeks' post-birth and those who do not?

Hypothesis 2 H_A. Scores on the Memorial Symptom Assessment Scale (MSAS) will be lower in the intervention group than in the control group.

All statistical assumptions, with the exception of sphericity, were met for the MSAS analysis. The Greenhouse-Geisser correction was therefore employed. Using a mixed effects ANOVA, a non-significant interaction effect was detected for the MSAS, $F(2,78) = 0.02$, $p = 0.37$, $\eta^2 = 0.02$, power = 0.17. This indicates that there was not a significant difference in how the treatment and control groups changed across the within-subjects observations. Means and 95% confidence intervals for the MSAS analyses can be found in Table 4.2. Line graphs of the MSAS interaction effects can be seen in Figure 4.4.

Table 4.2 Means and 95% Confidence Intervals over Time of the MSAS and ISEL-12

Outcome	Time of Observation	Treatment (*M*, 95% CI)	Control (*M*, 95% CI)	*p*-value
MSAS				
	Time 1	0.57 (0.42 – 0.71)	0.45 (0.30 – 0.60)	
	Time 2	0.31 (0.21 – 0.41)	0.29 (0.18 – 0.39)	
	Time 3	0.20 (0.12 – 0.28)	0.18 (0.10 – 0.26)	0.37
ISEL-12				
	Time 1	30.95 (28.67 – 33.24)	32.02 (29.68 – 34.36)	
	Time 2	30.48 (27.79 – 33.17)	30.59 (27.83 – 33.34)	
	Time 3	31.29 (28.81 – 33.77)	30.40 (27.86 – 32.94)	0.36

Note: (*M*, 95% CI) – Mean, 95% confidence interval

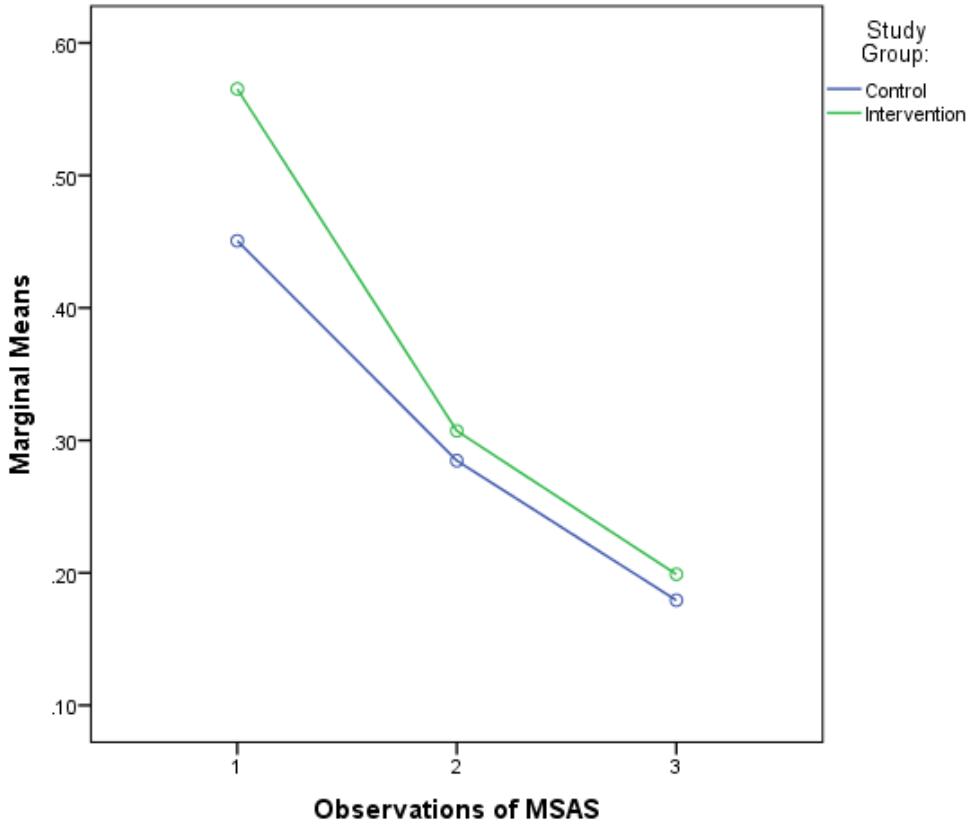


Figure 4.4 Line Graphs for the MSAS Interaction

No significant differences (p=0.37) were noted between the intervention and control group across the three observations on the MSAS at T1, T2, and T3. Therefore, the alternate hypothesis was rejected for Research Question II.

Answer to Research Question III

Research Question III. Does perceived availability of social support for first-time mothers who receive a daily nurse-navigated mobile messaging intervention until four weeks' post-birth vary from those who do not?

Hypothesis 3 H_A. Scores on the Interpersonal Support Evaluation List (shortened version) [ISEL-12] will be higher in the intervention group compared to the control group.

The assumption of sphericity was met for the ISEL-12 analysis. Using a mixed effects ANOVA, a non-significant interaction effect was also found for the ISEL-12, $F(2,38) = 1.06$, $p = 0.36$, $\eta^2 = 0.05$, power = 0.22. There was no difference between the treatment groups in regards to their change in ISEL-12 across time. Means and 95% confidence intervals for the analyses are outlined in Table 4.2. Line graphs of the ISEL-12 interaction effects are illustrated in Figure 4.5.

No significant differences (p=0.36) were noted between the intervention and control group across the three observations on the ISEL-12 at T1, T2, and T3. Therefore, the alternate hypothesis was rejected for Research Question III.

Summary

This chapter summarized the preliminary findings from this study. The characteristics of the sample were described and answers to the three research questions were addressed. The alternative hypothesis was accepted for Research Question I, but rejected for both Research Questions II and III. A discussion of these findings will be presented in Chapter Five.

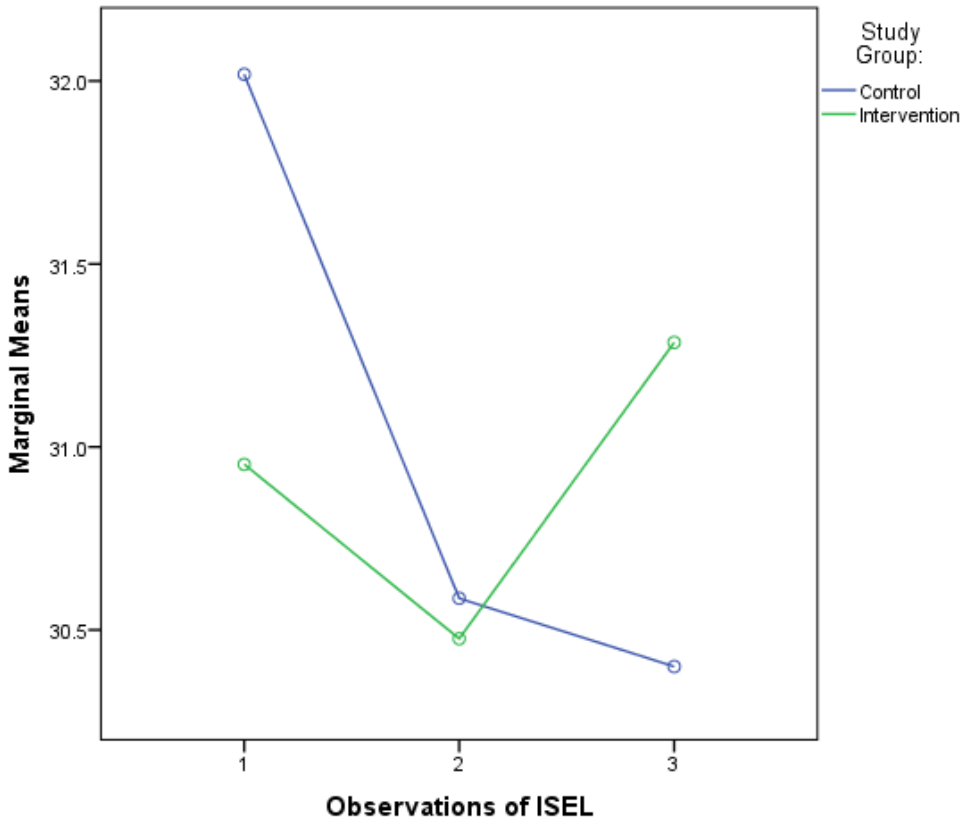


Figure 4.5 Line Graphs for the ISEL-12 Interaction

Chapter Five: Discussion

An aim of this study included testing a novel, interactive, postpartum nurse-navigated mobile messaging intervention for first-time mothers who had unplanned cesarean births. Secondary aims included investigating the relationship between the mobile messaging intervention and first-time mothers' recovery postpartum symptom experience and perceived availability of social support, as well as determining satisfaction with the nurse-navigated mobile messaging intervention. In this chapter, the author summarizes the study's preliminary findings and discusses these findings in relation to previous findings reported in the literature. Limitations and strengths of the study are presented. Implications for future research, nursing practice, nursing education and policy implications are discussed.

Summary of Preliminary Findings

The subjects in both the intervention groups and the control group were similar at enrollment on all demographic characteristics except for age and one annual income level. Subjects in the intervention group were noted to be 2.5 years older than subjects in the control group. The $20,000 to $59,999 level of annual income was significantly higher in the control group; the three other levels of annual income did not differ significantly between groups. Because the groups were not significantly different on any of the other numerous demographic variables examined, sufficient reason exists to presume that the groups were similar for the purposes of analysis and that these two significant differences likely did not impact the results of the study. The expectation exists that once adequately powered the statistical significance noted on these two variables will no longer be significant. If significant differences in the groups occur at the time of final enrollment, the PI will appropriately control statistically for the differences.

The majority (85.7%) of subjects in the intervention group who received daily, interactive texting from the PPNN expressed satisfaction. All but three of 21 subjects rated their overall experience as good or outstanding. Nearly two-thirds of the women in the intervention group indicated they very likely or definitely would choose to receive daily texting from a maternity nurse again after a birth with only two subjects reporting that they would not likely choose to receive daily texting from a maternity nurse again.

No differences were noted in postpartum symptom experience or perceived availability of social support for any subject, regardless of group assignment, when compared from baseline at two to four days' post-birth to two weeks' post-birth and four weeks' post-birth. Additionally, no differences were noted in postpartum symptom experience and perceived availability of social support between subjects who received daily, interactive texting from the PPNN until four weeks' post-birth compared to those who did not receive the texting from the PPNN across the same three time points, two to four days', two weeks' and four weeks' post-birth.

The Nurse-Navigated Mobile Messaging Intervention

Mobile messaging or texting as a tool to deliver an intervention has been used with various sample populations. Texting has commonly been used to promote healthy behaviors, send medical appointment reminders, and provide education to recipients. However, most text messages have been standardized without the option to customize a message or reply to the sender. Few studies have incorporated two-way texting communication. Two examples include a pilot study to support smoking cessation in college students (Obermayer, Riley, Asif, & Jean-Mary, 2004) as well as in a partially randomized controlled trial (N=100 with n=8 allocated to intervention because of severity of their disease) where physicians were able to respond with

recommendations when women with gestational diabetes texted their weekly glucose results (Pérez-Ferre et al., 2010).

No previous studies have been identified in the literature that employed a daily, individualized, patient-focused, interactive texting with a professional nurse in real-time until four weeks' birth in a postpartum population of first-time mothers who had unplanned cesarean sections. This study uniquely contributes to the advancement of nursing science because of this novel and innovative approach. Thus, in comparing this study's findings to the existing literature, the differences in interventions should be considered.

Expressed satisfaction with the nurse-navigated mobile messaging intervention. Subjects in this study expressed satisfaction with the daily, interactive, nurse-navigated mobile messaging intervention. These findings were not surprising as it was expected new mothers would respond positively to the access and personal attention received from a professional nurse as noted previously in the literature (Brooten et al., 1994; Butchart, 1999; Fahey & Shenassa, 2013; Kanotra et al., 2007).

This study's results align with findings in other studies where maternal satisfaction was reported with receipt of postpartum nurse support following childbirth. Mothers participating in focus groups identified the importance of the role of professional support and knowing the midwife was available to listen when needed (Butchart, 1999). Findings noted in a study of 122 women who had unplanned cesarean births similarly indicated significantly greater satisfaction during the postpartum period in the intervention group who received nurse specialist care compared to the control group despite shorter hospital stays in the intervention group (Brooten et al., 1994). The nurse specialist care included at least two home visits, ten telephone calls over eight weeks and daily extended telephone access to the nurse specialist (Brooten et al., 1994).

In a study conducted in California, 1014 low-risk maternal/newborn dyads discharged from the hospital by 48 hours of birth were randomized to home nurse visits or hospital-based follow-up care that occurred within 72 hours following hospital discharge (Escobar et al., 2001). Using intention-to-treat analyses, researchers reported the outcome of maternal satisfaction with care to be significantly higher in the group that received home follow-up nurse care; however, clinical outcomes did not differ between groups, and group follow-up visits at the hospital clinic cost far less (Escobar et al., 2001). Maternal satisfaction with care was measured at two weeks postpartum via a telephone call using by a validated scale that had been modified for study purposes (Escobar et al., 2001).

In another California study conducted at the same hospital facility but concluding the year prior to the initiation of the study by Escobar et al. (2001), which is described in the preceding paragraph, 1,163 low-risk mother/baby dyads were randomly assigned to receive home visits by a registered nurse with the control group receiving follow-up at the hospital's pediatric clinic within 48 hours post hospital discharge (Lieu et al., 2000). Women in the intervention group also reported increased satisfaction with different aspects of care received compared to women in the control group, but women in the control group assigned to return to the pediatric clinic did not see a provider for their own care during this visit (Lieu et al., 2000). This could have contributed to statistical differences noted between the two groups in maternal satisfaction with care when it was measured at two weeks postpartum. Costs associated with the nurse home visits exceeded costs incurred when the mother/infant dyads returned to the hospital clinic for follow-up care (Lieu et al., 2000).

In contrast, in a study in Canada with 586 postpartum women who delivered vaginally and were discharged home from the hospital within 36 hours of birth, researchers found no

difference in satisfaction with nurse care between the intervention and control groups (Gagnon, Dougherty, Jimenez, & Leduc, 2002). The intervention group received care via a registered nurse home visit at three to four days postpartum while the control group returned to the hospital clinic for follow-up on day three postpartum. Interestingly, the length of the nurse home visits lasted 82% longer (37.2 minutes) than the hospital follow-up clinic visits (Gagnon et al., 2002). Both groups of women received nurse phone calls at 48 hours postpartum prior to any follow-up care, so this may have attributed to no differences in satisfaction with services received between the two groups. Researchers concluded that hospital follow-up required less overall resources, was likely more cost-effective, and was acceptable to postpartum women (Gagnon et al., 2002).

Congruent with this study's findings related to expressed satisfaction with the mobile messaging intervention, but described in a cancer population, researchers reported increased satisfaction with care in 78 Korean subjects who participated in a 12-week care coordination program led by nurse navigators compared to the control group (T. Lee et al., 2011). Additionally, significant differences in physical and social functioning were noted between the intervention and control groups (T. Lee et al., 2011).

Postpartum symptom experience. No significant differences were noted between the intervention and control groups across time in the overall symptom experience. This study focused on women's total postpartum symptom experience and did not analyze specific individual symptoms experienced or examine mental health symptoms or physical health symptoms separately. In general, subjects did not report experiencing a large number of symptoms during the postpartum recovery period. Yet, in calculating the total symptom score, the scores for each of 32 symptoms was used even if a symptom score was equal to zero. This may help to explain the lack of differences in subjects and between groups from baseline across

the data collection time points. Additionally, even though professional nursing support may assist with decision making related to whether a symptom warrants further medical attention, the nursing support may not influence the occurrence, frequency, severity, or distress a symptom causes which is what the MSAS measured. This could offer one explanation for the similar variation and the lack of differences in overall postpartum symptom experience noted between subjects in this study's intervention and control groups.

Examining the prevalence of individual symptoms experienced and the distress caused by the symptom would have provided more specific insights into these first-time mothers' postpartum symptom experience. Determining the prevalence of the most bothersome individual symptoms to postpartum women who had unplanned cesarean births would have offered additional information about the postpartum symptom experience that could be useful for planning interventions to target improvement of those symptoms during the childbirth recovery period. Exploring the change in the specific symptoms over time within both the control and intervention groups as well as comparing specific symptoms experienced between the two groups may have yielded different results.

Additionally, analyzing the MSAS subscales, physical symptoms (MSAS-PHYS), psychological symptoms (MSAS-PSYCH), and the Global Distress Index score (MSAS-GDI) could have provided additional insights related to these subscale's specific cluster of symptoms for the postpartum women in this study. The MSAS-PHYS subscale score comprises the average symptom scores of 12 symptoms: lack of appetite, lack of energy, pain, feeling drowsy, constipation, dry mouth, nausea, vomiting, change in taste, weight loss, feeling bloated, and dizziness. The MSAS-PSYCH subscale score includes the average symptom scores for the six symptoms: feeling sad, worrying, feeling irritable, feeling nervous, difficulty sleeping, and

difficulty concentrating. The MSAS-GDI score encompasses the average of the single dimension of scores for 10 symptoms: the frequency scores for feeling sad, worrying, feeling irritable, and feeling nervous and distress scores for lack of appetite, lack of energy, pain, feeling drowsy, constipation, and dry mouth (Portenoy et al., 1994). The MSAS symptom subscales may have better captured the postpartum symptom experience for the women in this study.

Findings have been published on the symptom experience in late pregnancy (Beebe et al., 2017), but no published studies have reported findings on the overall postpartum symptom experience. Unpublished data from the Beebe et al. (2017) study, showed a significant decrease ($p<0.001$) in the MSAS total symptom scores of women from one to three months postpartum and older moms (35+ years old) had more reported symptoms (K. Lee, personal communication, March 20, 2018).

