

EXPERIENCES OF PREGNANT WOMEN USING A MOBILE APPLICATION AS
TREATMENT COMPANION

A Dissertation

by

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This dissertation meets the standards for scope and quality of
Texas A&M University-Corpus Christi and is hereby approved.

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ABSTRACT

The purpose of this descriptive phenomenological study was to explore the lived experiences of pregnant women using *VeedaMom*, a mobile app created to screen for and manage symptoms of perinatal depression. A total of six women at various points of their pregnancy development participated in individual interviews and a focus group. Data was also obtained from an in-app journal featured in the *VeedaMom* app. The purposeful sample was identified through a maternal-fetal clinic servicing the women of South Texas. Participants were required to complete the in-app Edinburgh Postnatal Depression Scale once a week, watch psycho-educational videos featured in the app, and practice mindfulness exercises offered through the app as audio recordings. This study utilized Giorgi's phenomenological methods to analyze the expectant mother's in-depth, conscious descriptions of their lived experiences using the app.

The findings of this study provide a deeper understanding of pregnant women's experiences and emotions while using the *VeedaMom* app as treatment companion. Nine themes and two subthemes emerged from the analysis: *welcoming a new life: my own; defining myself through comparisons*; with two subthemes: *me vs. others* and *my different pregnancies*; *need to address many emotions*; *mommy-focused care*; *the high value of insight and acceptance*; *apps are part of life*; *benefits of the in-app EPDS*; *teach me something new, now!*; . . . and *please remind me*. The findings include a general psychological structure of the experience, and a diagram representing its connections. The participants' descriptions referred to two important aspects of the phenomenon: the experience of motherhood, and the experience of using an app during pregnancy. Participants described pregnancy as a time of profound and significant change

that might lead them to redefine their own identity. They perceived the app as helpful and valuable, especially when related to important outcomes expected: mother-centered care, and the promotion of insight and acceptance.

Researchers must continue to investigate the effectiveness and adequacy of interventions through app technology in promoting mental health, especially for app-delivered interventions designed for the perinatal period, since the use of app technology is ubiquitous and increases during pregnancy.

DEDICATION

With all my heart, I dedicated this dissertation to my parents, Antonio and Mary Pili, for shaping who I am and instilling the values of unconditional love, personal growth, and the search for a higher purpose through their devoted care and example. I also dedicate this dissertation to my sisters, Melina and Maya, the other two pieces of my puzzle. And to my kids, Beka and Diego, who demonstrated being the most supportive, understanding, and loving people I have ever known. My heart grew three sizes the day each of you was born.

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CHAPTER I: INTRODUCTION

" . . . Everyone expects pregnant women to be blissfully happy, right? Just so overjoyed at the miracle of it all, too filled with excited anticipation to feel such humanly concerns as fear or discontentment" (Sharp, 2012, n.p.). Social media and blogging have allowed mothers to more easily share candid comments such as this. In spite of generally accepted beliefs and expectations, pregnancy could be accompanied by feelings of anxiety, fear, insecurity, and sadness (Knudson-Martin & Silverstein, 2009; Puryear, 2007; 2014). Traditionally, the term postpartum depression has been used to identify these feelings, with the assumption that symptoms are experienced after the birth of the baby. But recent studies indicate depression often occurs among pregnant women (Bunevicius, Kusminskas, Pop, Pedersen & Bunevicius, 2009; Stowe, Hostetter, & Newport, 2005; Yonkers, Ramin, Rush, Navarrete, Carmody, March, & Leveno, 2001). A study of 9,028 women in the UK reported more women suffering from symptoms of depression at 18 and 32 weeks of pregnancy than eight weeks and up to eight months after delivery (Evans, Heron, Francomb, Oke, & Golding, 2001).

The first editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM) made no reference to depression as related to pregnancy. The DSM-IV was the first edition to recognize Major Depressive Disorder (MDD) with postpartum onset (American Psychiatric Association [APA], 1994). The postpartum onset specifier would be applicable if the most recent Major Depression episode occurred within four weeks of delivering a child.

The definition and criteria for the diagnosis of depression surrounding pregnancy continued to evolve. One significant revision to the diagnosis of Major Depressive Disorder present in the DSM-5 (APA, 2013) is the change in the specifier to read "with peripartum onset" which is defined as the "most recent episode of major depression if onset of mood symptoms

occurs during pregnancy or in the 4 weeks following delivery" (p. 186). Authors of the DSM-5 also noted, "fifty percent of 'postpartum' major depressive episodes actually begin prior to delivery" (p. 186) and establishes "peripartum" as the collective way to refer to these episodes (APA, 2013). Also significant is the recognition of co-existing symptoms of "severe anxiety and even panic attacks" (p. 186). In addition, in the DSM-5 it is acknowledged, "mood and anxiety symptoms during pregnancy, as well as the "baby blues," increase the risk for a postpartum major depressive episode" (p. 187). However, experts in the field, postpartum support groups, and mothers who have suffered from the disorder have expressed disappointment in the fact that the DSM-5 did not extend the time frame for postpartum depression from four weeks to six months after delivery (Segre & Davis, 2013). Researchers suggest there is a higher risk for depression during the first six months after delivery (O'Hara & McCabe, 2013).