Data collection in this study ended after the four-week post-birth surveys were completed, so this study's findings differ in the time frames of symptom assessment when compared to the findings reported by Webb et al. (2008). In the longitudinal study to examine the relationship between the reported occurrence and severity of postpartum physical symptoms (grouped as seven symptom categories) and women's reported functional limitations and emotional well-being at nine to 12 months postpartum, investigators consistently found statistically significant relationships with all symptom groups. The seven symptom categories ([fatigue, headaches, nausea], backache, abdominal pain, [vaginal pain or dyspareunia], [constipation or hemorrhoids], [urinary or bowel problems], and breast soreness), grouped by an interdisciplinary panel of obstetricians, pediatricians, family physicians, and epidemiologists, appeared to be clinically related as confirmed by factor analyses (Webb et al., 2008). Interviewers used a symptom checklist when asking women if any of the symptoms had posed a

problem since childbirth, and if so, women were asked to indicate the severity, not a problem, a minor problem, somewhat of a problem, or a major problem (Webb et al., 2008). Researchers created their own instrument to measure postpartum symptoms in their study, and the study population (n = 1,323) differed from this study's sample as it included mostly single, low income, inner city, African American women with only 48% of them primiparas and only 21% of the sample experiencing a cesarean birth (Webb et al., 2008).

No differences in maternal depressive symptoms at two weeks postpartum were noted between the women in the intervention group who after hospital discharge received a nurse home visit within four days of birth and the control group who received hospital follow-up care within the same time frame in two different California studies, each with more than 1000 postpartum subjects (Escobar et al., 2001; Lieu et al., 2000).

Perceived availability of social support. The findings that the nurse-navigated mobile messaging intervention in this study did not increase perceived availability of social support are congruent with the findings from a systematic review of the literature that found no significant relationships in low-risk women with the effectiveness of universal postpartum support and the outcomes mental health, physical health, or quality of life (Shaw et al., 2006). Women desire social support after childbirth (Fahey & Shenassa, 2013; Kanotra et al., 2007; Negron et al., 2013).

This study's results differ from the most common theme "need for social support" identified in 32% of the comments related to postpartum concerns made by 9.5% of new mothers in the 2000 Pregnancy Risk Assessment Monitoring System (PRAMS) Survey (Kanotra et al., 2007). A specific comment shared by a new mother from that survey, "I felt there should a have been some sort of support group for the first time moms to talk to each other and maybe have a

nurse, doctor or a very experienced mom to help relieve fears" (Kanotra et al., 2007, p. 552). Although, subjects in the intervention group in this study did convey a similar general sentiment when 61.9% of them reported knowing a professional resource was available daily to ask questions regarding concerns was the most helpful thing about receiving daily texting from the PPNN.

The absence of differences in perceived availability of social support between the intervention and control groups may be attributed to the desire for instrumental support immediately following childbirth, which involves assistance with material resources and the completion of tasks instead of emotional support [feeling loved, supported, or encouraged] (Fahey & Shenassa, 2013; Negron et al., 2013). Since new mothers may be more task-focused during the initial postpartum period following birth, receipt of adequate instrumental support may lessen the need for emotional support during this same time frame.

The nurse-navigated mobile messaging intervention offers an emotional type of support as well as informational support but cannot provide the tangible instrumental support. Women often find they receive many offers of assistance during the initial days at home with a newborn from family members, neighbors, and friends. Therefore, initial social support needs may be satisfactorily met from various people within the postpartum woman's realm of supporters. This may provide another explanation for no significant differences or initial variation noted between the intervention and control groups from baseline to the two weeks' post-birth measurement.

Although not significantly different but nonetheless interesting, the intervention groups' perceived availability of social support increased at four weeks' post-birth while the control groups' perceived availability of social support continued its downward trajectory. A definite

benefit of full enrollment will be to determine whether or not this trend will continue and any significant differences are detected.

When planning the delivery of the intervention, the PI speculated the new mothers would require more attention from the PPNNs during the first two weeks' post-birth, but if social support availability exists from family and friends, the need for mobile messaging support may be greater once this social support wanes. Perhaps this contributed to the lack of significant findings. Extending the length of the mobile messaging intervention delivery until eight or twelve weeks' post-birth may better detect any differences between the intervention and control groups should they exist if, in general, social support typically lessens in the subsequent weeks following birth.

Another explanation worth considering may be related to the measure used. The ISEL-12 measures perceived availability of social support in a variety of populations. An instrument designed for specific use by postpartum women may have offered a more sensitive measure of social support for this study's population and may have been more suited to detect any existing differences between the intervention and control groups. Other considerations when measuring postpartum social support could include identifying the type (emotional, instrumental, informational), quantity, duration, and social support provider's relationship to the postpartum woman. Measures such as these could offer additional insights into the specifics social support needs of postpartum women.

A total ISEL-12 score was used for all analyses. Examining and comparing scores on ISEL-12's three subscales, appraisal support, belonging support, and tangible support could have possibly revealed differences among the intervention and control groups that were not demonstrated by evaluation of the total ISEL-12 score.

Implications for Research

The findings presented here include preliminary data analyses. Plans exist to continue the study by enrolling subjects until adequate power is met and a minimum of 82 subjects have completed the study. Data will then be analyzed from the larger sample to determine if any differences from the preliminary findings emerge. Opportunities exist to use data collected during this study to examine specific symptoms experienced with the symptom's associated symptom distress, to calculate subscale scores based on psychological symptoms and physical symptoms as well as calculate a Global Distress Index score. Examining specific symptoms experienced as well as comparing psychological versus physical symptom occurrence during this initial four-week postpartum period would provide further insights into women's postpartum symptom experience. Additionally, determining symptom prevalence among subjects will inform more specifically the symptoms women must manage during the four weeks following cesarean birth.

A qualitative analysis of all of the texting data between the subjects and the PPNNs while also including a qualitative exploration of the summary notes recorded by the PPNN on the daily encounter form would allow for the identification of themes that could further describe the postpartum symptom experience and perceived availability of social support of the first-time mothers who had an unplanned cesarean birth that participated in this study. Qualitative exploration may offer insights on possible benefits of a nurse-navigated mobile messaging support intervention that could not be detected with the measures used in this study. Additionally, qualitative findings can inform the refinement of the nurse-navigated mobile messaging support intervention.

Using this study as foundational work, next steps include exploring options to affordably expand the availability and access to a PPNN beyond only a specific two-hour daily time frame that was used in this study. Quick and easy access to professional nursing care during the initial postpartum period may offer benefits yet to be identified. Other things to consider include altering the "dose" as well as extending the length of the post-birth intervention.

Future studies could be designed to explore varying the "dose" of the nurse-navigated mobile messaging intervention. Some subjects suggested the contact with the PPNN could be decreased to one to three times per week after the first two weeks. Perhaps decreasing the texting by the primary PPNN to every other day or three times per week with a secondary PPNN available on the opposite day schedule could be a "dose" adjustment. This offers PPNN availability, whether primary or secondary, six of the seven days per week with the possibility of offering PPNN availability as an "on-call" option on the seventh day of the week. Additional studies with texting interventions with postpartum populations serve to advance the science and feasibility of using mobile health to promote health following childbirth.

Future studies can build on this study's preliminary findings and broaden the inclusion criteria to include all first-time mothers regardless of age, complications during pregnancy, ongoing treatment for a mental health concern, existence of a chronic illness, and mode of birth, whether vaginal or a cesarean. In another randomized controlled trial, it would be expected that these criteria would occur equally across both the intervention and control groups. Co-variates could be identified and controlled in statistical analyses. Exploring the influence of mode of birth or number of births on the postpartum symptom experience are other opportunities. Other outcomes such as postpartum functional status and healthcare costs related to postpartum morbidity could be investigated.

Identifying and using another validated instrument targeted specifically to the postpartum period to measure perceived postpartum social support could offer other insights. Should a suitable measure not be available, developing and testing an instrument that will more specifically measure social support during the initial postpartum period may be worth considering as the instrument used in this study (ISEL-12) provided a broad view of perceived availability of social support.

The SMT concept, symptom status outcomes, to the (Dodd et al., 2001; Humphreys et al., 2008; Larson et al., 1994), could be investigated by measuring outcomes such as postpartum functional status, postpartum emotional status, and/or postpartum morbidity healthcare costs. This could prove beneficial in determining if relationships exist with the postpartum symptom experience. Additionally, another consideration is to examine postpartum symptoms through the framework lens of the Theory of Unpleasant Symptoms (Lenz & Pugh, 2008) as it may offer another perspective that could be useful in planning postpartum nursing care and support interventions.

Subject burden related to completing three surveys at three separate time points, although carefully considered when initially planning this study, proved to be an unsubstantiated concern as it took no more than one-half of the originally projected time for subjects to complete the surveys. Therefore, incorporating additional measures to the measures used in this study should not unreasonably increase subject burden.

The extant literature on the facilitation of health during the initial postpartum period is limited. The health of women can influence the health and well-being of the family unit (Borders, 2006; Cheng et al., 2006), so consequently postpartum health deserves more research attention. Professional nurses are optimally positioned as care providers within the U.S.

healthcare system to take the lead in ensuring women receive the postpartum care needed. Mobile messaging support may offer a cost-efficient way to provide women easy and convenient access to a professional nursing resource during the postpartum period which can foster a healthy recovery following childbirth.

Implications for Nursing Practice

The role of the PPNN needs to be further refined and tested as a resource for women after childbirth. As the majority of the women receiving daily mobile messaging from a PPNN expressed satisfaction, providing easy access to a professional nurse resource in the weeks following childbirth may help to meet a need for addressing questions related to recovery care, newborn care and breastfeeding. After hospital discharge, new mothers, who are learning the logistics of breastfeeding, can likely use additional instructions along with reassurance and encouragement as they learn to breastfeed their newborns.

Mobile messaging can deliver continuity of care following hospital discharge until postpartum follow-up with care providers. Mobile messaging also offers the convenience of professional nursing assistance without the need to leave one's home setting. Furthermore, experienced maternity nurses serving as PPNNs possess the skills to assess and evaluate when face-to-face care is warranted. The potential exists to create a service where interested postpartum women could have texting access to a professional PPNN during their postpartum recovery. Determining the manner and the means to provide this mobile service more broadly requires further exploration.

Development of such a service could establish job and even business opportunities for experienced maternity nurses. Since texting can be implemented irrespective of the setting, working in the role of a PPNN might be attractive to professional maternity nurses who desire to

supplement their income, desire job schedule and location flexibility, desire to continue contributing to the profession after retirement from traditional bedside nursing, and/or desire options to provide nursing care in a non-traditional manner. Anecdotally and optimally, professional nurses functioning in the role of PPNN should possess both postpartum and newborn clinical nursing experience.

Implications for Nursing Education

Nursing curricula must be designed to teach strategies to equip students to function and deliver nursing care in an increasingly technologically driven environment. The number of U.S. cell phone owners now equals 95% with smart phones accounting for 77% of the total ("Mobile Fact Sheet," 2017). Mobile health (mHealth) is rapidly expanding, and a growing mobile society will mandate non-traditional nursing care. Nursing students should be trained and prepared to use the nursing process in the assessment, planning, delivery, and evaluation of care for patients through mHealth technologies. Opportunities should be provided to learn, practice, and role play therapeutic communication skills. Mobile nursing care delivered via remote technology will require astute assessment and observation skills, attention to detail, and excellent communication strategies. These skills are needed to aptly provide nursing care for all patients but even more so when physical touch is not an option because patients are located in other physical places. Nurses entering the profession will need to be well prepared to embrace all forms of technology so that they are equipped to provide patient-centered, evidenced-based nursing care whether it is delivered to patients face-to-face or remotely.

Policy Implications

Currently, the U.S. health insurance system provides coverage for numerous routine follow-up visits for the newborn during the first year of life, while only one maternal follow-up

care visit at six weeks postpartum is typically covered (Fowles, Cheng, & Mills, 2012). Postpartum healthcare in the U.S. lacks consistency and is often fragmented, with as many as 40% of women never returning for follow-up care after childbirth primarily due to lack of transportation, lack of child care, lack of maternity leave and/or feeling overwhelmed with infant care (American College of Obstetricians and Gynecologists, 2016; "Many nurses lack knowledge of health risk to mothers after childbirth," 2017). In the process of incorporating a newborn into a family, first-time mothers primary focus on caring for the newborn while juggling family role transitions and adaptations can make self-care and attention to postpartum concerns a lesser priority.

The American College of Obstetricians and Gynecologists (2018) released a Committee Opinion report outlining updated recommendations for redefining postpartum care. A Presidential Task Force recognized the need for ongoing postpartum care during the "fourth trimester" that would begin within three weeks of birth and conclude with a comprehensive postpartum evaluation of physical, psychological, and social well-being by 12 weeks postpartum rather than the current traditional one-time postpartum follow-up visit often scheduled six weeks after birth (American College of Obstetricians and Gynecologists, 2018). These recommended postpartum care delivery changes demonstrate a recognition of the importance of continuing maternal care in the weeks following birth, especially since nearly 40% of U.S. maternal deaths were found to occur during postpartum Days 1 to 41 postpartum (Creanga et al., 2017).

Creating access to postpartum health resources by providing reimbursement for such services through private and government health insurance and community resources is an investment in our future. Healthy new mothers can help to facilitate newborn health as well as health of the entire family as the mother is often a predominant contributor to the functioning of

the family. With evidence that the postpartum period is not without potential complications, it seems reasonable that providing access to a professional maternity nurse resource who can recognize the need for medical attention early in an effort to mitigate a complication could be more cost-efficient than if a complication is not promptly addressed. Alternately, a professional maternity nurse resource who can answer first-time mothers' questions, provide anticipatory guidance, as well as reassurance may help to prevent unnecessary costs if patients are directed to the appropriate level of care needed to address their concern. This could help to decrease unwarranted visits to an ED for care occurrences that should be managed in non-acute healthcare settings.

Mobile messaging can help to address transportation and child care barriers that interfere with women returning for follow-up care during the postpartum period. Mobile messaging eliminates boundaries when service can be extended regardless of patients' physical locations. Therefore, it is a potential tool that can help to increase access to postpartum care for women, especially women residing in underserved healthcare areas and/or rural settings. Easy access to professional nursing care via mobile technology can assist and guide women's decision making when determining whether postpartum concerns warrant further medical attention, an especially valuable benefit if extensive travel is required to get to a physical healthcare location for an evaluation.

Routine postpartum care for women should not be an after-thought in the U.S. Women recovering from childbirth deserve continued attention from healthcare providers in an effort to address and facilitate physical, psychological, and social well-being. Postpartum care should be an integral aspect of the healthcare offered to women during the childbearing cycle. Doing so

provides continuity of healthcare following the intensified and focused care women receive during pregnancy and childbirth.

Limitations

Random selection was not possible because recruitment of subjects occurred at only one large, southeastern medical center. This impacts the external validity of the study and limits the generalizability of the study's results to the select sample. A convenience sample of first-time mothers who met eligibility criteria were approached by staff nurse liaisons and volunteered to participate in the study after contact with the PI; the study's findings do not represent experiences of first-time mothers who were eligible but chose not to participate. The study's subjects included only women who could speak, read, and write the English language due to the nature of intervention. Otherwise, communication with the PPNN would have required technological translation and back-translation resources not available for this study. This further limits generalizability of any study findings.

Reactivity, the degree to which the subjects respond as a study participant, is another potential threat to the external validity of this study (DePoy & Gitlin, 2005). Although the generalizability of this study's findings is limited to the selected sample, knowledge gained in this study can inform future research studies that can produce findings that extend more broadly.

The study was underpowered, limiting the ability to detect a causal effect of the intervention. Data were analyzed on 41 subjects who completed the four-week study. Eighty-two subjects were required to power the study. With the study underpowered, the probability of detecting any differences between the control and intervention groups is very low. Low statistical power may fail to demonstrate any relationship between the intervention or independent variable and the dependent variables even when one exists (Polit & Beck, 2008).

Recruitment of subjects presented ongoing challenges and created definite limitations related to the pace of the study's progression. The timing of trying to recruit women to participate in the immediate days following birth proved difficult when many circumstances (interruptions from care providers, nurses, lactation consultants, hospital ancillary staff, visitors) were vying for the new mother's attention along with the adjustment of caring for a newborn. These things coupled with caring for a newborn who must be fed every two to four hours can be interruptive to trying to rest adequately after a major abdominal surgery. Some potential subjects declined to participate related to the steady flurry of activity and interruptions that typically occur with the arrival of a new baby and especially a first baby.

Additionally, other recruitment challenges were encountered at the study site. The hospital implemented a new electronic health record system, which created an initial documentation burden for the staff nurses. The nurse liaisons were unable to actively search and recruit potential subjects because documentation of their patient care took much longer than previously as they learned the new documentation system. Since the nurse liaisons identified potential subjects during their work shift, recruitment halted for two weeks. During the holidays, another three-week period occurred when no potential subjects were even screened for eligibility. Although the nurse manager of the postpartum unit was always helpful in trying to devise solutions to overcome the recruitment challenges, recruitment of subjects depended solely on the staff nurse liaisons and their time availability to identify potential subjects and approach them to determine interest in participating, which was a definite limitation.

Other recruitment challenges included connecting with potential subjects after they were identified by the staff nurse liaisons and agreed to be contacted by the PI. Prior to obtaining IRB approval to use an electronic consenting process, some potential subjects were lost before

enrollment when they were discharged at two days postpartum before the PI could meet with them to consent them in their hospital room. Some potential subjects, even though they had expressed interest in the study, did not respond to telephone messages or texts when the PI tried to connect with them. Trying to enroll subjects within the time constraint of two to four days postpartum was an additional enrollment burden.

Because of the numerous eligibility requirements, especially the exclusion of subjects 35 years or older (advanced maternal age), there were some women who were immediately excluded and never approached by the nurse liaisons. Several women, who were screened but deemed ineligible due to advanced maternal age, expressed disappointment when excluded from participation. The study's exclusion criteria attempted to eliminate potential confounders but perhaps removing the age limitation could have boosted enrollment more quickly. Random assignment would have helped to minimize effects of this potential confounder by theoretically distributing older mothers equally among the two groups.

Strengths

This study implemented a novel and innovative, technologically-based, mobile messaging intervention that was interactive, patient-centered, and implemented by professional maternity nurses during the initial postpartum period to first-time mothers who had unplanned cesarean births. The uniqueness of this intervention adds strength to this study as it is the first time this approach has been implemented with a population of first-time postpartum mothers. These findings contribute to advancing the science of nursing by entering the extant literature for the very first time.

This study created a postpartum nurse support role, designated the professional registered nurse serving in this role as a PPNN, and tested the acceptance of nurse support in the initial

postpartum period through mobile messaging. A majority of first-time mothers in this study indicated that would likely choose to receive texting from a maternity nurse after a future birth. Access to an experienced professional registered nurse was well received by most of the women in this study and shows promise as a potentially effective intervention to support postpartum health. Providing easier access to professional nursing care for mothers following childbirth through a PPNN may facilitate an uneventful postpartum recovery experience and support maternal well-being.

Another strength of this study relates to the randomized controlled trial research design. Random assignment strengthened the research design contributing to the internal validity of the study. Although power was not met and was a factor in the preliminary findings presented, this study's research design provides the highest level of evidence to support the effectiveness of an intervention which can be used to inform evidence-based nursing practice (DePoy & Gitlin, 2005). Consequently, final data analyses will be completed and findings re-evaluated when the study is appropriately powered.

Conclusion

Promoting healthy beginnings for new mothers and their babies is essential. The testing of the daily, interactive nurse-navigated mobile messaging intervention for four weeks' post-birth provided information about the relationship between nurse-navigated support for new mothers and the postpartum symptom experience as well as new mothers' perception of social support. The PPNN intervention shows promise as a bridge for a care gap that exists between hospital discharge and follow-up care often not scheduled until four to six weeks after birth. Study findings also provided insights into women's satisfaction with receiving nurse-navigated mobile messaging postpartum support.

The results of this study offer information to consider when planning postpartum care interventions as interventions can be developed to target and influence the postpartum recovery experience for women. The results also contribute to the existing knowledge in the literature in the area of postpartum health. Facilitating optimal health for the postpartum women can positively impact the maternal/infant dyad generating benefits for families that extend well beyond the initial postpartum recovery period.

References

Albers, L. L. (2000). Health problems after childbirth. *The Journal of Midwifery & Women's Health*, *45*(1), 55–57. https://doi.org/10.1016/S1526-9523(99)00003-3

Alden, K. R. (2016a). Anatomy and physiology of pregnancy. In D. L. Lowdermilk, S. E. Perry, K. Cashion, & K. R. Alden (Eds.), *Maternity & women's health care* (11th ed., pp. 283–300). St. Louis, MO: Elsevier.

Alden, K. R. (2016b). Newborn nutrition and feeding. In D. L. Lowdermilk, S. E. Perry, K. Cashion, & K. R. Alden (Eds.), *Maternity & women's health care* (11th ed., pp. 601–632). St. Louis, MO: Elsevier.

Alden, K. R. (2016c). Postpartum physiologic changes. In D. L. Lowdermilk, S. E. Perry, K. Cashion, & K. R. Alden (Eds.), *Maternity & women's health care* (11th ed., pp. 473–480). St. Louis, MO: Elsevier.

American College of Obstetricians and Gynecologists. (2016). *Optimizing postpartum care* (Committee on Obstetric Practice Opinion No. No. 666) (pp. 1–6). The American College of Obstetricians and Gynecologists. Retrieved from https://www.acog.org/Resources-And-Publications/Committee-Opinions/Committee-on-Obstetric-Practice/Optimizing-Postpartum-Care

American College of Obstetricians and Gynecologists. (2018). Optimizing postpartum care. *Obstetrics & Gynecology*, *131*(5), e140–e150. https://doi.org/10.1097/AOG.0000000000002633

American College of Obstetricians and Gynecologists, Society for Maternal-Fetal Medicine, Caughey, A. B., Cahill, A. G., Guise, J.-M., & Rouse, D. J. (2014). Safe prevention of the primary cesarean delivery. *American Journal of Obstetrics & Gynecology*, *210*(3), 179–193. https://doi.org/10.1016/j.ajog.2014.01.026

Ansara, D., Cohen, M., Gallop, R., Kung, R., & Schei, B. (2005). Predictors of women's physical health problems after childbirth. *Journal of Psychosomatic Obstetrics & Gynecology, 26*(2), 115–125. https://doi.org/10.1080/01443610400023064

Aouizerat, B. E., Gay, C. L., Lerdal, A., Portillo, C. J., & Lee, K. A. (2013). Lack of energy: An important and distinct component of HIV-related fatigue and daytime function. *Journal of Pain and Symptom Management, 45*(2), 191–201.

Bartick, M., & Reinhold, A. (2010). The burden of suboptimal breastfeeding in the United States: A pediatric cost analysis. *Pediatrics, 125*(5), e1048–e1056. https://doi.org/10.1542/peds.2009-1616

Beebe, K. R., Gay, C. L., Richoux, S. E., & Lee, K. A. (2017). Symptom experience in late pregnancy. *Journal of Obstetric, Gynecologic & Neonatal Nursing, 46*(4), 508–520. https://doi.org/10.1016/j.jogn.2017.03.007

Borders, N. (2006). After the afterbirth: A critical review of postpartum health relative to method of delivery. *Journal of Midwifery & Women's Health, 51*(4), 242–248. https://doi.org/10.1016/j.jmwh.2005.10.014

Boyle, A., Reddy, U. M., Landy, H. J., Huang, C.-C., Driggers, R. W., & Laughon, S. K. (2013). Primary cesarean delivery in the United States. *Obstetrics & Gynecology, 122*(1), 33–40. https://doi.org/10.1097/AOG.0b013e3182952242

Briggs, J. K. (1997). *Telephone triage protocols for nurses*. Philadelphia, PA: Lippincott.

Brink, P. J., & Wood, M. J. (1998). *Advanced design in nursing research* (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Brooten, D., Roncoli, M., Finkler, S., Arnold, L., Cohen, A., & Mennuti, M. (1994). A randomized trial of early hospital discharge and home follow-up of women having cesarean birth. *Obstetrics & Gynecology*, *84*(5), 832–838.

Buchner, A., Erdfelder, E., Faul, F., & Lang, A.-G. (n.d.). Universität Düsseldorf: G*Power: Statistical power analyses for Windows and Mac. Retrieved July 12, 2016, from http://www.gpower.hhu.de/en.html

Buckley, S. J. (2015). *Hormonal physiology of childbearing: Evidence and implications for women, babies, and maternity care* (pp. 1–225). Washington, D.C.: Childbirth Connection Programs, National Partnership for Women & Families. Retrieved from www.ChildbirthConnection.org/HormonalPhysiology

Butchart, W. A. (1999). Listening to Women: Focus group discussions of what women want from postnatal care. *Curationis*, *22*(4), 3–8. https://doi.org/10.4102/curationis.v22i4.739

Centers for Disease Control and Prevention. (2016). *Progressing toward national breastfeeding goals, United States* (Breastfeeding Report Card) (pp. 1–8). Atlanta, GA.

Chang, V. T., Hwang, S. S., Thaler, H. T., Kasimis, B. S., & Portenoy, R. K. (2004). Memorial symptom assessment scale. *Expert Review of Pharmacoeconomics & Outcomes Research*, *4*(2), 171–178.

Chantry, C. J. (2011). Supporting the 75%: Overcoming barriers after breastfeeding initiation. *Breastfeeding Medicine*, *6*(5), 337–339. https://doi.org/10.1089/bfm.2011.0089

Chen, C.-H., Tseng, Y.-F., Chou, F.-H., & Wang, S.-Y. (2000). Effects of support group intervention in postnatally distressed women: A controlled study in Taiwan. *Journal of Psychosomatic Research*, *49*(6), 395–399. https://doi.org/10.1016/S0022-3999(00)00180-X

Cheng, C.-Y., Fowles, E. R., & Walker, L. O. (2006). Postpartum maternal health care in the United States: A critical review. *Journal of Perinatal Education, 15*(3), 34–42. https://doi.org/10.1624/10581246X119002

Chilukuri, N., West, M., Henderson, J. L., Lawson, S., Ehsanipoor, R., Costigan, K., … Bennett, W. (2015). Information and communication technology use among low-income pregnant and postpartum women by race and ethnicity: A cross-sectional study. *Journal of Medical Internet Research*, *17*(7), e163/1-10. https://doi.org/10.2196/jmir.3916

Chou, F.-H., Avant, K. C., Kuo, S.-H., & Fetzer, S. J. (2008). Relationships between nausea and vomiting, perceived stress, social support, pregnancy planning, and psychosocial adaptation in a sample of mothers: A questionnaire survey. *International Journal of Nursing Studies*, *45*(8), 1185–1191. https://doi.org/10.1016/j.ijnurstu.2007.08.004

Clapp, M. A., Little, S. E., Zheng, J., & Robinson, J. N. (2016). A multi-state analysis of postpartum readmissions in the United States. *American Journal of Obstetrics and Gynecology*, *215*(1), 113.e1-113.e10. https://doi.org/10.1016/j.ajog.2016.01.174

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Cohen, S., Mermelstein, R., Kamarck, T., & Hoberman, H. M. (1985). Measuring the functional components of social support. In I. G. Sarason & B. R. Sarason (Eds.), *Social support: Theory, research, and applications* (pp. 73–94). The Hague, Holland: Martinus Niijoff.

Cohen, Sheldon. (n.d.). Dr. Cohens' scales. Retrieved from http://www.psy.cmu.edu/~scohen/

Creanga, A. A., Syverson, C., Seed, K., & Callaghan, W. M. (2017). Pregnancy-related mortality in the United States, 2011-2013. *Obstetrics & Gynecology*, *130*(2), 366–373. https://doi.org/10.1097/AOG.0000000000002114

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Los Angeles, CA: SAGE Publications, Inc.

Davidson, M. R. (2014). *Fast facts for the antepartum and postpartum nurse: A nursing orientation and care guide in a nutshell*. New York, NY: Springer Publishing Company, LLC.

Davis-Floyd, R. (2001). The technocratic, humanistic, and holistic paradigms of childbirth. *International Journal of Gynecology and Obstetrics*, *75*(Supplement 1), S5–S23. https://doi.org/10.1016/S0020-7292(01)00510-0

Declercq, E. R., Sakala, C., Corry, M. P., Applebaum, S., & Herrlich, A. (2013). *Listening to mothers III: New mothers speak out*. New York: Childbirth Connection. Retrieved from http://transform.childbirthconnection.org/wp-content/uploads/2013/06/LTM-III_MajorSurveyFindings_NMSO.pdf

Dennis, C.-L., & Kingston, D. (2008). A systematic review of telephone support for women during pregnancy and the early postpartum period. *JOGNN: Journal of Obstetric, Gynecologic & Neonatal Nursing, 37*(3), 301-314 14p. https://doi.org/10.1111/j.1552-6909.2008.00235.x

DePoy, E., & Gitlin, L. N. (2005). *Introduction to research: Understanding and applying multiple strategies* (3rd ed.). St. Louis, Missouri: Elsevier Mosby. Retrieved from www.elsevierhealth

Dodd, M., Janson, S., Facione, N., Faucett, J., Froelicher, E. S., Humphreys, J., … Taylor, D. (2001). Advancing the science of symptom management. *Journal of Advanced Nursing, 33*(5), 668–676.

Duggan, M. (2013). *Cell phone activities 2013*. Pew Research Center Internet & Technology. Retrieved from http://www.pewinternet.org/2013/09/19/cell-phone-activities-2013/

Edmonds, J. K., & Jones, E. J. (2013). Intrapartum nurses' perceived influence on delivery mode decisions and outcomes. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *42*(1), 3–11. https://doi.org/10.1111/j.1552-6909.2012.01422.x

Ellis, T. J., & Levy, Y. (2009). Towards a guide for novice researchers on research methodology: Review and proposed methods. *Issues in Informing Science & Information Technology*, *6*, 323.

Escobar, G., Braveman, P. A., Ackerson, L., Odouli, R., Coleman-Phox, K., Capra, A. M., … Lieu, T. A. (2001). A randomized comparison of home visits and hospital-based group follow-up visits after early postpartum discharge. *Pediatrics*, *108*(3), 719–727.

Evans, W. D., Abroms, L. C., Poropatich, R., Nielsen, P. E., & Wallace, J. L. (2012). Mobile health evaluation methods: The Text4baby case study. *Journal of Health Communication, 17:sup1*, 22–29. https://doi.org/10.1080/10810730.2011.649157

Fahey, J. O., & Shenassa, E. (2013). Understanding and meeting the needs of women in the postpartum period: The Perinatal Maternal Health Promotion Model. *Journal of Midwifery & Women's Health*, *58*(6), 613–621. https://doi.org/10.1111/jmwh.12139

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149–1160.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191.

Fawcett, J., Tulman, L., & Myers, S. T. (1988). Development of the Inventory of Functional Status after Childbirth. *Journal of Nurse-Midwifery*, *33*(6), 252–268.

Fenech, G., & Thomson, G. (2014). Tormented by ghosts from their past': A meta-synthesis to explore the psychosocial implications of a traumatic birth on maternal well-being. *Midwifery*, *30*(2), 185–193. https://doi.org/10.1016/j.midw.2013.12.004

Focus on infants during childbirth leaves U.S. moms in danger. (2017, May 12). *Lost mothers: Maternal mortality in the U.S.* Nashville Public Radio. Retrieved from https://www.npr.org/2017/05/12/527806002/focus-on-infants-during-childbirth-leaves-u-s-moms-in-danger

Fowles, E. R., Cheng, H.-R., & Mills, S. (2012). Postpartum health promotion interventions: A systematic review. *Nursing Research*, *61*(4), 269–282. https://doi.org/10.1097/NNR.0b013e3182556d29

Francis, M. (2007). *The everything health guide to postpartum care*. Avon, Massachusetts: Adams Media.

Free, C., Phillips, G., Galli, L., Watson, L., Felix, L., Edwards, P., … Haines, A. (2013). The effectiveness of mobile-health technology based health behavior change or disease management interventions for health care consumers: A systematic review. *PLOS Medicine*, *10*(1), e1001362 (1-45). https://doi.org/10.1371/journal.pmed.1001362

Freeman, H. P. (2012). The origin, evolution, and principles of patient navigation. *Cancer Epidemiology, Biomarkers and Prevention*, *21*(10), 1614–1617. https://doi.org/10.1158/1055-9965.EPI-12-0982

Gagnon, A. J., Dougherty, G., Jimenez, V., & Leduc, N. (2002). Randomized trial of postpartum care after hospital discharge. *Pediatrics*, *109*(6), 1074–1080.

Gamble, J., & Creedy, D. (2005). Psychological trauma symptoms of operative birth. *British Journal of Midwifery*, *13*(4), 218-.

Gilbert, J. E., Green, E., Lankshear, S., Hughes, E., Burkoski, V., & Sawka, C. (2011). Nurses as patient navigators in cancer diagnosis: review, consultation and model design. *European Journal of Cancer Care*, *20*(2), 228–236. https://doi.org/10.1111/j.1365-2354.2010.01231.x

Guise, J.-M., Denman, M. A., Emeis, C., Marshall, N., Walker, M., Fu, R., … McDonagh, M. (2010). Vaginal birth after cesarean: New insights on maternal and neonatal outcomes. *Obstetrics & Gynecology*, *115*(6), 1267–1278. https://doi.org/10.1097/AOG.0b013e3181df925f

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, *42*(2), 377–381. https://doi.org/10.1016/j.jbi.2008.08.010

Hotelling, B. (2004). Teaching normal birth interactively. *The Journal of Perinatal Education*, *13*(2), 51–56. https://doi.org/10.1624/105812404X109546

Humphreys, J., Lee, K. A., Carrieri-Kohlman, V., Puntillo, K., Faucett, J., Janson, S., … USCF School of Nursing Symptom Management Faculty Group. (2008). Theory of symptom management. In M. J. Smith & P. R. Liehr (Eds.), *Middle range theory for nursing* (2nd ed., pp. 145–158). New York: Springer Publishing Company.

Interpersonal Support Evaluation List (ISEL). (n.d.). Retrieved from http://www.psy.cmu.edu/~scohen/ISEL_scoring_and_info.pdf

Jordan, E. T., Ray, E. M., Johnson, P., & Evans, W. D. (2011). Text4Baby: Using text messaging to improve maternal and newborn health. *Nursing for Women's Health, 15*(3), 206–212. https://doi.org/10.1111/j.1751-486X.2011.01635.x

Kanotra, S., D'Angelo, D., Phares, T. M., Morrow, B., Barfield, W. D., & Lansky, A. (2007). Challenges faced by new mothers in the early postpartum period: An analysis of comment data from the 2000 Pregnancy Risk Assessment Monitoring System (PRAMS) survey. *Maternal and Child Health Journal, 11*(6), 549–558. https://doi.org/10.1007/s10995-007-0206-3

Keele, R. (2010). *Nursing research and evidence-based practice: Ten steps to success* (revised). Jones & Bartlett Learning. Retrieved from http://samples.jbpub.com/9780763780586/80586_CH03_Keele.pdf

Kennell, J., & McGrath, S. (2005). Starting the process of mother-infant bonding. *Acta Paediatrica, 94*(6), 775–777. https://doi.org/10.1111/j.1651-2227.2005.tb01982.x

Larson, P. J., Carrieri-Kohlman, V., Dodd, M. J., Douglas, M., Faucett, J., Froelicher, E. S., … Underwood, P. R. (1994). A model for symptom management. *Image: Journal of Nursing Scholarship, 26*(4), 272–276.

Lavender, T., Richens, Y., Milan, S. J., Smyth, R. M., & Dowswell, T. (2013). Telephone support for women during pregnancy and the first six weeks postpartum. *Cochrane Database of Systematic Reviews*, (7, Art. No.: CD009338). https://doi.org/10.1002/14651858.CD009338.pub2

Leahy Warren, P. (2005). First-time mothers: social support and confidence in infant care. *Journal of Advanced Nursing, 50*(5), 479–488. https://doi.org/10.1111/j.1365-2648.2005.03425.x

Leahy-Warren, P., & McCarthy, G. (2007). Postnatal depression: Prevalence, mothers' perspectives, and treatments. *Archives of Psychiatric Nursing*, *21*(2), 91–100. https://doi.org/10.1016/j.apnu.2006.10.006

Lee, K. A., Gay, C., Portillo, C. J., Coggins, T., Davis, H., Pullinger, C. R., & Aouizerat, B. E. (2009). Symptom experience in HIV-infected adults: A function of demographic and clinical characteristics. *Journal of Pain and Symptom Management*, *38*(6), 882–893. https://doi.org/10.1016/j.jpainsymman.2009.05.013

Lee, T., Ko, I., Lee, I., Kim, E., Shin, M., Roh, S., … Chang, H. (2011). Effects of nurse navigators on health outcomes of cancer patients: *Cancer Nursing*, *34*(5), 376–384. https://doi.org/10.1097/NCC.0b013e3182025007

Lenz, E. R., & Pugh, L. C. (2008). Theory of unpleasant symptoms. In M. J. Smith & P. R. Liehr (Eds.), *Middle range theory for nursing* (2nd ed., pp. 159–182). New York: Springer Publishing Company.