Perinatal or peripartum are now accepted as more accurate expressions to refer to depression surrounding pregnancy. The term perinatal depression comprises a broad range of mood and anxiety disorders that can affect women from the beginning of pregnancy until up to one year after the birth of her child (New York State Department of Health [NYSDH], 2012; Jessamyn, 2011). It encompasses prenatal and postpartum depression, the baby blues, and postpartum psychosis. Researchers have found that 20 to 30% of women experience depression before delivery and another 20 to 30% during the weeks following birth, while up to 80% of women experience the baby blues (NYSDH, 2012; World Health Organization [WHO], 2016; Patton, Romaniuk, Spry, Coffey, Olson, Doyle, Oats, Hearps, Carlin, & Brown, 2015). The percentage of women experiencing symptoms of perinatal depression becomes more significant considering the National Center for Health Statistics (NCHS) estimated the number of pregnancies in the USA to be 6,369,000 during 2009 (NCHS, 2013). Researchers (Robertson,

Grace, Wallington & Stewart, 2004; Thurgood, Avery, & Williamson, 2009) and renowned organizations such as March of Dimes (2016), Postpartum Support International (n.d.), and the World Health Organization (2012) recognize postpartum nonpsychotic depression as the most common complication of childbearing.

The recognition obtained in the USA of depression surrounding pregnancy resulted in significant and long-lasting changes in laws and medical practices. For example, in 2003, the State of Texas passed the Andrea Yates Bill, House Bill 341, mandating that mothers receive educational materials on postpartum depression prior to discharge from the hospital. The bill was named after the case of Andrea Yates, who killed her five children as a result of mental illness linked to postpartum depression (Denno, 2003; Night, 2007). In 2006, New Jersey became the first state requiring screening for depressive symptoms after childbirth and before mothers are discharged from hospitals (New Jersey Department of Health, 2014).

Currently, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) recommends that obstetrician-gynecologists (OB-GYNs) offer information on postpartum depression to their patients. However, this practice ignores those women who begin to experience depressive symptoms prepartum. More recently, the U.S. Preventive Services Task Force issued a recommendation to screen pregnant and postpartum mothers for depression citing depression as the primary cause of disability in women around the world when related to disease, and establishes nine percent of pregnant women and 10 percent of new moms experiencing a major depressive episode (Siu & U.S. Preventive Services Task Force [USPSTF], 2016). The task force also cited the possibility of accurate diagnosis and successful treatment as well as the harmful effects of untreated depression extending to the child. The document also recognized

screening as just the first step and that screening might be insufficient in offering treatment options.

Despite the number of women suffering from perinatal depression in the USA and around the world, treatment remains significantly low, in part because of the challenges to access and utilization of services in perinatal mental health (Shivakumar, Brandon, Johnson, & Freeman, 2014). Access to mental health services by pregnant women who need it is limited by several factors, including the ability of care professionals to explore the issue of perinatal depression, the willingness of the patient to self-report, and especially the accessibility to adequate mental health care and insurance (Shivakumar et al., 2014). Perinatal depression is more prevalent in rural and impoverished areas, and especially in developing countries (Fisher, Cabral de Mello, Patel, Rahman, Tran, Holton, & Holmes, 2012; Shidhaye & Giri, 2014). Risk factors for depression during pregnancy include teenage pregnancy, low income, lower educational attainment, history of depression, and history of abuse (Leigh & Milgrom, 2008).

Researchers also suggest that some issues with seeking services relate to stigmatization of mental health disorders, taboo surrounding this condition, and clients' negative beliefs (Shivakumar et al., 2014; Smith, Shao, Howell, Wang, Poschman, & Yonkers, 2009). Many women feel inadequate for experiencing these negative feelings towards themselves and their babies (Barrera & Nichols, 2015; Megnin-Viggars, Symington, Howard, & Pilling, 2015). Mobilization to obtain care becomes more challenging when physical or emotional distress (e.g., depression or tiredness) and the responsibilities of caring for a new baby are added to the formula. Further investigation is needed to establish and assess treatment modalities and improved access to care after probable depression has been identified.

Use of Technology in Treatment Interventions

The advent of technology provides the opportunity to breach distances and connect providers to clients who otherwise have limited access to professionals and services. For example, the Center for Connected Health Policy (CCHP, 2014a) was created in California with the mission of improving cost effectiveness, quality, delivery, and access to health care practices through the advancement of tele-health policies. The outcomes and conclusions presented by its Research Catalogue and Quality Assessment were promising in terms of the effectiveness of tele-psychotherapy (CCHP, 2014b). Researchers suggest there is growing interest in and potential to employ app technology to deliver interventions that promote health. The commonly used word *app* is short for the term application. In computing, app or mobile app refers to a program or software installed by a user to a mobile device, such a smartphone or tablet, to fulfill a particular purpose or perform a task. (App, n.d.; Boulos, Brewer, Karimkhani, Buller, & Dellavalle, 2014).

The use of health related mobile interventions might be especially valuable for pregnant women. Derbyshire and Dancey (2013) conducted a review of clinical trials with health related mobile interventions being tested on 1,603 females. They concluded smartphones provide an excellent platform to improve the quality of healthcare systems and to support women's health, especially in low-income areas. The authors also determined certain phases of the life cycle play a role in the usage of app technology, and that usage of app technology increases during pregnancy. Other findings suggest mothers are more inclined to seek nontraditional treatment and informal support for depressive symptoms during pregnancy over traditional treatment in medical settings (Shivakumar et al., 2014). But research concerning the use of app technology to

deliver health-related interventions is still scarce and needs to be further developed (Eng & Lee, 2013).

Statement of the problem

Perinatal depression is a global health issue (Patton et al., 2015). Although statistics are not always consistent, perinatal depression affects at least 10 to 15% of women in high-income areas or countries like the USA and a greater proportion in underdeveloped or low-income regions (Patton et al., 2015; Wisner, Sit, Mc Shea, Rizzo, Zoretich, Hughes, & Hanusa, 2013). However, the identification and treatment of depression in pregnant and postpartum women is significantly lower than in the general population (14% vs. 26%). Research indicates the onset occurs as much during pregnancy as it does postpartum (Bunevicius et al., 2009; Stowe et al., 2005; Yonkers et al., 2001). Most statistics refer only to cases that have been diagnosed or self-reported and to pregnancies resulting in live birth. Those women whose pregnancy outcome is different (abortion, miscarriage, still-birth, etc.) might be at a higher risk of depression and are usually not taken into account among those women suffering postpartum depression (Miller, 2002). For some women it is difficult to access mental health care (e.g. those living in rural areas), and depression, poor perception of physical health that could accompany pregnancy, or having to care for a newborn makes it even more challenging to access needed services (Fleury, Ngamini Ngui, Bamvita, Grenier & Caron, 2014).

Perinatal depression has serious consequences beyond the well-being of the mother. It affects babies and the family unit (Meltzer-Brody, 2011; Muzik & Borovska, 2010; Wisner, et al., 2013). Perinatal depression increases the risk for multiple adverse outcomes. For the mother the consequences include decreased ability for self-care, nutritional issues, weight gain, substance use, relationship problems, decreased social support, and diminished interaction with

their babies. For the baby, maternal depression can translate into low birth and gestational weights, preterm deliveries, insecure attachment, and poor cognitive behavioral performance (Beck, 1995; Meltzer-Brody, 2011; Muzik & Borovska, 2010; Wisner, et al., 2013). Researchers have also found the effects of perinatal depression extends to the entire family unit causing relational difficulties, diminished support to and from mothers and even has a strong correlation to perinatal depression in fathers (Muzik & Borovska, 2010).

Several researchers (Bennett, Einerson, Taddio, Koran, & Einerson, 2004; CDC, 2008; Muzik & Borovska, 2010) have demonstrated that the prevalence of perinatal depression is higher in vulnerable populations. Some risk factors include young age, single motherhood, experiencing complications, and especially having previously experienced loss or trauma. Studies have reported that a significantly higher number of women who are socioeconomically disadvantaged experience depressive symptoms during pregnancy, with some researchers concluding the prevalence in this group to be as high as 51% (Bennett et al., 2004). These are the populations that face greater challenges to obtain mental health and other services.

Effective and valid treatment interventions to promote wellness can help women suffering from perinatal depression. The use of technology to improve access and quality of care is continuously increasing in the medical field (Kvedar, Coye, & Everett, 2014). Experts agree the use of telemedicine is certain in the future of the medical profession, and extend this belief to tele-mental health (CCHP, 2014a; 2014b). Although the use of technology is possibly a good fit for the management of perinatal depression, very little data is available about the use of technology to improve women's mental health and access to mental health services.

Purpose of the Study

The purpose of this phenomenological study was to explore the lived experiences of pregnant women using an electronic intervention to screen for and manage symptoms of perinatal depression and promote wellness during pregnancy. This study concentrated on the perceptions, reactions, and experiences of the women using the app as a form of support and companionship.

Research Questions

1. What are the lived experiences of pregnant women using an electronic intervention as a companion during their pregnancies?
2. What are the experiences of pregnant women in regard to anxiety, depression, and wellness while using an electronic intervention?