Lieu, T. A., Braveman, P. A., Escobar, G. J., Fischer, A. F., Jensvold, N. G., & Capra, A. M. (2000). A randomized comparison of home and clinic follow-up visits after early postpartum hospital discharge. *Pediatrics, 105*(5), 1058–1065.

Link, D. G. (2016). Nursing care of the family during pregnancy. In D. L. Lowdermilk, S. E. Perry, K. Cashion, & K. R. Alden (Eds.), *Maternity & women's health care* (11th ed., pp. 301–343). St. Louis, MO: Elsevier.

Lobel, M., & DeLuca, R. S. (2007). Psychosocial sequelae of cesarean delivery: Review and analysis of their causes and implications. *Social Science & Medicine, 64*(11), 2272–2284. https://doi.org/10.1016/j.socscimed.2007.02.028

Lowdermilk, D. L., Perry, S. E., Cashion, K., & Alden, K. R. (2016). *Maternity & women's health care* (11th ed.). St. Louis, MO: Elsevier.

Main, E. K., Morton, C. H., Hopkins, D., Giuliani, G., Melsop, K., & Gould, J. (2011). *Cesarean deliveries, outcomes, and opportunities for change in California: Toward a public agenda for maternity care safety and quality* (A CMQCC White Paper) (pp. 1–86). Palo Alto, CA: CMQCC. Retrieved from www. cmqcc.org

Many nurses lack knowledge of health risk to mothers after childbirth. (2017, August 17). *Lost mothers: Maternal mortality in the U.S.* NPR: Nashville Public Radio. Retrieved from http://www.npr.org/sections/health-shots/2017/08/17/543924405/many-nurses-lack-knowledge-of-health-risks-for-mothers-after-childbirth

Martin, J. A., Hamilton, B. E., Osterman, M. J. K., Driscoll, A. K., & Drake, P. (2018). *Births: Final data for 2016* (National Vital Statistics Reports No. Volume 67, Number 1). Hyattsville, MD: National Center for Health Statistics.

Mass, S. B. (2011). Supporting breastfeeding in the United States: The Surgeon General's call to action. *Current Opinion in Obstetrics and Gynecology, 23*(6), 460–464. https://doi.org/10.1097/GCO.0b013e32834cdcb3

McCarty, D. (2016). Transition to parenthood. In D. L. Lowdermilk, S. E. Perry, K. Cashion, & K. R. Alden (Eds.), *Maternity & women's health care* (11th ed., pp. 502–522). St. Louis, MO: Elsevier.

McVeigh, C. (1997). Motherhood experiences from the perspective of first-time mothers. *Clinical Nursing Research, 6*(4), 335–348. https://doi.org/10.1177/105477389700600404

McVeigh, C. A. (1997). An Australian study of functional status after childbirth. *Midwifery, 13*(4), 172–178. https://doi.org/10.1016/S0266-6138(97)80003-4

Medicalize. (2014). Retrieved from http://www.oxforddictionaries.com/definition/english/medicalize

Menacker, F., & Hamilton, B. E. (2010). Recent trends in cesarean delivery in the United States. *NCHS Data Brief, 35*, 1–8.

Mobile Fact Sheet. (2017, January 12). Retrieved January 28, 2018, from http://www.pewinternet.org/fact-sheet/mobile/

Moran, T. E., Polanin, J. R., & Wenzel, A. (2014). The postpartum worry scale-revised: An initial validation of a measure of postpartum worry. *Archives of Women's Mental Health*, *17*(1), 41–48. https://doi.org/10.1007/s00737-013-0380-9

Munro, B. H. (2005). *Statistical Methods for Health Care Research* (5th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Negron, R., Martin, A., Almog, M., Balbierz, A., & Howell, E. A. (2013). Social support during the postpartum period: Mothers' views on needs, expectations, and mobilization of support. *Maternal and Child Health Journal*, *17*(4), 616–623. https://doi.org/10.1007/s10995-012-1037-4

Nelson, A. M. (2003). Transition to motherhood. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*, *32*(4), 465–477. https://doi.org/10.1177/0884217503255199

Obermayer, J. L., Riley, W. T., Asif, O., & Jean-Mary, J. (2004). College smoking-cessation using cell phone text messaging. *Journal of American College Health*, *53*(2), 71–78.

Office of the Surgeon General (U.S.), Centers for Disease Control and Prevention (U.S.), & Office on Women's Health (U.S.). (2011). *The Surgeon General's call to action to support breastfeeding*. Rockville (MD): Office of the Surgeon General (U.S.). Retrieved from http://www.ncbi.nlm.nih.gov/books/NBK52682/

Oncology Nurse Navigator Core Competencies. (2013). Oncology Nursing Society. Retrieved from https://www.ons.org/sites/default/files/ONNCompetencies_rev.pdf?__hstc=214899912.fdd7a7debc8575bac5a80cf7e168316a.1426636800129.1426636800130.1426636800131.1&__hssc=214899912.1.1426636800132&__hsfp=59720947

Osman, H., Chaaya, M., El Zein, L., Naassan, G., & Wick, L. (2010). What do first-time mothers worry about? A study of usage patterns and content of calls made to a postpartum support telephone hotline. *BMC Public Health*, *10:611*, 1–6. https://doi.org/10.1186/1471-2458-10-611

Pérez-Ferre, N., Galindo, M., Fernández, M. D., Velasco, V., Runkle, I., de la Cruz, M. J., … Calle-Pascual, A. L. (2010). The outcomes of gestational diabetes mellitus after a telecare approach are not inferior to traditional outpatient clinic visits. *International Journal of Endocrinology*, 1–6. https://doi.org/10.1155/2010/386941

Perinatology definition. (2016). Retrieved June 18, 2016, from http://perinatology.com/dictionary/Perinatologydef.htm

Pew Research Center. (2015). *U.S. Smartphone Use in 2015* (pp. 1–60). Pew Research Center. Retrieved from http://www.pewinternet.org/2015/04/01/us-smartphone-use-in-2015/

Polit, D. F., & Beck, C. T. (2008). *Nursing research: Generating and assessing evidence for nursing practice* (8th ed.). Philadelphia, PA: Wolters Kluwer Health/Lippincott Williams & Wilkins.

Poorman, E., Gazmararian, J., Parker, R. M., Yang, B., & Elon, L. (2015). Use of text messaging for maternal and infant health: A systematic review of the literature. *Maternal and Child Health Journal*, *19*(5), 969–989. https://doi.org/10.1007/s10995-014-1595-8

Portenoy, R. K., Thaler, H. T., Kornblith, A. B., McCarthy Lepore, J., Friedlander-Klar, H., Kiyasu, E., … Scher, H. (1994). The Memorial Symptom Assessment Scale: An instrument for the evaluation of symptom prevalence, characteristics and distress. *European Journal of Cancer*, *30A*(9), 1326–1336.

Powers, B. A., & Knapp, T. R. (2011). *Dictionary of nursing theory and research* (4th ed.). New York: Springer Publishing Company.

Primiparous. (2016). Retrieved from http://medical-dictionary.thefreedictionary.com/primiparous

Prior, E., Santhakumaran, S., Gale, C., Philipps, L. H., Modi, N., & Hyde, M. J. (2012). Breastfeeding after cesarean delivery: A systematic review and meta-analysis of world literature. *The American Journal of Clinical Nutrition*, *95*(5), 1113–1135. https://doi.org/10.3945/ajcn.111.030254

Puia, D. (2013). A meta-synthesis of women's experiences of cesarean birth. *MCN, The American Journal of Maternal/Child Nursing*, *38*(1), 41–47. https://doi.org/10.1097/NMC.0b013e31826aa855

Razurel, C., Bruchon-Schweitzer, M., Dupanloup, A., Irion, O., & Epiney, M. (2011). Stressful events, social support and coping strategies of primiparous women during the postpartum period: a qualitative study. *Midwifery*, *27*(2), 237–242. https://doi.org/10.1016/j.midw.2009.06.005

REDCap: Research Electronic Data Capture. (2016). Retrieved from https://projectredcap.org/

Rhyne, E. P., & Borawski, A. (2014). Text messaging as an adjunct treatment for urban mothers with postpartum depression. *Journal of Pediatric Health Care*, *28*(6), e49. https://doi.org/10.1016/j.pedhc.2014.08.003

Romm, A. J. (2002). *Natural health after birth: The complete guide to postpartum wellness*. Rochester, Vermont: Healing Arts Press.

Ruchala, P. L. (2000). Teaching new mothers: Priorities of Nurses Postpartum Women. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *29*(3), 265–273. https://doi.org/10.1111/j.1552-6909.2000.tb02048.x

Sakala, C., & Corry, M. P. (2008, October). Evidence-based maternity care: What it is and what it can achieve. New York: Milbank Memorial Fund.

Saurel-Cubizolles, M.-J., Romito, P., Lelong, N., & Ancel, P.-Y. (2000). Women's health after childbirth: A longitudinal study in France and Italy. *BJOG: An International Journal of Obstetrics & Gynaecology*, *107*(10), 1202–1209. https://doi.org/10.1111/j.1471-0528.2000.tb11608.x

Schytt, E., Lindmark, G., & Waldenström, U. (2005). Physical symptoms after childbirth: prevalence and associations with self-rated health. *BJOG: An International Journal of Obstetrics & Gynaecology*, *112*(2), 210–217. https://doi.org/10.1111/j.1471-0528.2004.00319.x

Shaw, E., Levitt, C., Wong, S., Kaczorowski, J., & The McMaster University Postpartum Research Group. (2006). Systematic review of the literature on postpartum care: Effectiveness of postpartum support to improve maternal parenting, mental health, quality of life, and physical health. *Birth: Issues in Perinatal Care*, *33*(3), 210–220. https://doi.org/10.1111/j.1523-536X.2006.00106.x

Sherman, J. (2016). Mental health disorders and substance abuse. In D. L. Lowdermilk, S. E. Perry, K. Cashion, & K. R. Alden (Eds.), *Maternity & women's health care* (11th ed., pp. 739–758). St. Louis, MO: Elsevier.

Suplee, P. D., Bingham, D., & Kleppel, L. (2017). Nurses' knowledge and teaching of possible postpartum complications: *MCN, The American Journal of Maternal/Child Nursing,* 338–344. https://doi.org/10.1097/NMC.0000000000000371

Swain, J. E., Tasgin, E., Mayes, L. C., Feldman, R., Constable, R. T., & Leckman, J. F. (2008). Maternal brain response to own baby-cry is affected by cesarean section delivery. *Journal of Child Psychology & Psychiatry, 49*(10), 1042–1052. https://doi.org/10.1111/j.1469-7610.2008.01963.x

Testing Homogeneity of Covariance Matrices. (n.d.). [SPSS Statistics Subscription]. Retrieved March 16, 2018, from https://www.ibm.com/support/knowledgecenter/en/SSLVMB_sub/spss/tutorials/glmm_patlos_homcov.html

Thomasson, M. A., & Treber, J. (2008). From home to hospital: The evolution of childbirth in the United States, 1928-1940. *Explorations in Economic History*, *45*, 76–99. https://doi.org/10.1016/j.eeh.2007.07.001

Thompson, J. F., Roberts, C. L., Currie, M., & Ellwood, D. A. (2002). Prevalence and persistence of health problems after childbirth: Associations with parity and method of birth. *Birth*, *29*(2), 83–94. https://doi.org/10.1046/j.1523-536X.2002.00167.x

Tucker, J. A. (2016). Assessment of high risk pregnancy. In D. L. Lowdermilk, S. E. Perry, K. Cashion, & K. R. Alden (Eds.), *Maternity & women's health care* (11th ed., pp. 633–652). St. Louis, MO: Elsevier.

Tulman, L., & Fawcett, J. (1988). Return of functional ability after childbirth. *Nursing Research*, *37*(2), 77–81.

Tulman, L., Fawcett, J., Groblewski, L., & Silverman, L. (1990). Changes in functional status after childbirth. *Nursing Research, 39*(2), 70–75.

United States Department of Health and Human Services. (2014). Healthy People 2020: Maternal, Infant, and Child Health [Office of Disease Prevention and Health Promotion]. Retrieved from http://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health/objectives

Wagner, E. H., Ludman, E. J., Bowles, E. J. A., Penfold, R., Reid, R. J., Rutter, C. M., … McCorkle, R. (2014). Nurse Navigators in early cancer care: A randomized, controlled trial. *Journal of Clinical Oncology, 32*(1), 12–18. https://doi.org/10.1200/JCO.2013.51.7359

Webb, D. A., Bloch, J. R., Coyne, J. C., Chung, E. K., Bennett, I. M., & Culhane, J. F. (2008). Postpartum physical symptoms in new mothers: Their relationship to functional limitations and emotional well-being. *Birth, 35*(3), 179–187. https://doi.org/10.1111/j.1523-536X.2008.00238.x

Welch, R. A., & Thomas, V. E. (2014). Survey of postpartum patients regarding electronic communication between obstetricians and patients. *Obstetrics & Gynecology*, *123*(5 (Supplement)), 178S. https://doi.org/10.1097/01.AOG.0000447195.12926.b9

Wheeler, L. (2002). *Nurse-midwifery handbook: A practical guide to prenatal and postpartum care* (2nd ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Whittaker, R., Matoff-Stepp, S., Meehan, J., Kendrick, J., Jordan, E., Stange, P., … Rhee, K. (2012). Text4baby: Development and Implementation of a National Text Messaging Health Information Service. *American Journal of Public Health, 102*(12), 2207–2213.

Wiegers, T. A. (2006). Adjusting to motherhood: Maternity care assistance during the postpartum period: How to help new mothers cope. *Journal of Neonatal Nursing*, *12*(5), 163–171. https://doi.org/10.1016/j.jnn.2006.07.003

Wilcox, B., & Bruce, S. D. (2010). Patient navigation: A “win-win” for all involved. *Oncology Nursing Forum*, *37*(1), 21–25. https://doi.org/10.1188/10.ONF.21-25

Wood, M. J., & Ross-Kerr, J. C. (2006). *Basic steps in planning nursing research: From question to proposal* (6th ed.). Sudbury, MA: Jones & Bartlett.

Appendices

Appendix A

Telephone Screening Questionnaire

Melanie Morris

Telephone Screening Questionnaire (to be completed by PI) Participant #: _____

If a NO response is received OR the participant does not meet the AGE inclusion criteria (18-34), the participant will be ineligible. The PI will say *"Unfortunately, this makes you ineligible to participate in this project. Thank you for your interest"* **and end the call. The screening will continue for YES responses through question 11 (except as noted on question 5a).**

Are you interested in participating in a research study to examine women's symptom experience after giving birth? YES NO

Your age? _____

1. Are you able to read, write and speak English? YES NO
2. Was your birth at or after 37.0 weeks? YES NO
3. Is this your first birth? YES NO
4. Did your pregnancy result in the birth of only one baby? YES NO
5. Was your pregnancy low-risk without complications? YES NO
   If no, please explain_____
   (PI will determine if explanation deems participant ineligible. If NO, screening will continue to 5a.)
   5a. Did a high-risk doctor provide care for you during this pregnancy? YES NO
   (If YES, participant will be ineligible & screening will end. IF NO, screening will continue with 6.)
6. Did you have an unplanned or emergency cesarean birth? YES NO
7. Did your cesarean birth occur 0-4 days ago? YES NO
8. Do you have access to the internet to complete surveys? YES NO
9. Do you have an email address that a link to the surveys can be sent? YES NO
10. Do you anticipate that your newborn will be discharged home with you? YES NO
11. Do you anticipate being discharged home within 2-4 days of your birth? YES NO

If a YES response is received for question 12 or 14, eligibility will be determined as outlined below each question. If ineligible, the PI will say *"Unfortunately, this makes you ineligible to participate in this project. Thank you for your interest"* **and end the call. The screening will continue for NO responses through question 15.**

12. Do you have any conditions requiring medical attention or medication? YES NO
    If yes, please explain_____
13. How long have you been receiving treatment for this condition? _____
    (PI will determine if the explained condition is considered a chronic illness and whether the participant has received treatment for 6 months or longer. If YES, the subject will be ineligible & screening will end. If NO, screening will continue with question 14.)
14. Are you currently being treated for a mental health concern? YES NO
    If yes, please explain _____
    (A subject will be ineligible if receives any medical treatment (e.g. takes medication) & screening will end. Otherwise screening will continue with question 15.)
15. Have you experienced a previous pregnancy loss or stillbirth? YES NO
    If **YES**, which trimester? 1st (1-12 weeks) __2nd (13-26 weeks) __3rd (27-40+ weeks) __
    (A subject will be ineligible if she has had a pregnancy loss @ 27 weeks or more.)
16. Do you possess or have daily access to a working cell phone or electronic tablet that will allow you to send and receive text messages? YES NO
    (A subject will be ineligible for NO response.) For those eligible, a convenient time will be arranged to review and obtain informed consent.

Date of Approval:1/25/2017

VANDERBILT UNIVERSITY
Institutional Review Board

Appendix B

Consent Form

Institutional Review Board
Informed Consent Document for Research

Principal Investigator: Melanie H. Morris **Revision Date: 10/10/2017**
Study Title: Investigating First-Time Mothers' Postpartum Recovery Symptom Experience
Institution/Hospital: Vanderbilt University Medical Center

This informed consent document applies to female adults between the ages of 18 and 34.

Name of participant: _____ Age: _____

The following information is provided to inform you about the research project and your participation in it. Please read this form carefully and feel free to ask any questions you may have about this study and the information given below. You will be given an opportunity to ask questions, and your questions will be answered. Also, you will be given a copy of this consent form.

Your participation in this research study is voluntary. You are also free to stop being in this study at any time. In the event new information becomes available that may affect the risks or benefits associated with this research study or your willingness to participate in it, you will be notified so that you can make an informed decision whether or not to continue your participation in this study.

1. **Purpose of the study:**
   The purpose of the study is to learn about first-time mothers' recovery symptom experience following an unplanned cesarean birth.

   You are being asked to participate in a research study because your participation will help improve what healthcare providers and researchers know about new mothers who have an unplanned cesarean birth. Your participation will also help researchers to know more about using texting in the weeks after having a baby.

   The Principal Investigator (Researcher) is a PhD Candidate at the University of Tennessee, Knoxville and is an Instructor in Nursing at Vanderbilt University.

2. **Procedures to be followed and approximate duration of the study:**
   If you agree to be in this study, you will fill out the online surveys further explained below and then you will be placed in 1 of 2 groups. You will have the same chance to be in either group. If you are placed in one group, you will fill out the online surveys again at 2 weeks and 4 weeks after your birth. If you are placed in the opposite group, you will fill out the online surveys again at 2 weeks and 4 weeks after your birth and you will receive daily texting from a maternity nurse until 4 weeks after your birth as described in the information below.

Information about Filling out the Online Surveys:

- You will be asked to complete 3 online surveys 2-4 days after your birth. One survey will ask information about you. One survey will ask about symptoms you have had in the past few days, and one survey will ask about your support. An electronic tablet will be available for your use in the hospital or you may access the surveys from your electronic device. The time to complete the questions is 30 minutes or less.

- You will need internet access to fill out 3 online surveys at 2 weeks and again at 4 weeks after the birth of your baby (2 surveys will be the same and 1 survey is a shorter version of the same survey you will fill out at 2-4 days after birth).

- At both 2 weeks and 4 weeks after your birth, you will be sent reminders. The email reminders will include a link that you will use that will take you to the website to fill out the online surveys. You will continue to receive an email reminder every other day for one week or until you fill out the surveys. If you are interrupted before you finish, you can save your answers and return to finish filling out the surveys. If you do not complete the surveys at one time, then you will receive a code to use to access the surveys when you return. If the online surveys are not filled out within 1 week after you receive the first reminder, you will be automatically taken out of the study.

Date of IRB Approval: 01/16/2018
Date of Expiration: 01/15/2019

Institutional Review Board
VANDERBILT

- If you fill out all of the surveys, then at the end of the study at 4 weeks after your birth if you are in the texting group, you will be asked to fill out one additional short online survey about texting with the maternity nurse that should take no longer than 10 minutes.

- The total time to fill out the surveys for the entire study should be no more than 2 hours.

- After you submit the surveys 4 weeks after your birth, then your participation in the study will end.

If you are in the group that receives texting from a maternity nurse:

- You will need access to an electronic device (a cell phone or electronic tablet) to receive a daily text from a maternity nurse beginning on the first day after you leave the hospital until 4 weeks after your birth. Each day the maternity nurse will text to ask how you are feeling. She is also able to answer any questions about your recovery from birth or your newborn.

- The maternity nurse will contact you by text during the same time frame each day during either a morning or an afternoon/evening time frame. You will tell us which one will be best. If a circumstance occurs that would require the maternity nurse to contact you at different time, she will text you to arrange a convenient alternative.

- A second maternity nurse will be available during a separate time frame each day should you have a question that you want to ask before your next daily texting session with the maternity nurse assigned to you.

- If during texting, the maternity nurse determines it would be helpful to talk with you by phone, she will text you for permission to contact you by phone so that she can better answer your questions.

- If there is a question the maternity nurse cannot answer or if you have an urgent health question, you should contact your doctor/nurse-midwife/healthcare provider.

- For any emergency situation, you should go to an emergency department or call 911 for immediate assistance.

- The daily texting from the maternity nurse will stop 4 weeks after your birth.

- If you do not respond to the maternity nurse's daily text, she will continue to text you once each day for one week. If she receives no response, she will then try to contact you by phone one time. If she does not get a response or you indicate you are no longer interested in being in the study, all attempts to contact you will stop and you will no longer be in the study.

- The daily time for texting with the maternity nurse will depend on how much you want to text and your needs or questions. It could be as little as 5 minutes or longer depending on what you wish to discuss.

If you are in the group that does not receive texting from a maternity nurse:

- If you have a question about you or your newborn's care or if you have an urgent health matter, you should contact your doctor/nurse-midwife/healthcare provider.

- For any emergency situation, you should go to an emergency department or call 911 for immediate assistance.

Date of IRB Approval: 01/16/2018
Date of Expiration: 01/15/2019

Institutional Review Board
VANDERBILT

3. **Expected costs:**
There is no fee to participate in the study. You will need to be able to use the internet to fill out the online surveys at 2 weeks and 4 weeks after your birth. You will be responsible for your own internet service or free internet access is usually available at community libraries.

If you are in the group that receives texting from the maternity nurse, you will need daily use of an electronic device with texting capability (a cellular phone or electronic tablet) with active cellular service to be in the study. You will need to be able to receive a daily text from a maternity nurse until 4 weeks after your birth. You will be responsible for the costs associated with the cellular service for your cellular phone or electronic tablet.

4. **Description of the discomforts, inconveniences, and/or risks that can be reasonably expected as a result of participation in this study:**
Participation in this study will pose no more risk than what is expected in everyday life.

It is possible that you will find the daily text messaging bothersome if you are in the texting group.

Filling out the surveys may make you feel uneasy. You may quit the study at any time by not filling out the online surveys, by contacting the Principal Investigator (researcher) at the number listed in the contact information section below, or by telling the maternity nurse if you are in the texting group.

If you have discomfort from being in the study and you desire help, you may call The Crisis Line with Family and Children's Service at [redacted] 24 hours a day. The Crisis Line is for "any person, any problem, any time".

Should you have an urgent health concern(s) or health question, contact your doctor/nurse-midwife/healthcare provider.

For any emergency situation, you should go to an emergency department or call 911 for immediate assistance.

5. **Compensation in case of study-related injury:**
Vanderbilt University does not automatically reimburse participants for medical claims or other compensation. If physical injury is suffered in the course of this research, or for more information, please notify the investigator in charge: **Melanie Morris at** [redacted]

6. **Good effects that might result from this study:**

a) **The benefits to science and humankind that <u>might</u> result from this study.**
You may help to improve what healthcare providers and researchers know about new mothers who have an unplanned cesarean birth. What is learned in this study may help to improve postpartum care for women who have cesarean births.

You may also help researchers to know more about using texting in the weeks after having a baby. This can help with planning ways to assist new mothers recovering from a cesarean birth.

b) **The benefits you might get from being in this study.**
You may not receive any direct benefits from being in this study. Completing the surveys may be helpful in identifying the presence of postpartum symptoms and/or identifying the presence of support.

If you are in the texting group, sharing your experiences after the delivery of your baby with the maternity nurse may help you to feel like you have a person who can answer questions as you can share daily texts with a maternity nurse until four weeks after your birth. You may ask the maternity nurse any questions about you, your newborn, and/or your recovery.

7. **Compensation for participation:**
As a participant, you will receive a $30 participant reimbursement check mailed to the address you specify within 4 weeks after filling in the online surveys at 4 weeks after the birth. If you quit the study prior to completing the surveys at 4 weeks after birth, you will not receive a participant reimbursement check. We will ask you for an address and for your Social Security number, information that is needed to send you your reimbursement check. If you do not receive your reimbursement check within 4 weeks after completing the 4-week post-birth surveys, please contact the investigator in charge: Melanie Morris at [redacted]

8. **Reasons why the researcher (Principal Investigator) may take you out of this study:**
If the online surveys are not filled out within 1 week after you receive the first reminder, you will be automatically taken out of the study.

If you are in the texting group and do not respond to the maternity nurse's daily text, she will continue to text you once each day for one week. If she receives no response, she will then try to contact you by phone one time. If she does not get a response or you indicate you are no longer interested in being in the study, all texting with you will stop and you will no longer be in the study.

9. **What happens if you choose to stop being in the study?**
Your participation in this study is voluntary; you may decide not to participate without penalty. If you decide to participate, you may quit the study at any time without penalty or loss of usual benefits. If you quit the study before the end of the study, your data will be stored securely per the confidentiality measures outlined below. You may request that all information collected before you quit be destroyed.

10. **Contact Information.** If you should have any questions about this research study or possible injury, please feel free to contact **Melanie Morris** at [redacted] or my Faculty Advisor, **Sadie Hutson** at [redacted].

For additional information about giving consent or your rights as a participant in this study, to discuss problems, concerns, and questions, or to offer input, please feel free to contact the Institutional Review Board Office at (615) 322-2918 or toll free at (866) 224-8273.

11. **Confidentiality:**
All efforts, within reason, will be made to keep your personal information in your research record confidential but total confidentiality cannot be guaranteed.

You will be asked to provide a current email address where a link will be sent to access the online surveys after the birth of your baby. All answers to the online surveys will be encrypted when you submit them to REDCap, the research electronic data capture system. Your name will not appear on any study documents. All answers will be kept confidential. Data will be stored in REDCap and will be seen only by approved researchers. The REDCap electronic system requires researchers to use a two-step sign-in method as an additional security measure when accessing if not within the Vanderbilt University network. Your email address will be deleted in REDCap wen the study has ended.

If you are in the group that receives texting from the maternity nurse:
You will be asked to create a nickname that will be used to communicate with you by text and by phone, if necessary, during the study.

Date of IRB Approval: 01/16/2018
Date of Expiration: 01/15/2019

Institutional Review Board
VANDERBILT

Your nickname and phone number will not appear on the same forms with your online survey answers you fill out at 2-4 days, 2 weeks, and 4 weeks following the birth of your baby. The study information is kept in the secure REDCap system that is available only to approved researchers. Your phone number will be deleted in REDCap when the study has ended.

The maternity nurse(s) will be using a password-protected electronic tablet that is used for this study only. Once your participation in the study has ended, the texting data will be de-identified, and then it will be moved from the maternity nurse's electronic tablet used for the study to the University of Tennessee College of Nursing Office of Research Administration's secure electronic data storage space that is only available for examination by approved researchers. All study data will be deleted and wiped from the electronic tablets used by the maternity nurses.

Your information will not be used in oral or written reports about the study.

My dissertation faculty advisor, Dr. Sadie P. Hutson, and my faculty mentors will have access to de-identified data.

Signed Vanderbilt consent forms will be retained in REDCap.

12. Privacy:
Efforts will be made to keep your study-related information confidential. However, there may be circumstances where this information must be released.

Your information may be shared with Vanderbilt or the government, such as the Vanderbilt University Institutional Review Board, Federal Government Office for Human Research Protections, Representatives of the University of Tennessee at Knoxville associated with the Institutional Review Board or Office of Research & Engagement, the researcher's PhD Dissertation Committee, if you or someone else is in danger or if we are required to do so by law.

Vanderbilt may give or sell your data without identifiers for other research projects not listed in this form. Vanderbilt, Melanie H. Morris, MSN, APRN, WHNP-BC, PhD Candidate, and her Dissertation Committee will comply with any and all laws regarding the privacy of such information. There are no plans to pay you for the use or transfer of this de-identified information.

STATEMENT BY PERSON AGREEING TO PARTICIPATE IN THIS STUDY

I have read this informed consent document and the material contained in it has been explained to me verbally. All my questions have been answered, and I freely and voluntarily choose to participate.

Date	Signature of patient/volunteer
Consent obtained by:	
Date	Signature
	Printed Name and Title

Date of IRB Approval: 01/16/2018
Date of Expiration: 01/15/2019

Institutional Review Board
VANDERBILT

Appendix C

Demographic Questionnaire

Confidential

Demographics Initial

Please complete the survey below.

Thank you!

DEMOGRAPHIC QUESTIONNAIRE (2-4 days post-birth)

Today's Date: _____

First-time mother? ◯ Yes ◯ No

Your current age _____

Race/ethnicity

◯ American Indian/Native American
◯ Asian
◯ Black/African American
◯ Hispanic/Latina
◯ Native Hawaiian/Pacific Islander
◯ White/Caucasion
◯ Mixed
◯ Other

If Other, please specify _____

PREGNANCY and BIRTH INFORMATION

Number of pregnancies including most recent _____

How many weeks pregnant were you at the time your baby was born? _____

Date of your baby's birth? _____

What was the reason for your cesarean birth? _____

What is the number of hours you were in labor before your cesarean? _____

Prior to my cesarean, I was pushing ◯ Yes ◯ No

If NO, ◯ I was dilated before my cesarean
◯ I do not know

I was this many centimeters dilated before my cesearean _____

I received an epidural during labor ◯ Yes ◯ No

I received an epidural or spinal immediately prior to my surgery ◯ Yes ◯ No

I was put to sleep for my cesarean surgery ◯ Yes ◯ No

Date of Approval: 05/02/2017

Institutional Review Board

VANDERBILT
www.projectredcap.org
REDCap

How many weeks pregnant were you when you first started receiving prenatal care? _____

I attended childbirth classes ◯ Yes ◯ No

If YES, number of classes attended was _____

Have you experienced any pregnancy losses? ◯ Yes ◯ No

Number of pregnancy losses up to 13 weeks _____

Number of pregnancy losses between 14-26 weeks _____

Number of pregnancy losses between 27-40+ weeks _____

NEWBORN FEEDING

Newborn Feeding

◯ Breastfeeding only ◯ Formula feeding only ◯ Both breastfeeding and formula feeding

OTHER INFORMATION

In a relationship? ◯ Yes ◯ No

Live with partner? ◯ Yes ◯ No

Relationship status ◯ Single ◯ Married ◯ Divorced ◯ Widowed

Length of current relationship: _____

If married, for how long? _____

Birth gender of partner ◯ Male ◯ Female

Current partner is the father of this baby? ◯ Yes ◯ No

Highest completed level of education

◯ 11th grade or less ◯ High School diploma ◯ Some college or trade school ◯ College degree ◯ Graduate degree

Family yearly income

◯ less than $20,000 ◯ $20,000 - $59,999 ◯ $60,000 - $99,999 ◯ $100,000 or more

The number of people that currently live with me in my SAME household is

_____

Date of Approval: 05/02/2017

Institutional Review Board

VANDERBILT www.projectredcap.org REDCap

Confidential

The people that live with me in my SAME household include (Check all that apply)

- ☐ Spouse/Partner
- ☐ Mother
- ☐ Father
- ☐ Grandmother
- ☐ Grandfather
- ☐ Mother-in-law
- ☐ Father-in-law
- ☐ Other in-law
- ☐ Sister
- ☐ Brother
- ☐ Niece
- ☐ Nephew
- ☐ Aunt
- ☐ Cousin
- ☐ Friend
- ☐ Other

If Other in-law, specify which in-law _____

If Other, specify relationship _____

For any category selected above, is there more than 1 person living with you from the same category? ◯ Yes ◯ No

For EACH category with more than 1 person, list the category and the number of people in the same category living with you in your SAME household. _____

Do any children besides your newborn baby live in your SAME household? ◯ Yes ◯ No

If so, please list each child's age and relationship to you. _____

I own my home ◯ Yes ◯ No

If NO,

◯ I rent a house ◯ I rent an apartment ◯ I live with family ◯ I live with friends ◯ I live with others

If live with others, please specify who _____

I am currently employed ◯ Yes ◯ No

Type of work _____

MEDICAL INFORMATION

I have previously received treatment for depression ◯ Yes ◯ No

How long ago? _____

Date of Approval: 05/02/2017

Institutional Review Board

VANDERBILT
www.projectredcap.org
REDCap

Treatment(s) included
(Check all that apply)

☐ Medication ☐ Counseling ☐ Hospitalization ☐ Other Treatment

If other treatment, please explain

I currently receive medical treatment ◯ Yes ◯ No

I receive medical treatment for these conditions

I currently take medications ◯ Yes ◯ No

I currently take these medications

SOCIAL INFORMATION

I use a form of tobacco ◯ Yes ◯ No

What type? _____

I use tobacco daily ◯ Yes ◯ No

How much per day? _____

I use tobacco weekly ◯ Yes ◯ No

How much per week? _____

I use electronic cigarettes ◯ Yes ◯ No

How many per day? _____

If you do not use electronic cigarettes each day, how often do you use? _____

During the past 30 days, on how many days did you drink one of more alcoholic beverages (beer, wine, wine coolers, malt beverages, or liquor)?

_____

Of the days that you drank more than one alcoholic beverage, how many, on average, alcoholic beverages did you drink?

_____

Date of Approval: 05/02/2017

Institutional Review Board

VANDERBILT

www.projectredcap.org REDCap

PROVIDER/INSURANCE INFORMATION

My main OB Healthcare Provider is a	◯ Physician ◯ Nurse Midwife ◯ Nurse Practitioner
My insurance is TN Care	◯ Yes ◯ No
If no, I have other medical insurance	◯ Yes ◯ No

Date of Approval: 05/02/2017

Institutional Review Board

Appendix D

Demographic Questionnaire Follow-up

Confidential

Demographics Follow-up

Please complete the survey below.

Thank you!

DEMOGRAPHIC QUESTIONNAIRE FOLLOW-UP (2 and 4 weeks postpartum)

Today's Date: _____

Newborn Feeding

◯ Breastfeeding only ◯ Formula feeding only ◯ Both breastfeeding and formula feeding

OTHER INFORMATION

I have changed partners since the birth of my baby ◯ Yes ◯ No

If YES, my current partner is the father of my baby? ◯ Yes ◯ No

The number of people that currently live with me in my SAME household is

_____

The people that live with me in my SAME household include
(Check all that apply)

☐ Spouse/Partner
☐ Mother
☐ Father
☐ Grandmother
☐ Grandfather
☐ Mother-in-law
☐ Father-in-law
☐ Other in-law
☐ Sister
☐ Brother
☐ Niece
☐ Nephew
☐ Aunt
☐ Cousin
☐ Friend
☐ Other

If Other in-law, specify which in-law _____

If Other, specify relationship _____

For any category selected above, is there more than 1 person living with you from the same category? ◯ Yes ◯ No

For EACH category with more than 1 person, list the category and the number of people in the same category living with you in your SAME household. _____

Date of IRB Approval: 10/31/2017

Institutional Review Board

VANDERBILT
www.projectredcap.org
REDCap

Confidential

Do any children besides your newborn baby live in your SAME household? ◯ Yes ◯ No

If so, please list each child's age and relationship to you.

_____

My living arrangements have changed since the birth of my baby ◯ Yes ◯ No

If YES, please describe

I am currently employed ◯ Yes ◯ No

MEDICAL/SOCIAL INFORMATION

I currently receive medical treatment ◯ Yes ◯ No

I receive medical treatment for these conditions

I currently take medications ◯ Yes ◯ No

I currently take these medications

I use a form of tobacco ◯ Yes ◯ No

What type? _____

I use tobacco daily ◯ Yes ◯ No

How much per day? _____

I use tobacco weekly ◯ Yes ◯ No

How much per week? _____

I use electronic cigarettes ◯ Yes ◯ No

How many per day? _____

If you do not use electronic cigarettes each day, how often do you use? _____

During the past 30 days, on how many days did you drink one or more alcoholic beverages (beer, wine, wine coolers, malt beverages, or liquor)?