Significance

Perinatal depression is a global phenomenon. Women all over the world experience symptoms of depression at different levels and intensity during and following pregnancy (World Health Organization, 2008). Researchers have demonstrated that negative repercussions of perinatal depression could affect the mother, child, partner, and other members of the family (Meltzer-Brody, 2011; Muzik & Borovska, 2010). Addressing the problems of women experiencing perinatal depression using an electronic intervention could provide needed and appropriate screening and mental health services, especially to those facing difficulties obtaining face-to-face treatment. Adapting the use of this technology to other situations may have implications for the treatment of varied mental disorders and reach clients who have been underserved.

Professional counselors have the responsibility to advance research and evaluate practices in order that new kinds of interventions can be utilized in an ethical and effective manner (American Counseling Association [ACA], 2014). Moreover, the ACA *Code of Ethics* mandates professional counselors to contribute to the promotion of wellness beyond disorder treatment and the concern for beneficence through improved access to mental health services (ACA, 2014). Professional counselors have the opportunity and obligation to be concerned with the holistic wellness of this vulnerable population, including those women who do not meet the criteria for clinical perinatal depression, knowing the promotion of wellness is relevant in the prevention and management of perinatal depression.

Methodology

This study utilized a qualitative phenomenological research method to explore the lived experiences of pregnant women using an app to promote maternal wellness and mental health by screening and managing depressive symptoms. Phenomenological research is inductive in nature and particularly appropriate when there is limited information available about a topic. Theorists explain the aim of phenomenological research approaches is to explore experiences, discover constructed meaning, and draw conclusions derived from data (Creswell, 2013; Hill, Thompson, & Williams, 1997). Edmund Husserl is commonly credited with the introduction of modern phenomenological philosophy. He viewed this approach as a scientific method to investigate consciousness, lived experience, and existence (Churchill & Wertz, 2001). Based on Husserl's phenomenology, Amadeo Giorgi formulated formal procedures and further developed descriptive phenomenological methods for the study of persons-in-context with scientific rigor (Wertz, 2005; Wertz, Desai, Maynard, Misurell, Morrissey, Rotter, & Skoufalos, 2011). This study utilized Giorgi's phenomenological methods to analyze the expectant mother's in-depth,

conscious descriptions of their lived experiences using the app. Based on phenomenological tradition, the researcher and the participant have mutual influence on each other; nevertheless, the researcher must pursue objectivity by recognizing and bracketing biases (Robson, 2002; Patton, 2014).

Qualitative researchers embrace the fact that findings are evidentiary and make assertions instead of conclusions (Jones, Torres & Arminio, 2014; Nolen & Talbert, 2011). Moreover, the fact that truth is conceptualized as contextual and relational means it is temporal and subject to change (Nolen & Talbert, 2011). Qualitative research findings are meant to start explorations and conversations, instead of closing arguments.

Sample

One of the initial steps involved in phenomenological research is the selection of participants whose lives include a revelatory relationship with the topic being investigated and who can make accessible what the researcher is interested in exploring (Wertz, 2005). Giorgi (2009) proposed a minimum of three participants were necessary to conduct a descriptive phenomenological research in order to obtain important variations in the raw data. After that number, the amount of participants needed depends on the amount of data collected per participant since what is important is not the number of subjects, but the "number of instances of the phenomenon that are contained in the descriptions" (Giorgi, 2009, p.198).

The participants in this phenomenological study were six pregnant women at various points of their pregnancy development. The purposeful sample was selected on a first-come basis from a larger group of 13 women who had agreed to participate in the study. The pregnant mothers were identified through a private maternal-fetal clinic servicing the women of South Texas. The expectant mothers used the app for a minimum of six weeks before participating in

interviews. The app was designed to be compatible with IOS; thus only women with access to iPhones were able to participate. Pregnant mothers participating in the study were 18 years of age or older. If pregnant mothers delivered during the study, they were able to continue their participation and use of the app. There were no other criteria for inclusion in or exclusion from the study.

Intervention

Participants in the study used VeedaMom, a mobile application designed as a companion tool to help identify and manage perinatal depression based on mindfulness and acceptance practices. Users were prompted to assess and track their emotional wellbeing using the 10-item Edinburgh Postnatal Depression Scale (EPDS). This self-report instrument is widely used for assessing symptoms of perinatal depression and anxiety. The psychometric properties of the EPDS are 86 % sensitivity (accurately identifying true positives), 78 % specificity (accurately identifying women without the condition) and 73 % positive predictive value (positives validated by clinical interview) (Kozinszky & Dudas, 2015; Shrestha, Pradhan, Tran, Gualano, & Fisher, 2016). The app offered suggestions depending on the results of the assessment. If the responses showed a risk or tendency to depression, the app suggested practicing mindfulness exercises, one of the activities in a "feel-good activity list," or calling a friend or family member. The app requested users to input emergency contact numbers during the registration process, without identifying the person to whom those numbers belong. If a mother responded positively to the question assessing for suicidal ideation, the app prompted them to call their doctor, their emergency contact, or a suicide hotline. The app created a graph with the data obtained from the EPDS that users could show their doctors to track and assess changes in mood.

Through the app, mothers were able to post pictures and information related to their pregnancy on social media. The app provided users with psycho-educational videos and audio exercises to promote wellness and manage symptoms of depression via mindfulness practices for stress and anxiety management and relaxation. The app also offered other resources such as a map of the nearest health centers and hospitals, and an in-app journaling feature.

Psycho-educational videos

The app prompted users to watch six psycho-educational videos, one per week. Users had access to all the videos at any time and were able to watch them at their own pace, independently from the prompt. All the videos followed the same format. They consisted of a brief explanation of a construct or topic related to perinatal depression. At the end of each video, the featured counselor invited users to practice mindfulness techniques addressing each of the constructs. The psycho-educational videos offered through the app are:

- Video 1: Perinatal depression
- Video 2: Mindfulness
- Video 3: Social support
- Video 4: Acceptance
- Video 5: Distress tolerance and mindfulness of pain
- Video 6: Mindfulness of thoughts and emotions

Mindfulness Exercises

At the end of each psycho-educational video, the featured counselor prompted users to practice one of the mindfulness exercises. Users had access to all the exercises at any time and were able to practice them at their own pace, independently from the prompt. The exercises were

offered as audio and followed the same format. The following mindfulness exercises were offered through the app:

- Basic deep breathing: The importance of breath to achieve relaxation. Introduction of diaphragmatic breathing.
- Listening to noises: Introduction of the use of sensory awareness for mindfulness.
- Loving kindness meditation for baby and others (partner, family, friends) helping with the birthing.
- Body scan: Discussion of awareness of the body. Introduction of the body scan technique.
- Mindfulness exercise for pain and discomfort.
- Mindfulness exercise for emotion regulation.

In-App Journal

The app offered users a built-in journal feature that allows participants to record their feelings, thoughts, and experiences on a regular basis. Users can either type or use a voice recording option to add entries to the journal.

Data Collection

Upon IRB approval, physicians or nurses at a private OB-GYN clinic located in South Texas informed their patients about the app and refer them to the principal investigator (PI). The researcher set up times to be available on site for the time period required to recruit participants. The PI provided information about the app and the study following the script in Appendix A. After triage, the PI discussed the study and requirements for participation including how to use the app, journaling in the app, and participation in an interview and focus group, and provide the opportunity for potential participants to ask questions prior to proceeding. After allowing time to consider their participation, and when the doctor visit was approaching the end, the PI obtained

informed consent from identified participants (see Appendix B). Participants were asked to sign the informed consent form on paper if they agree to participate in the study. Women who agree to participate completed a demographic questionnaire on paper including name, phone number, and email address (see Appendix C). The PI also assisted them with downloading and learning to use the app.

Participants had the right to withdraw from the study at any time without penalty. They were able to continue using the app if they chose to do so. The PI and interviewer contacted participants at the end of the research period by phone and/or email to schedule face-to-face or phone interviews. Once individual interviews were completed, participants were contacted again to schedule the focus group. Participants did not receive direct payment. A drawing for a \$50 gift card was held at the end of the study period. Data was collected through an in-app journal, semi-structured interviews, and focus groups. All data collected was de-identified. The app required users to choose a pseudonym or username at the moment they signed up. The pseudonym was used in all features of the app and interviews. Because some pseudonyms included information that could be identifiable, the researcher changed the pseudonyms used in Chapter Four: Findings to reflect the color used for coding their responses.

All entries into the in-app journal were used as data points and utilized to determine preliminary meaning units and theme structures. Participants in the interviews and focus group were determined on a first-come basis.

In-App Journaling

The entries to the in-app journal were accessible to the principal researcher for content analysis. The app saved responses on a HIPAA compliant cloud server appropriate for use by health care providers.

Interviews

The external interviewer and PI conducted individual interviews using a semi-structured interview guide (see Appendix D). Each interview lasted between 30 minutes to one hour. The interviews were conducted in a secure room at the hospital where the participant maternal fetal clinic is housed, or over the phone. The interviews were recorded and later transcribed verbatim. In the transcriptions, the researchers avoided any identifier and used only the pseudonym provided by the participant when necessary.

Focus Group

A focus group was scheduled once initial themes from individual journals and interviews had been identified. The discussion and comments from the focus group were recorded and transcribed verbatim. Participants were asked to avoid identifiers and use their pseudonyms during the focus groups. The group was conducted via conference call and lasted approximately 40 minutes. The focus group was conducted as a checking with a *critical other* as proposed by Giorgi (2009) and to gain additional insights from participants. The researcher presented initial units of meaning and general structure, and encouraged the group to make revisions and offer additional comments when appropriate.