_____

Of the days that you drank more than one alcoholic beverage, how many, on average, alcoholic beverages did you drink?

_____

Date of IRB Approval: 10/31/2017

Institutional Review Board

DURING THE PAST TWO WEEKS:

How many times did you call your healthcare provider's office? _____

If you called your healthcare provider's office one or more times, it was for (check all that apply)

☐ a medical concern related to you ☐ a medical concern related to your baby ☐ a non-medical concern

The number of times you called for a medical concern related to you _____

The reason(s) you called for a medical concern related to you

_____

The number of times you called for a concern related to your baby _____

The reason(s) you called for a medical concern related to your baby

_____

The number of times you called for a non-medical concern _____

The reason(s) you called for a non-medical concern

_____

If you contacted your healthcare provider's office one or more times, indicate the number of times the reason for calling was resolved by an "OFFICE STAFF MEMBER"?

_____

If you contacted your healthcare provider's office one or more times, indicate the number of times the reason for calling was resolved by an office "NURSE"?

_____

If you contacted your healthcare provider's office one or more times, indicate the number of times the reason for calling was resolved by a "PHYSICIAN, NURSE-MIDWIFE, OR NURSE-PRACTITIONER"?

_____

How many times, if any, did you return to your healthcare provider's office for a follow-up visit?

_____

The reason(s) if you returned to your healthcare provider's office for a follow-up visit

Date of IRB Approval: 10/31/2017

Institutional Review Board

During the past two weeks:

How many times, if any, did you seek care or treatment in an Emergency Room? _____

The reason(s) if you sought care or treatment in an Emergency Room

How many times, if any, were you re-admitted to the hospital following your birth? _____

The reason(s) if you were you re-admitted to the hospital following your birth

If you were re-admitted to the hospital during the past two weeks, how long did you stay in the hospital? (number of days) _____

Date of IRB Approval: 10/31/2017

Institutional Review Board

Appendix E

Memorial Symptom Assessment Scale (MSAS)

1

Memorial Symptom Assessment Scale (MSAS)

Portenoy, R. K., Thaler, H. T., Kornblith, A. B., McCarthy Lepore, J., Friedlander-Klar, H., Kiyasu, E., … Scher, H. (1994). The Memorial Symptom Assessment Scale: An instrument for the evaluation of symptom prevalence, characteristics and distress. *European Journal of Cancer*, *30A*(9), 1326–1336.

Instructions: The following is a list of symptoms. First, choose YES if you have had the symptom in the PAST FEW DAYS. If you have had the symptom during these past few days, choose how OFTEN you had it, how SEVERE it usually was and how much it DISTRESSED or BOTHERED you.

DURING THE PAST FEW DAYS Did you have any of the following symptoms?			IF YES How OFTEN did you have it?				IF YES How SEVERE was it usually?				IF YES How much did it DISTRESS or BOTHER you?				
	NO	YES	Rarely	Occasionally	Frequently	Almost constantly	Slight	Moderate	Severe	Very Severe	Not at all	A Little Bit	Somewhat	Quite a Bit	Very Much
1. Difficulty concentrating			1	2	3	4	1	2	3	4	0	1	2	3	4
2. Pain			1	2	3	4	1	2	3	4	0	1	2	3	4
3. Lack of energy			1	2	3	4	1	2	3	4	0	1	2	3	4
4. Cough			1	2	3	4	1	2	3	4	0	1	2	3	4
5. Feeling nervous			1	2	3	4	1	2	3	4	0	1	2	3	4
6. Dry mouth			1	2	3	4	1	2	3	4	0	1	2	3	4
7. Nausea			1	2	3	4	1	2	3	4	0	1	2	3	4
8. Feeling drowsy			1	2	3	4	1	2	3	4	0	1	2	3	4
9. Numbness/tingling in hands/feet			1	2	3	4	1	2	3	4	0	1	2	3	4
10. Difficulty sleeping			1	2	3	4	1	2	3	4	0	1	2	3	4
11. Feeling bloated			1	2	3	4	1	2	3	4	0	1	2	3	4
12. Problems with urination			1	2	3	4	1	2	3	4	0	1	2	3	4
13. Vomiting			1	2	3	4	1	2	3	4	0	1	2	3	4
14. Shortness of breath			1	2	3	4	1	2	3	4	0	1	2	3	4
15. Diarrhea			1	2	3	4	1	2	3	4	0	1	2	3	4
16. Feeling sad			1	2	3	4	1	2	3	4	0	1	2	3	4
17. Sweats			1	2	3	4	1	2	3	4	0	1	2	3	4

Date of Approval:1/25/2017

VANDERBILT UNIVERSITY
Institutional Review Board

18. Worrying			1	2	3	4	1	2	3	4	0	1	2	3	4
19. Problems with sexual interest or activity			1	2	3	4	1	2	3	4	0	1	2	3	4
20. Itching			1	2	3	4	1	2	3	4	0	1	2	3	4
21. Lack of appetite			1	2	3	4	1	2	3	4	0	1	2	3	4
22. Dizziness			1	2	3	4	1	2	3	4	0	1	2	3	4
23. Difficulty swallowing			1	2	3	4	1	2	3	4	0	1	2	3	4
24. Feeling irritable			1	2	3	4	1	2	3	4	0	1	2	3	4

Instructions: The following is a list of 8 more symptoms. First, choose YES if you have had the symptom in the PAST FEW DAYS. If you have had the symptom during these past few days, choose how SEVERE it usually was and how much it DISTRESSED or BOTHERED you.

DURING THE PAST FEW DAYS Did you have any of the following symptoms?			IF YES How SEVERE was it usually?				IF YES How much did it DISTRESS or BOTHER you?				
	NO	YES	Slight	Moderate	Severe	Very Severe	Not at all	A Little Bit	Somewhat	Quite a Bit	Very Much
25. Mouth sores			1	2	3	4	0	1	2	3	4
26. Change in the way food tastes			1	2	3	4	0	1	2	3	4
27. Weight loss			1	2	3	4	0	1	2	3	4
28. Hair loss			1	2	3	4	0	1	2	3	4
29. Constipation			1	2	3	4	0	1	2	3	4
30. Swelling of arms or legs			1	2	3	4	0	1	2	3	4
31. "I don't look like myself"			1	2	3	4	0	1	2	3	4
32. Changes in skin			1	2	3	4	0	1	2	3	4
IF YOU HAD ANY OTHER SYMPTOMS DURING THE PAST FEW DAYS, PLEASE LIST BELOW AND INDICATE HOW MUCH THE SYMPTOM HAS DISTRESSED OR BOTHERED YOU.											
33. Other:							0	1	2	3	4
34. Other:							0	1	2	3	4
35. Other:							0	1	2	3	4

Date of Approval:1/25/2017

VANDERBILT UNIVERSITY
Institutional Review Board

Appendix F

Interpersonal Support Evaluation List (ISEL-12)

1

Interpersonal Support Evaluation List - ISEL-12

Cohen, S., Mermelstein, R., Kamarck, T., & Hoberman, H. M. (1985). Measuring the functional components of social support. In *Sarason, I. G. and Sarason, B. R. (Eds.), Social support: Theory, research, and applications*. The Hague: Netherlands: Martinus Niijoff.
ISEL-12. (n.d.). Retrieved from http://www.psy.cmu.edu/~scohen/ISEL12.html

Instructions: This scale is made up of a list of statements each of which may or may not be true about you. For each statement circle "definitely true" if you are sure it is true about you and "probably true" if you think it is true but are not absolutely certain. Similarly, you should circle "definitely false" if you are sure the statement is false and "probably false" if you think it is false but are not absolutely certain.

1. If I wanted to go on a trip for a day (for example, to the country or mountains), I would have a hard time finding someone to go with me.

1. definitely false 2. probably false 3. probably true 4. definitely true

2. I feel that there is no one I can share my most private worries and fears with.

1. definitely false 2. probably false 3. probably true 4. definitely true

3. If I were sick, I could easily find someone to help me with my daily chores.

1. definitely false 2. probably false 3. probably true 4. definitely true

4. There is someone I can turn to for advice about handling problems with my family.

1. definitely false 2. probably false 3. probably true 4. definitely true

5. If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me.

1. definitely false 2. probably false 3. probably true 4. definitely true

6. When I need suggestions on how to deal with a personal problem, I know someone I can turn to.

1. definitely false 2. probably false 3. probably true 4. definitely true

7. I don't often get invited to do things with others.

Date of Approval:1/25/2017

VANDERBILT UNIVERSITY
Institutional Review Board

1. definitely false 2. probably false 3. probably true 4. definitely true

8. If I had to go out of town for a few weeks, it would be difficult to find someone who would look after my house or apartment (the plants, pets, garden, etc.).

1. definitely false 2. probably false 3. probably true 4. definitely true

9. If I wanted to have lunch with someone, I could easily find someone to join me.

1. definitely false 2. probably false 3. probably true 4. definitely true

10. If I was stranded 10 miles from home, there is someone I could call who could come and get me.

1. definitely false 2. probably false 3. probably true 4. definitely true

11. If a family crisis arose, it would be difficult to find someone who could give me good advice about how to handle it.

1. definitely false 2. probably false 3. probably true 4. definitely true

12. If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me.

1. definitely false 2. probably false 3. probably true 4. definitely true

Date of Approval:1/25/2017

VANDERBILT UNIVERSITY
Institutional Review Board

Appendix G

Mobile Messaging Encounter Form

Confidential

Mobile Messaging Encounter Form

MOBILE MESSAGING ENCOUNTER FORM

Time form began: _____

Today's Date: _____

MNN: ◯ Marietta ◯ Maureen

Participant Nickname: _____

Participant Postpartum Day:

◯ 1 ◯ 2 ◯ 3 ◯ 4
◯ 5 ◯ 6 ◯ 7 ◯ 8
◯ 9 ◯ 10 ◯ 11 ◯ 12
◯ 13 ◯ 14 ◯ 15 ◯ 16
◯ 17 ◯ 18 ◯ 19 ◯ 20
◯ 21 ◯ 22 ◯ 23 ◯ 24
◯ 25 ◯ 26 ◯ 27 ◯ 28

Initial Text Initiated @time: _____

Final text ended @ time: _____

Total Time (in minutes): _____
(MINUTES)

Follow-up from previous day's concerns:

Chief complaint today: _____

Other symptom complaints: _____

Disposition: Check protocol(s) used in today's interaction with the subject

☐ General Well-Being
☐ Breastfeeding: Engorgement
☐ Breastfeeding: Pain - latch
☐ Breastfeeding: Pain - sore nipples
☐ Breastfeeding: Pain - plugged duct
☐ Breastfeeding: Red Streaks
☐ Engorgement: Formula Feeding
☐ Infection/General Malaise
☐ Pain: Incision
☐ Pain: Abdomen
☐ Pain: Hemorrhoids
☐ Pain: Perineum
☐ Pain: General
☐ Postpartum Blues/Depression
☐ Sleep/Fatigue Concerns
☐ Miscellaneous Reported Concerns
☐ Newborn Reported Concerns

Any additional recommendations given per text:

Date of Approval: 05/02/2017

Institutional Review Board

VANDERBILT
www.projectredcap.org
REDCap

Confidential

Summary Notes:

Phone Call Initiated: ◯ Yes ◯ No

If YES, time initiated: _____

Time ended: _____

Total time (in minutes): _____
(MINUTES)

Recommendations per phone:

Summary of conversation:

Miscellaneous Notes:

Time form completed: _____

Total time of documentation (in minutes): _____
(MINUTES)

Total time of encounter (in minutes): _____
(MINUTES)

Date of Approval: 05/02/2017

Institutional Review Board

VANDERBILT
www.projectredcap.org
REDCap

Appendix H

Mobile Messaging Protocols/Decision Trees

Mobile Messaging/Texting Protocols

The introductory script and template for the mobile messaging/texting protocols and decision trees developed for this study were adapted from the telephone intervention script protocol work done previously by L.H. Beebe (personal communication, January 1, 2016).

The mobile messaging/texting protocols were developed by the PI utilizing her more than 30 years of maternity/women's health nursing experience and with Davidson's (2014) *Fast Facts for the Antepartum and Postpartum Nurse* as the base resource with support from various other knowledgeable authors in the maternity/postpartum field (Francis, 2007; Lowdermilk et al., 2016; Romm, 2002; Wheeler, 2002). The mobile messaging protocols and decision trees were reviewed for content accuracy and clarity by five expert registered nurse (RN) professionals who have extensive professional experience with providing care with mothers and newborns. Additionally, three of the expert RNs also are credentialed as Board Certified Nurse-Midwives, two have earned a Doctor of Philosophy degree in Nursing, one a Master's in Science, three are recognized Fellows in their respective professional organizations, and two of the experts have extensive experience as Board Certified Lactation Consultants, and one RN is a Certified Lactation Counselor. The experts' feedback was incorporated into the protocols.

Other Resources Used for Protocol development

Davidson, M. R. (2014). *Fast facts for the antepartum and postpartum nurse: A nursing orientation and care guide in a nutshell*. New York, NY: Springer Publishing Company, LLC.

Francis, M. (2007). *The everything health guide to postpartum care*. Avon, Massachusetts: Adams Media.

Lowdermilk, D. L., Perry, S. E., Cashion, K., & Alden, K. R. (2016). *Maternity & women's health care* (11th ed.). St. Louis, MO: Elsevier.

Romm, A. J. (2002). *Natural health after birth: The complete guide to postpartum wellness*. Rochester, Vermont: Healing Arts Press.

Wheeler, L. (2002). *Nurse-midwifery handbook: A practical guide to prenatal and postpartum care* (2nd ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

[* Protocol text messages for use by the Maternity Nurse Navigator (MNN) noted in blue print in the following protocols. ***]**

Daily Introductory Mobile Message

MNN: Hi, this is (name) from the texting study. This is your daily text to see how you are doing. This text is only intended for (subject's nickname). Is this (subject's nickname)? If YES, proceed with the General Well-Being Protocol. If NO, text the following: Ok. I will text the (subject's nickname) again at (date) and (time).

General Well-Being – 7 content areas to review daily

How are you feeling today?

Well – No concerns

Not Well – Go to protocol #7 first and then follow with #1 - #6.

1.) **ACTIVITY: Are you getting up to walk at least every 2-4 hours while you are awake?**
If no, Moving will help to improve your circulation, prevent blood clots, and assist with recovery.

2.) **INCISION: Is your incision healing without redness, drainage, swelling, or warmth?**
If no, refer to **INFECTION/GENERAL MALAISE** Protocol

3.) **INTAKE:** Are eating and are you drinking at least eight 8 oz. glasses of fluid in 24 hours?
If no, Increasing your fluid intake aids in recovery, circulation, & supports breastfeeding (if applicable).

4.) **BREASTFEEDING: Is the baby breastfeeding every 2-3 hours** OR **formula feeding every 3-4 hours?**
If no, is newborn having at least 6-8 wet diapers per day?
If no, are you able to arouse infant to feed more often? (Q 2-3 hours [breastfeeding] OR Q 3-4 hours [formula feeding)
If no, please notify newborn's health care provider today about this.
If yes, continue to incorporate 6 hours of skin-to-skin (1st week)/2 hours (weeks 2-4) daily.

5.) **OUTPUT: Are you having any problems with constipation?**
If yes, increasing your movement, fluid intake, consumption of fresh fruits & veggies, & high fiber will often help.
If no results after this, stool softeners or mild bulk-forming laxatives (e.g. Metamucil, FiberCon, Citrucel), available over the counter, are an option. Use with ample fluids. How often are you taking narcotic pain medications? Begin to substitute with non-narcotic medications (e.g. ibuprofen – take with food). Limit use of narcotic pain medications.
Are you having any difficulty, pain, or burning with urination?
If yes, increase your fluid intake and contact your healthcare provider today.

6.) **SLEEP/REST: Have you been able to sleep, nap, and or rest?**
If no, is there someone available to watch the baby so you can get a nap?

7.) **GENERAL: Do you have any particular concerns or questions?**

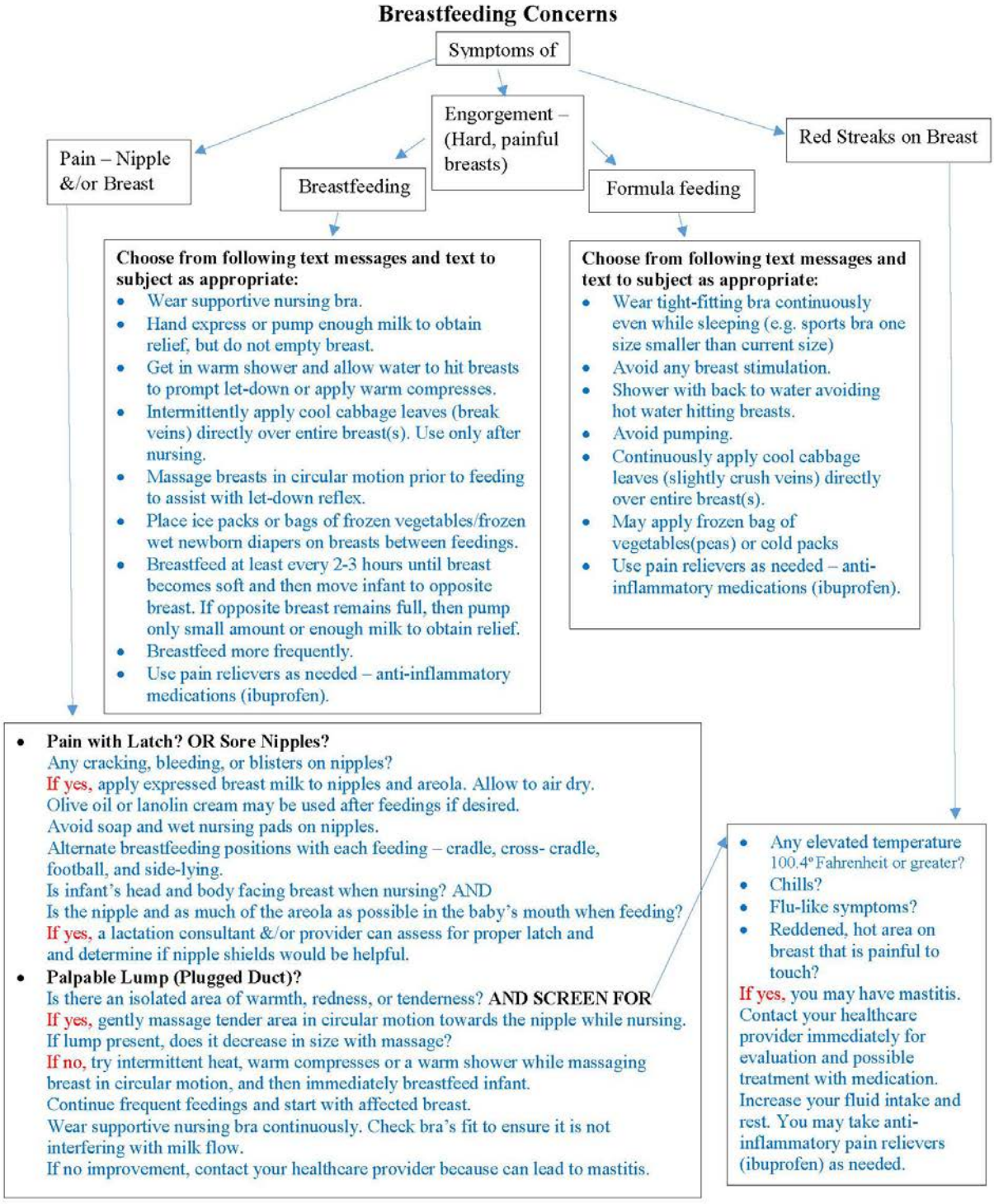
NO

DAILY CONCLUDING TEXT: I will text tomorrow during the time frame of (time) and (time). If you need help before then, please contact your healthcare provider. For EMERGENCY assistance, immediately call 911. Thank you!