Data Analysis

Giorgi's method of data analysis is rooted in Husserl's phenomenological principles and psychological phenomenological attitude. It requires the researcher to utilize two procedures called epochēs (or bracketing), which are abstentions from influences that could bias the descriptions or analysis of the subject matter. First, the epochē of natural science requires the researcher to refrain from incorporating previously obtained scientific knowledge, conceptualizations, or hypothesis on the subject matter (Giorgi, 2010; Wertz et al., 2011). The

second bracketing procedure, the epochē of natural attitude, requires the researcher to abstain from conceiving life in a naturalistic but naïve way, assuming existence without noticing conscious and experiential processes (Giorgi, 2010; Wertz et al., 2011).

I conducted Giorgi's phenomenological data analysis in four central steps. First, I gathered a sense of the whole by reading each description with an open mind. Second, I distinguished units of meaning. Third, I psychologically reflected on each meaning unit in order to reveal the essence of the subject matter. Fourth, I utilized all existing data and insights, integrated reflections, and created a coherent structure of the subject matter, answering all research questions. □

Trustworthiness

Naturalistic science theorists have proposed different terminology to distance themselves from the positivist paradigm's ideas of validity and reliability. In qualitative research trustworthiness is obtained through credibility, dependability, transferability, and confirmability (Guba & Lincoln, 1994; Koch, 1994; Shenton, 2004). Giorgi (2009) argued that the clearly defined process of phenomenological inquiry offers legitimation and trustworthiness to qualitative research. Husserlian phenomenology methods utilize bracketing to ensure rigor in research (Shosa, 2012). Bracketing means the researcher should explore and suspend personal biases and assumptions to separate previous knowledge from the participants' description. Credibility is achieved through self-awareness of the researcher's experience (Giorgi, 2009, Shosha, 2012). Koch (1994) argued that trustworthiness in relation to phenomenological inquiry, also referred to as investigative rigor, is established if the consumer of research is able to audit the decisions, influences, and actions of the researcher. Hence, the decision trail must be documented and explained (Koch, 1994). Sousa (2014) stressed that trustworthiness necessitates

procedures involving clear and rigorous description of all the methodological steps used in the research process. These steps begin with the appropriateness of the research question and participant sample, and expand to the theme of the study and the methods for data collection and analysis.

I kept a journal as an instrument to record and bracket my experiences and reactions as I conducted the research study. Credibility is also established through consultation and member checking with critical others, or even with the critical other within the researcher (Giorgi, 2009). Focus groups were conducted to explore with participants the preliminary findings. Transferability refers to the applicability of findings. Due to the nature of qualitative inquiry, results are not generalizable, but transferability might occur depending on the similarity of context. Sandelowski (1986) explained how audiences perceive findings as meaningful and applicable (fitting) when adequate contextual information is given. I provided a clear contextual recollection and detailed description of the procedural steps followed to reach the findings. Dependability relies on the possibility of other investigators to follow the decision trail used by the researcher to reach similar findings. Consistency of data is a key element of dependability and is achieved by triangulation of different data sources. This study obtained data from personal interviews, participant journals, and member checking. Wertz (1984) added the question of validity also relates to the adequate identification of subjects and situations that can manifest the phenomenon. I purposely identified a population and setting that could offer revelatory descriptions of the phenomenon investigated.

Role of the Researcher

In qualitative inquiries, the researcher becomes the primary tool of data collection and analysis (Merriam & Tisdell, 2015; Patton, 2014). I am also one of the app's co-creators. I

collaborated in the production of the content, interventions, and assessment tools that make up the app. I contributed to the process of graphic and formatting design. I am featured in the videos and audios delivered as interventions.

Lens of the Researcher

Qualitative inquiry is by nature interpretative. All data is interpreted through the lens of the researcher (Creswell, 2013; Moustakas, 1994; Patton, 2014). In qualitative research, investigators become the primary instrument of data collection and analysis and therefore must be aware of their role in the study (Merriam & Tisdell, 2015; Patton, 2014). I used personal journals to explore my reactions to the investigation. I explored factors that might influence my stance on the topic. I have been pregnant twice, and have experienced symptoms of depression during those pregnancies. I recognize the negative consequences caused by depression. I am aware of the limits of attention given to perinatal depression by physicians. I am also a co-developer of the app being investigated; as such, experiences, expectations, and potential biases about the app and its development must be bracketed.

Definition of Terms

App: For this study, a software application designed to run on smartphones and other mobile devices. This is the most common and popular definition of app.

Baby blues: Feelings of being overwhelmed, irritable, frustrated, exhausted or anxious with mood lability and trouble falling or staying asleep. Symptoms don't meet depressive disorder criteria and are usually resolved by two weeks post delivery (NYSDH, 2012).

Major Depressive Disorder with Peripartum onset diagnosis: ". . . can be applied to the current or, if full criteria are not currently met for a major depressive episode, most recent episode of

major depression if onset of mood symptoms occurs during pregnancy or in the 4 weeks following delivery" (APA, 2013, p. 186).