Document summary on Mobile Messaging Encounter Form.

YES

1) Refer to & follow the appropriate protocol(s) that addresses patient concern(s).
2) If no written protocol for subject's concern,
3) then may initiate phone call with patient with her permission as warranted.
4) Prior to termination of daily interaction review **#1 through #6** of **General Well-Being** protocol.
5) End session with **DAILY CONCLUDING TEXT**.


Breastfeeding Concerns
Symptoms of
Pain – Nipple &/or Breast
Engorgement – (Hard, painful breasts)
Red Streaks on Breast
Breastfeeding
Formula feeding
Choose from following text messages and text to subject as appropriate:
Wear supportive nursing bra.
Hand express or pump enough milk to obtain relief, but do not empty breast.
Get in warm shower and allow water to hit breasts to prompt let-down or apply warm compresses.
Intermittently apply cool cabbage leaves (break veins) directly over entire breast(s). Use only after nursing.
Massage breasts in circular motion prior to feeding to assist with let-down reflex.
Place ice packs or bags of frozen vegetables/frozen wet newborn diapers on breasts between feedings.
Breastfeed at least every 2-3 hours until breast becomes soft and then move infant to opposite breast. If opposite breast remains full, then pump only small amount or enough milk to obtain relief.
Breastfeed more frequently.
Use pain relievers as needed – anti-inflammatory medications (ibuprofen).
Choose from following text messages and text to subject as appropriate:
Wear tight-fitting bra continuously even while sleeping (e.g. sports bra one size smaller than current size)
Avoid any breast stimulation.
Shower with back to water avoiding hot water hitting breasts.
Avoid pumping.
Continuously apply cool cabbage leaves (slightly crush veins) directly over entire breast(s).
May apply frozen bag of vegetables(peas) or cold packs
Use pain relievers as needed – anti-inflammatory medications (ibuprofen).
Pain with Latch? OR Sore Nipples?
Any cracking, bleeding, or blisters on nipples?
If yes, apply expressed breast milk to nipples and areola. Allow to air dry.
Olive oil or lanolin cream may be used after feedings if desired.
Avoid soap and wet nursing pads on nipples.
Alternate breastfeeding positions with each feeding – cradle, cross- cradle, football, and side-lying.
Is infant's head and body facing breast when nursing? AND
Is the nipple and as much of the areola as possible in the baby's mouth when feeding?
If yes, a lactation consultant &/or provider can assess for proper latch and and determine if nipple shields would be helpful.
Palpable Lump (Plugged Duct)?
Is there an isolated area of warmth, redness, or tenderness? AND SCREEN FOR
If yes, gently massage tender area in circular motion towards the nipple while nursing.
If lump present, does it decrease in size with massage?
If no, try intermittent heat, warm compresses or a warm shower while massaging breast in circular motion, and then immediately breastfeed infant.
Continue frequent feedings and start with affected breast.
Wear supportive nursing bra continuously. Check bra's fit to ensure it is not interfering with milk flow.
If no improvement, contact your healthcare provider because can lead to mastitis.
Any elevated temperature 100.4° Fahrenheit or greater?
Chills?
Flu-like symptoms?
Reddened, hot area on breast that is painful to touch?
If yes, you may have mastitis. Contact your healthcare provider immediately for evaluation and possible treatment with medication. Increase your fluid intake and rest. You may take anti-inflammatory pain relievers (ibuprofen) as needed.

Infection/General Malaise Concerns

If patient has general non-specific complaints or there is any concern about potential infection, review signs and symptoms of infection to determine if present.

- Is there any increased redness, tenderness, pain, or warmth, any swelling, new bruising, drainage, foul smelling discharge, or separation of your incision?
- Do you have an elevated temperature 100.4° Fahrenheit or greater?
- Feel like heart is racing?
- Chills?
- Flu-like symptoms?
- Red streaks down your breast?
- Burning with frequent urination?
- Foul smelling discharge?
- Abdominal tenderness?
- If yes, contact your healthcare provider immediately.

Follow-up text during next contact:
[if patient directed to contact their healthcare provider for any of the above complaints]

- Continue to eat a well-balanced diet with fresh fruits and vegetables, proteins, dairy, and whole grains
- Continue to drink plenty of fluids; avoid/limit caffeine, soft drinks
- Continue taking prenatal vitamins

Pain Concerns

Breast

Engorgement
Sore Nipples

Refer to **Breastfeeding Concerns: Pain Protocol**

Incision

- Is there any increased redness, tenderness, pain, or warmth, any swelling, new bruising, drainage, foul smelling discharge, or separation of your incision?
- Do you have an elevated temperature above 100.4° Fahrenheit?
- If yes, contact healthcare provider immediately.
- If general soreness, apply pillow over incision site when getting up from a chair or bed.
- Avoid lifting anything heavier than the baby.
- Use anti-inflammatory pain relievers (ibuprofen) as needed.

Abdomen

- Describe pain.
- If incisional, is there any increased redness, tenderness, pain, or warmth, any swelling, new bruising, drainage, foul smelling discharge, or separation of your incision?
- Do you have an elevated temperature 100.4° Fahrenheit or greater?
- If yes, contact healthcare provider immediately.
- If not incisional and is in another specific abdominal area, does pain interfere with doing other activities of daily living – walking, eating, bathing/showering, or sleeping?
- Does pain persist after taking prescribed pain relievers?
- If yes, contact healthcare provider immediately.
- If general soreness, apply pillow over incisional site when getting up from a chair or bed.
- Avoid lifting anything heavier than the baby.
- May use anti-inflammatory pain relievers (ibuprofen)
- If cramping, may apply heating pad set on low or heated rice sock
- Try prone position
- May take pain relievers (ibuprofen) 30 minutes before breastfeeding if cramping occurs with breastfeeding
- Try frequent ambulation.
- If gas pain/referred shoulder pain, this is not uncommon.
- Walking can assist with expelling gas.
- May try over-the-counter anti-gas medication or prescribed pain relievers.

General non-pharmacological pain relief options – suggest when appropriate:

- Rest periods.
- Relaxation techniques incorporating soft music.
- Warm bath, warm compresses, or warm rice sock.
- Massage.
- Aromatherapy – use appropriate caution with essential oils and newborn in same room. Need to establish safety for newborn prior to using.
- Warm beverage of choice.

Hemorrhoids

Choose from following text messages and text to subject as appropriate:

- Cleanse with peri-bottle & carefully wipe after BM
- Consider using disposable cleansing cloths
- Soak as needed in shallow tub of warm water
- Apply witch hazel pads after urinating or a BM
- Use either hemorrhoid OR topical steroid cream as prescribed
- Lie down in side-lying position
- Avoid constipation & straining with BM
- Increase intake of:
  - plenty of fluids
  - raw fruits and vegetables
  - high fiber – bran, oats, whole grains
- Try over-the-counter stool softeners as needed
- Contact your healthcare provider for evaluation for unresolved pain or for concerns with bleeding.

Perineum

Choose from following text messages and text to subject as appropriate:

- Soak as needed in warm or cool tub of water
- Apply witch hazel pads
- Apply topical steroid creams/foams/sprays as needed
- May use intermittent ice packs/frozen wet peri-pads as desired
- Use pain relievers as needed
- Avoid direct pressure to area when sitting if possible
- Use side-lying position when resting
- **For continued or unrelieved perineal pain,** contact healthcare provider as soon as possible for evaluation.

Postpartum Blues/Postpartum Depression

Symptoms of

sadness	crying for no apparent reason	anxiety
insomnia	sleep disturbances	anger
lack of appetite	excessive worrying	guilt
lethargy	extreme fatigue	
restlessness	disinterest in the infant	

feelings of disappointment, worthlessness, hopelessness

Thoughts of harming self or baby

- **IMMEDIATE** referral to healthcare provider, emergency department or call 911

Symptoms for 10 days or <

Choose from following text messages and text to subject as appropriate:

- These feelings are common in 50% - 80% of women.
- The symptoms are typically self-limiting and resolve by Day 10 of postpartum.
- Increase rest periods and nap when the baby sleeps.
- Make a point to rest when others are present to help. Do not feel obligated to visit.
- Accept help from others.
- When others ask what they can do to help, suggest providing a meal, completing a load(s) of laundry, or completing household task(s) and rest when they are providing this help.
- Ask for help when needed.
- Delegate necessary household tasks; allow other non-urgent tasks to wait. When someone offers help, allow them to complete the non-urgent tasks.
- Take a shower or soak in a tub if incision is well approximated and is healing well while someone cares for the newborn.
- Take a walk daily if possible. Let someone care for the baby or take and stroll the baby. Walk in safe areas.
- Eat a well-balanced diet with fresh fruits and vegetables.
- Drink plenty of fluids. Limit/avoid caffeine and alcohol.
- Continue taking prenatal vitamins.
- Incorporate relaxation techniques when trying to go to sleep (e.g. slow deep breathing, progressive relaxation)
- Play soothing music.
- Incorporate aromatherapy. If use an essential oil, check for safety for use with newborn in the same room.
- Take advantage of offers to care for newborn and plan a time away from the house visiting with friends or enjoying a favorite activity.

Symptoms > 10 days

Choose from following text messages and text to subject as appropriate:

- What strategies have you utilized for symptom relief?
- Which strategies provided relief even if temporary?
- Who is available to offer some assistance with newborn care and household tasks?
- Have you had any thoughts of harming yourself or your baby? If yes, **immediate referral** to healthcare provider, emergency department, or call 911.

Continued other symptoms warrants instructions for patient to contact healthcare provider.

Sleep/Fatigue Concerns

Choose from following text messages and text to subject as appropriate:

- Plan rest and sleep periods when baby is napping.
- Limit visitors.
- Accept help from others.
- When others ask what they can do to help, suggest providing a meal, completing a load(s) of laundry, or completing household task(s) and rest when they are providing this help.
- Ask for help when needed.
- Make a point to rest when others are present to help. Do not feel obligated to visit.
- Eat a well-balanced diet with proteins, fresh fruits and vegetables.
- Drink plenty of fluids. Avoid caffeine.
- Continue taking prenatal vitamins.
- Create dark, quiet environment for sleep.
- Eliminate unnecessary background noise.
- Incorporate relaxation techniques when trying to go to sleep (e.g. slow deep breathing, progressive relaxation)
- Play soothing music.
- Incorporate aromatherapy.
- Delegate necessary household tasks; allow other non-urgent tasks to wait. When someone offers help, allow them to complete the non-urgent tasks.
- Gradually add increased activity to daily routine.
- If continued complaints of fatigue, contact healthcare provider for evaluation.

Miscellaneous Concerns Reported by Patient

Concerns that require <u>immediate emergency assistance</u>. Patient, family member or MNN to <u>call 911 or patient should seek immediate follow-up at an emergency department</u>

- Seizures
- Chest pain
- Shortness of breath
- Difficulty breathing
- Thoughts of wanting to harm yourself or your baby

Concerns that require <u>immediate contact</u> with healthcare provider <u>or follow-up at an emergency department</u> if unable to connect with healthcare provider

- Saturating a peri-pad with vaginal bleeding within 1 hour or less. Increased bleeding is unrelated to breastfeeding newborn or standing up after lying recumbent for a period of time
- Heavy bleeding that has increased significantly from previous amount of bleeding
- Passing golf ball sized clots
- Feeling of impending doom or dread
- Feeling that something is just not right
- Coughing up blood

Concerns that require <u>immediate contact</u> with healthcare provider

- Increased redness, tenderness, pain, or warmth, any swelling, new bruising, drainage, foul smelling discharge, or separation of abdominal incision
- Temperature 100.4° Fahrenheit or greater
- Feel like heart is racing
- Flu-like symptoms and/or chills
- Red streaks down your breast
- Painful breasts or hardened areas that do not soften after breastfeeding
- Burning with urination, urgency, flank pain
- Foul smelling vaginal discharge noted after bathing/showering and fresh pad
- Abdominal pain or increased tenderness that persists after rest
- Unrelieved headaches, visual changes (blurry or spots before eyes), epigastric pain, swelling
- Redness, warmth, tenderness, swelling, burning sensation, pain, or red streaks in legs
- Crying spells, mood swings, or feeling out of control that intensifies or persists
- Vomiting and diarrhea

Concerns that should resolve with time

- Nighttime sweats
- Frequent urination without burning, urgency, or flank pain

Follow up:

- Continue to drink plenty of fluids

Maintain after concern resolved:

- Continue to eat a well-balanced diet with fresh fruits and vegetables, proteins, dairy, and whole grains
- Continue to drink plenty of fluids; avoid/limit caffeine, soft drinks
- Continue taking prenatal vitamins

Newborn Concerns Reported by Patient

Concerns that require calling 911 or immediate follow-up at an emergency department

- Stops breathing

Concerns that require immediate contact with healthcare provider or follow-up at an emergency department if unable to connect with healthcare provider

- Difficulty breathing – rapid (quicker than usual breathing), labored, or noisy breathing
- Listlessness or difficulty waking up
- Spit up is green, bile-like color
- Bleeding from the umbilical or circumcision site that does not stop with pressure

Concerns that require immediate contact with healthcare provider

- Temperature > 99° or < 97° Fahrenheit
- Vomiting or spitting up a large part or all of a feeding 2 or more consecutive times
- Extreme behavior change – shrill crying, irritability, or tremors
- Blue color to lips and face
- Loss of appetite or refusal of 2 consecutive feedings
- 3 or more in a row diarrhea or watery stools (differs from normal liquid yellow seedy breast milk stool)
- Redness, drainage, or foul odor from umbilical site
- Visible blood in the stool
- No urination for 6-8 hours
- Increase or appearance of yellowish color of skin or whites of eyes
- A feeling that something is just not right

Appendix I

Nurse Liaison Script

NURSE LIAISON SCRIPT

(To be used when discussing Postpartum Symptom study with a potential participant. [nurse researcher, Melanie Morris])
(script in bold italics in boxes)

We are conducting a study with new mothers like you who have had an unplanned cesarean birth to look at the symptoms that occur in the first four weeks following birth.

Are you interested in learning more and talking to the nurse investigator?

(If YES)

May she call you on your hospital phone or would you prefer she call you on your cell phone?

(If NO)

Thank you for your time.

(If YES)

What is the preferred contact number?

Thank you. The nurse investigator will be contacting you before you are discharged.

Preferred Contact #

_____

Text "*Potential participant*" and include preferred contact number to _____ and then shred this paper.

(If the potential participant prefers to contact the nurse investigator, please remove the contact information at the bottom of this sheet and give to the potential participant.)

Melanie Morris – nurse researcher
Study – symptoms mothers experience after an unplanned cesarean birth If interested, please contact _____.

Date of Approval:1/25/2017

VANDERBILT UNIVERSITY
Institutional Review Board

Appendix J

Evaluation of Maternity Nurse Navigator Intervention

Confidential

Maternity Nurse Navigator Evaluation

EVALUATION of TEXTING with the MATERNITY NURSE

The following questions ask about texting with the nurse(s) during the previous 4 weeks.

Rate your overall experience with receiving daily texts from the maternity nurse

◯ Poor ◯ Fair ◯ Neutral ◯ Good ◯ Outstanding

How likely would you be to choose to receive daily text messages from a maternity nurse after a birth again?

◯ Not likely ◯ Somewhat likely ◯ No opinion ◯ Very Likely ◯ Definitely

What was the best time of day for you to receive a text from the maternity nurse? _____

How much during the week would you have preferred to receive texts from the maternity nurse? (example - 2 times or more per day, once a week, etc.) _____

What was the most helpful thing about receiving a daily text from the maternity nurse?

What was the least helpful thing about receiving a daily text from the maternity nurse?

Additional comments or suggestions

Date of Approval: 05/02/2017

Institutional Review Board

VANDERBILT

www.projectredcap.org REDCap

03.28.2017 23:51

Appendix K

Recruitment Flyer

Research Study: Investigating First-time Mothers' Postpartum Recovery Symptom Experience



VOLUNTEER PARTICIPANTS WANTED FOR RESEARCH STUDY

Study Purpose:
You are being asked to join a research study about first-time mothers' childbirth recovery experience following an unplanned cesarean birth. Your participation can help enhance what healthcare providers and researchers know about new mothers who have an unplanned cesarean birth and can help researchers learn about using texting in the weeks after having a baby.

Who's Eligible:
Women who had their first birth by unplanned or emergency cesarean section less than 5 days ago

- -Age 18 – 34 years
- -Birth occurred at 37 or more weeks of gestation
- -Anticipate discharge home with the newborn 2 to 4 days after birth
- -Possess daily access to a cell phone or electronic tablet with texting capability
- -Have ability to access the internet
- -Possess the ability to read, write, and speak English

What's Involved:
You will be asked to complete 3 surveys electronically on three different occasions:

1. between days 2 and 4 following birth
2. at 2 weeks following birth
3. at 4 weeks following birth

The estimated time to complete the surveys each time is less than 30 minutes. You will be randomly assigned to one of two groups. Completing the surveys is all that is required if you are assigned to one group. If you are assigned to the other group, a maternity nurse will contact you daily by text until your newborn is 4 weeks old. The maternity nurse will ask questions related to your general well-being, and she can answer your questions related to symptoms experienced during your postpartum recovery, breastfeeding, and/or newborn care.

Compensation for Participation:
You will receive a $30 participant reimbursement check approximately 4-6 weeks after completing the final surveys at 4 weeks following birth.

Benefits of Joining:

- Help to improve what researchers know about new mothers who have an unplanned cesarean birth
- Help researchers to better understand and improve postpartum care for women who have cesarean births
- Help researchers know more about using texting in the weeks after birth

Principal Investigator:
The principal investigator for this study is Melanie Morris, MSN, APRN, WHNP-BC, a PhD candidate at the University of Tennessee, Knoxville, College of Nursing and an Instructor in Nursing at Vanderbilt University School of Nursing. The faculty advisor is Sadie Hutson, PhD, RN, WHNP, BC, at [redacted].

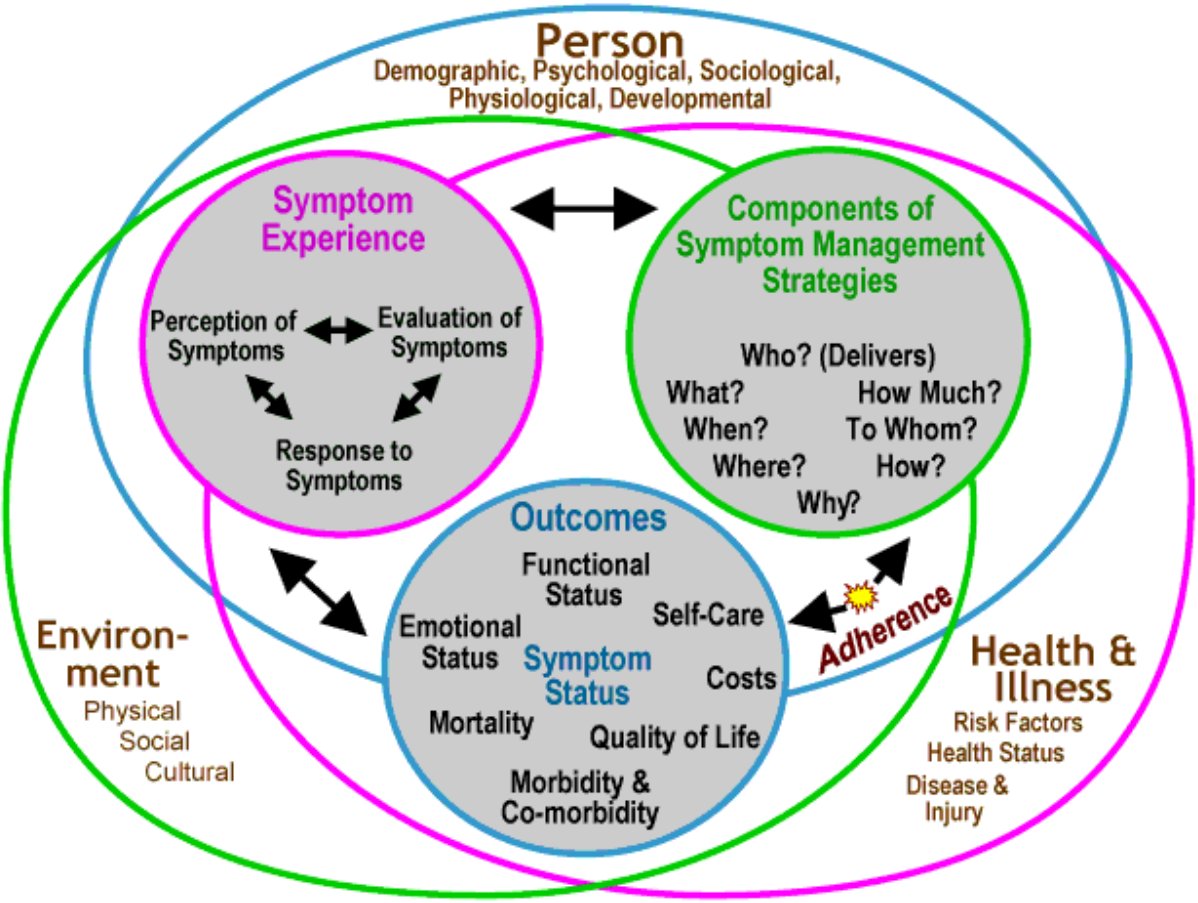
If you would like to volunteer for the study or request more information, please contact Melanie Morris by calling or texting [redacted]
You may also contact her by email at melanie.h.morris@vanderbilt.edu.

Date of IRB Approval: 01/30/2018 Institutional Review Board
VANDERBILT

Appendix L

Symptom Management Model

SYMPTOM MANAGEMENT MODEL



Permission to Use Model *(shown above)*. The most recent presentation of the **Symptom Management Model** appears as Humphreys, J., et. al., in Smith, M.J. and Liehr, P.R. (eds.,2014). **Middle Range Theory for Nursing.** *Chapter 7. Theory of Symptom Management.* New York: Springer Publishing Company.

Dodd M, Janson S, Facione N, Faucett J, Froelicher ES, Humphreys J, Lee K, Miaskowski C, Puntillo K, Rankin S, Taylor D. (2001). Advancing the Science of Symptom Management. *Journal of Advanced Nursing, 33(5),* 668-676.

License for use obtained from John Wiley and Sons: license number: 4313170422384

Appendix M

Institutional Review Board Approval

Vanderbilt University
Institutional Review Board
504 Oxford House Nashville, Tennessee 37232-4315
(615) 322-2918 Fax: (615) 343-2648
www.mc.vanderbilt.edu/irb

January 25, 2017

Melanie Morris, MSN, APRN, WHNP-BC, CCE
SON AcademicFaculty

RE: IRB# 162142 "Investigating the Relationship between Nurse-Navigated Mobile Messaging Support and Primiparous Womens Postpartum Symptom Experience Following Unplanned Cesarean Birth"

Dear Melanie Morris, MSN, APRN, WHNP-BC, CCE:

A sub-committee of the Institutional Review Board reviewed the research application identified above. The sub-committee determined the study poses minimal risk to participants, and the application is approved under 45 CFR 46.110 (F)(7). Approval is extended to the Master Protocol and the Mobile Messaging and Texting Protocol.

The Consent Form(s) have been stamped with the approval and expiration date and this copy should be used when obtaining the participant's signature. Federal regulations require that the original copy of the participant's consent be maintained in the principal investigator's files and that a copy be given to the subject at the time of consent. An additional record (i.e., case report form, medical record, database, etc.) of the consent process should also be maintained in a separate location for documentation purposes.

As the Principal Investigator, you are responsible for the accurate documentation, investigation and follow-up of all possible study-related adverse events and unanticipated problems involving risks to participants or others. The IRB Adverse Event reporting policy III.G is located on the IRB website at http://www.mc.vanderbilt.edu/irb/.

If this trial requires registration as a clinical trial, accrual cannot begin until this study has been registered at clinicaltrials.gov and a National Clinical Trial Number (NCT) provided. Please provide the NCT# to the IRB as soon as it is obtained. If an approval is required from an additional source other than the Vanderbilt IRB, this must be obtained prior to study initiation. These approvals may include, but are not limited to CRC, SRC, IND, IDE.

Please note that approval is for a 12-month period. Any changes to the research study must be presented to the IRB for approval prior to implementation.

DATE OF IRB APPROVAL: 1/25/2017 DATE OF IRB EXPIRATION: 1/24/2018

Sincerely,



David G. Schlundt, Ph.D., Chair
Institutional Review Board
Behavioral Sciences Committee

DGS/sdb
Electronic Signature: David G Schlundt/VUMC/Vanderbilt : (796F1AC8B041640E8B9C1882CCA9AE5D)
Signed On: 01/25/2017 04:19:12 PM CST

Human Research Protections Program – HRPP
Supporting the work of the IRB and Providing HRPP Oversight

VANDERBILT

RE: IRB #162142 "Investigating the Relationship between Nurse-Navigated Mobile Messaging Support and Primiparous Womens Postpartum Symptom Experience Following Unplanned Cesarean Birth"

Dear Melanie Morris, MSN, APRN, WHNP-BC, CCE:

A sub-committee of the Institutional Review Board reviewed the Application for Continuing Review for the research study identified above. The sub-committee determined the study poses Minimal Risk to participants. This study meets 45 CFR 46.110 (F) category (7) for Expedited Review.

The Consent Form(s) have been stamped with the approval and expiration date and this copy should be used when obtaining the participant's signature. Federal regulations require the original copy of the participant's consent be maintained in the principal investigator's files and that a copy be given to the participant at the time of consent. An additional record (i.e., case report form, medical record, database, etc.) of the consent process should also be maintained in a separate location for documentation purposes.

As the Principal Investigator, you are responsible for the accurate documentation, investigation and follow-up of all possible study-related adverse events and unanticipated problems involving risks to participants or others. The IRB Adverse Event reporting policy III.G is located on the IRB website at http://www.mc.vanderbilt.edu/irb/.

Please note that approval is for a 12-month period. Any changes to the research study must be presented to the IRB for approval prior to implementation.

DATE OF IRB APPROVAL: 1/16/2018 DATE OF IRB EXPIRATION: 1/15/2019

Sincerely,

David G Schlundt PhD, Chair
Institutional Review Board
Behavioral Sciences Committee

Electronic Signature: David G Schlundt/VUMC/Vanderbilt : (5607f7e4923e06c766802ed43792f4b1)
Signed On: 01/16/2018 7:50:01 PM CST

1313 21st Ave., South, Suite 504
Nashville, TN 37232
www.vanderbilt.edu/irb

Appendix N

Reliance Agreement

Vanderbilt University
IRB Authorization Agreement

A. This Agreement is entered into by and between the institutions identified below (each a "party" and collectively the "parties").

Institution or Organization Providing IRB Review ("Reviewing Institution/IRB"):

Federalwide Assurance ("FWA") #: 00005756
IRB Registration #: 00000477

Institution or Organization Relying on the Designated IRB ("Relying Institution"):

Federalwide Assurance ("FWA") #:

( ) This institution does not have an FWA and the research is not federally funded

---

B. The Officials signing below agree that the Relying Institution may rely on the Reviewing Institution/IRB for review and continuing oversight of its human subjects research as described:

( ) This agreement applies to all human subjects research covered by the Relying Institution's FWA.

(X) This agreement is limited to the following specific protocol(s):

Name of Research Project: Investigating the Relationship between Nurse-Navigated Mobile Messaging Support and Primiparous Women's Postpartum Symptom Experience Following Unplanned Cesarean Birth
IRB Study # at Reviewing Institution/IRB: #162142
Principal Investigator at Reviewing Institution/IRB: Melanie Hall Morris
Principal Investigator at Relying Institution: Melanie Hall Morris
Sponsor or Funding Agency: not applicable
Award Number (if any):

( ) Other (describe):

C. **Reviewing Institution/IRB** agrees that it will:

(1) Provide initial and continuing review for the research protocol(s) specified in Section B pursuant to 45 CFR 46 and its FWA. In performing this review, the Reviewing Institution/IRB will make all reasonable efforts to meet the human subject protection requirements of the Relying Institution's OHRP-approved FWA.

(2) Follow written procedures for reporting its findings and actions to appropriate official(s) at the Relying Institution via the principal investigator at the Relying Institution specified in Section B.

Template revised 2016.08.26

(3) Make relevant minutes of IRB meetings and other relevant documentation available to the Relying Institution upon request.

D. **Relying Institution** agrees that it will:

(1) Be responsible for the timely compliance of its employees, students, and agents with the Reviewing Institution/IRB's policies, procedures, and determinations regarding the research protocol(s) specified in Section B and with the terms of this Agreement and the terms of Reviewing Institution's OHRP-approved FWA, if applicable.

(2) Accept the final authority and decisions of the Reviewing Institution/IRB, including but not limited to directives to suspend or terminate designated research activities.

(3) Be responsible for safeguarding the rights and welfare of each research subject in performance of the research protocol(s) specified in Section B by its own employees, students, and agents in accord with the determinations of the Reviewing Institution/ IRB and the terms of the Reviewing Institution's OHRP-approved FWA, if applicable.

(4) Not use, or authorize others to use, the name, symbols, or marks of the Reviewing Institution/IRB in any advertising or publicity material or make any form of representation or statement in relation to the research protocol(s) specified in Section B which would constitute an expressed or implied endorsement by the Reviewing Institution/IRB, except for factual representations of the Reviewing Institution/IRB's performance of research pursuant to this Agreement.

E. **Both parties** agree to the following general provisions:

(1) The term of this Agreement shall begin upon full execution by the parties and shall continue in effect until expiration or termination of the Reviewing Institution/IRB's approval of the research protocol(s) specified in Section B.

(2) Each party will be responsible for its own negligence in connection with its performance of this Agreement and the research protocol(s) specified in Section B.

(3) Upon the occurrence of events or incidents that require reporting to external regulatory agencies or other organizations, including without limitation the reporting of unanticipated problems or instances of non-compliance to OHRP or the agency sponsoring the research protocol(s) specified in Section B, the parties will make all reasonable efforts to determine which party has primary responsibility for making the required reports; provided, however, that both parties shall have a reasonable opportunity to review and comment on such reports. Both parties further agree to make all reasonable efforts to assist and cooperate in the preparation of any required reports relating to the research protocol(s) specified in Section B.

(4) This document must be kept on file by both parties and provided to OHRP upon request.

(5) Correspondence regarding the occurrence of events or incidents that require reporting to external regulatory agencies or other organizations, including without limitation the reporting of unanticipated problems or instances of non-compliance to OHRP or the agency sponsoring the research protocol(s) specified in Section B, shall be sent to the signatory officials listed below.

(6) Any liability of The University of Tennessee to Vanderbilt University and third parties for any claims, damages, losses, or costs arising out of or related to acts performed by The University of Tennessee under this Agreement will be governed by the Tennessee Claims Commission Act, Tenn. Code Ann. §§ 9-8-301, et. seq. The University of Tennessee is self-insured under the Tennessee Claims Commission Act, Tenn. Code Ann. §§ 9-8-301 et seq., which covers certain tort liability for actual damages of up to $300,000 per claimant and $1,000,000 per occurrence.

(7) It is agreed that VUMC may choose to provide the coverage stated above through a program of self-insurance.

Signature of Signatory Official (or authorized designee) at Reviewing Institution/IRB:

Todd W. Rice

Date: February 2, 2017

Name: Todd Rice, MD

Institutional Title: Institutional Official
Phone: 615-322-2918
Email: todd.rice@vanderbilt.edu

Signature of Signatory Official (or authorized designee) at Relying Institution:

Date: 2/1/17

Name: Robert Nobles, DrPH, MPH, CIP

Institutional Title: Associate Vice Chancellor for Research
Phone: 865-974-3053
Email: nobles@utk.edu

Vita

Melanie Hall Morris was born in Memphis, Tennessee and has resided in Tennessee all of her life. Even though she grew up surrounded by multiple dental health professionals, Melanie never felt called into the dental healthcare arena. However, while a student at Mars Hill College, Melanie did discover the existence of the profession of nurse-midwifery. This pivotal "Aha" moment prompted her to transfer to Vanderbilt University to pursue a nursing degree. Upon returning to Nashville, Tennessee, she was lucky enough to work alongside an obstetrician and two nurse-midwives in a pioneering collaborative private practice. During this time, she met a woman, Peggy, who invited her to attend her birth. Witnessing Peggy's birth and the miracle of life forever impacted the trajectory of Melanie's professional nursing career and aspirations. A passion ignited within Melanie at the moment of that birth and has never once faded in all of the years since then.

After completing her Bachelor's degree in Nursing at Vanderbilt University, she married her high-school sweetheart, Craig, and worked as a Registered Nurse for two years in a step-down intensive care unit before returning to graduate school and landing her first obstetrical job at the city hospital. She completed her Master's degree in Nursing as a Family Nurse Clinician at Vanderbilt University and became certified as a Women's Health Nurse Practitioner, Childbirth Educator, and Basic Life Support instructor. She has been privileged to provide nursing care for women in both acute care and primary care settings during pregnancy, labor, birth, and postpartum and has cared for newborns during their transition to extrauterine life. All of her experiences of providing nursing care to women and newborns served to fuel her passion and add joy to her career as a professional nurse. However, she claims the sixteen years she spent homeschooling her two precious children, John Michael and Cari, as an extraordinarily rewarding and fulfilling venture.

Melanie discovered a love for teaching nursing students after a number of years of providing direct nursing care to women. She worked as an Adjunct Clinical Nursing Instructor at Belmont University and Cumberland University. For more than 10 years, she has been delighted to be able to share her love for nursing and the wonderful world of obstetrics with students at her alma mater, Vanderbilt University School of Nursing.

In 2011, Melanie made a monumental decision to pursue the terminal Doctor of Philosophy in Nursing degree and set to the side a long-held dream of nurse-midwifery. She determined that she could best contribute to the advancement of the nursing profession as a nurse scientist. Melanie still hangs onto a secret hope that perhaps one day she will be able to assist in the birth of one of her future grandbabies whose birth she hopes will be attended by a certified nurse-midwife. A definite bonus for her would be if the birth care provider just happened to be a former student.

At this time, she is overcome with joy that she has finally reached the end of a very demanding yet exhilarating PhD journey which began in 2012. The transformation into a nurse scientist did not occur without heartache and failures along the way, but through perseverance, those struggles resulted in immense satisfaction, triumph, and elation. Each step and every stumble experienced have uniquely shaped her journey. Although this doctoral journey milestone is now complete, Melanie recognizes that there is much left to accomplish. She remains committed to working in the nursing arena as a researcher, educator, and clinician. She plans to devote her time and skills to finding ways to foster postpartum health and well-being for women following childbirth. As the center of the family unit, she recognizes the health of a mother very much influences the welfare of her entire family, and this reason sufficiently affirms the worth of her doctoral journey.