Perinatal depression: also known as perinatal mood disorders; a wide range of mood and anxiety disorders that can affect a woman from the beginning of pregnancy until up to one year after the birth of her child (NYSDH, 2012).

Postpartum depression: a mood disorder affecting mothers after childbirth. Women with postpartum depression might experience anxiety, extreme sadness, and fatigue that might interfere with daily care activities for themselves, their babies or others (National Institute for Mental Health [NIMH], n.d.). The DSM-5 specifies the symptoms must appear within 4 weeks of delivery (APA, 2013). The definition of postpartum depression used for this study follows other experts and organizations that recognize symptoms might appear within one year of childbirth (Stewart, Robertson, Dennis, Grace & Wallington, 2003).

Prenatal depression: commonly understood as depressive symptoms experienced from the moment of conception until delivery, usually for longer than two weeks (Melville, Gavin, Guo, Fan, & Katon, 2010). The DSM-5 is the first of the manuals to recognize the onset of symptoms occurring before delivery, but refers to depressive episodes during pregnancy and after delivery collectively as peripartum episodes (APA, 2013).

Postpartum psychosis: Client presentation with abrupt onset usually occurring immediately or soon after delivery. It presents with severe symptoms that might include auditory and visual hallucinations, insomnia, feeling agitated and angry, anxiety, paranoia, delirium, delusions, confusion, mania, suicidal or homicidal thoughts, usually to harm the infant. It constitutes a serious Psychiatric emergency requiring psychiatric hospitalization (NYDH, 2012).

Theoretical Basis

The interventions in the app are based on Mindfulness and Acceptance and Commitment Therapy (ACT) and Dialectical Behavioral Therapy (DBT) and are geared towards preventing and managing prenatal depression (Strosahl & Robinson, 2008). Both ACT and DBT are mindfulness based, empirically supported intervention within the third-wave CBT theoretical approaches (Hunot, Moore, Caldwell, Davies, Jones, Lewis, & Churchill, 2010). Both approaches propose that mental health and growth can be achieved through the acceptance of experiences, committed action, and the practice of mindfulness (American Psychological Association, 2015; Batten, 2011; Hayes, Strosahl, & Wilson, 2012;).

Limitations

The aim of this phenomenological study was to explore the experiences of women using a mobile app to screen for depression symptoms and promote wellness during pregnancy. The study presents some limitations. The risk exists that some of the data provided by participants may be influenced by factors external to the study such as hormonal changes and imbalances, stage of life issues, and the participants' environment. However, these same factors can influence a woman's experience of depressive symptoms during pregnancy. Technical issues or difficulties could have impacted women's perceptions and experiences beyond what relates to the mobile intervention. I assumed women were giving honest opinions to the prompts and questions. The participants might have felt pressure to participate or conform since their treating physicians or nurses might have recommended the use of the app. I took intentional steps to prevent pressure to participate or conform by clarifying there was no penalty or reward by participating in the study and ensuring informed consent.

Remaining Chapters

Chapter Two provides a literature review regarding perinatal depression, including definition, prevalence, screening and identification, and treatment approaches. The literature review also addresses the use of app technology in mental health care. Chapter Three provides a description of the study's participants and settings, a rationale for the use of the Descriptive Phenomenological Psychological methodology, and an explanation of data analysis procedures. The results and findings are presented in chapter Four. Chapter Five includes a discussion of the findings, implications for mental health professionals, and recommendations for future research.

CHAPTER II: REVIEW OF THE LITERATURE

Introduction

The present literature review was conducted with the purpose of exploring the breadth of knowledge, clarifying concepts, and examining the relationship between constructs and topics connected to the use of app technology in relation to wellness and depressive symptoms during pregnancy. Based on the scope of this study, this review focuses mainly on literature directly addressing mental health, depressive symptoms, and related topics during the prenatal period and literature that examined perinatal depression including pregnancy and postpartum stages. It also includes a review of treatment interventions and their effectiveness in addressing perinatal depression and a comprehensive review of the use of mobile app technology in mental health care.

Although historically there has been an abundance of writings related to postpartum depression, the advent of new standards and terminology to define the disorder (ultimately encompassing the pregnancy period to be defined as perinatal depression) there is disagreement between popular and clinical definitions. In addition, recent discoveries related to the causes and effects of the issue demand a thorough review of the literature on the subject, with the purpose of clarifying and defining the subject matter and providing a current perspective thereof.

The search for perinatal and prenatal only studies was performed carefully since the terms postpartum, peripartum, and perinatal are often used interchangeability by researchers and theorists. The search for the term postpartum depression (PPD) yielded 915 results in the Psych+Behavioral sciences database between the years of 1977 and 2017. Most of the articles report studies on prevalence, predictors, risk factors, and the effects of PPD, while only 102 articles were related to treatment outcomes and interventions. The search for literature

addressing specifically prenatal or perinatal depression including pregnancy yielded 102 articles, 38 of which addressed treatment and interventions. It wasn't until 1998 that the first articles addressing perinatal and prenatal depression appeared in the Psych+Behavioral sciences database, with only 10 results during 1998-2005, all addressing the prenatal period as a time for early intervention or preparation for postpartum mood changes. After 2005 researchers and experts began to address the onset and prevalence of depression during the prenatal period, or the more encompassing perinatal period.

From Postpartum to Perinatal Depression

For centuries, physicians and other experts have noted the relationship between having a new baby and experiencing emotional distress. One of the earliest writings on emotional difficulties after pregnancy can be traced back to Hippocrates around 400 B.C. (Regus, 2007; Tovino, 2010). However, there is no clear agreement on the definition, symptomatology, and time frame of emotional distress related to pregnancy and the period following birth. In general, the terms perinatal or postpartum depression refer to a wide range of mood disorders characterized by feelings of sadness, fear, insecurity, and anxiety surrounding pregnancy (Knudson-Martin & Silverstein, 2009; NYSDH, 2012; Puryear, 2007; 2014). The term postpartum depression has traditionally been used assuming the onset of symptoms occurs after the birth of the baby. During the past decade researchers have determined that onset of depressive and anxiety symptoms can occur from the beginning of pregnancy until after the birth of the baby (Bunevicius et al., 2009; Jessamyn, 2011; NYSDH, 2012; Stowe et al., 2005; Yonkers et al., 2001). As a result, the terms perinatal or peripartum depression are now acknowledged as more accurate terminologies for the disorder.

Although it is accepted that symptoms can be experienced during pregnancy, the time frame in which the onset might occur is still a topic of contention. Researchers, experts, and related organizations have established the onset of symptomology from the beginning of pregnancy to any time up to one year after delivery. The DSM-5 specifies the onset must occur from pregnancy to up to four weeks following delivery, while the International Classification of Diseases (ICD) specifies the onset to occur from pregnancy to up to six weeks after delivery (American Psychiatric Association [APA], 2013; Woody, Ferrari, Siskind, Whiteford, & Harris, 2017).

Experts are also in disaccord about the symptomatology and severity of what constitutes the disorder. Clinical depression surrounding pregnancy is defined by the DSM-5 under Major Depressive Disorder (MDD) as a major depressive episode (MDD) with a "peripartum onset" specifier (APA, 2013). Five or more of the following symptoms, with at least one of the symptoms being either depressed mood or loss of interest or pleasure, characterize a major depressive episode. Symptoms must be present during the same 2-week period, represent a change from previous functioning, and not be clearly attributable to another medical condition. The symptoms include:

1. Depressed mood most of the day, nearly every day, as indicated by either subjective report (e.g., feels sad, empty, hopeless) or observation made by others (e.g., appears tearful).
2. Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation.)
3. Significant weight loss when not dieting or weight gain (e.g., a change of more than 5% of body weight in a month), or decrease or increase in appetite nearly every day.

4. Insomnia or hypersomnia nearly every day.
5. Psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down).
6. Fatigue or loss of energy nearly every day.
7. Feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick).
8. Diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others).
9. Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide (APA, 2013, p. 161).

Peripartum onset is attached to the diagnosis if the "onset of mood symptoms occurs during pregnancy or in the 4 weeks following delivery" (APA, 2013, p. 186). Nevertheless, some of the symptoms such as fatigue or loss of energy, weight gain, or insomnia/hypersomnia might be naturally related to and occurring during pregnancy, making the diagnosis more difficult (Choate & Gintner, 2011; Marcus, 2009). Authors of the DSM-5 also noted, "fifty percent of 'postpartum' major depressive episodes actually begin prior to delivery" (p. 186), and recognized "severe anxiety and even panic attacks" (p. 186) as common co-existing symptoms of perinatal depression. Although not clinically diagnosable, authors of the DSM-5 acknowledged a wider range of symptomatology and severity in the disorder by specifying, "mood and anxiety symptoms during pregnancy, as well as the 'baby blues,' increase the risk for a postpartum major depressive episode" (p. 187).

The evolution of the DSM's definition of perinatal disorder signifies an important step for researchers, experts, and involved organizations. Many of them assert perinatal depression can comprise a wide range of symptoms and mood disorders, some considered subclinical, including the baby blues, prenatal depression, postpartum depression, and postpartum psychosis. Other organizations and experts accept a wider definition of perinatal depression as an episode of minor or major depression or depressive symptoms, with onset from pregnancy up to the first year postpartum (Milgrom & Gemmill, 2014).

Some post-modern theorists disagree with the medicalization of PND altogether (Regus, 2007). They consider it the medical industry's way to gain acceptance and compliance with obstetrics and other medical fields. They posit that fear of harm to the mother, the baby, or other members of the family could be used to gain acceptance of PND as a medical issue, which would benefit medical experts and pharmaceutical companies at a professional and economical level, while redefining and disfranchising mother's personal experiences of their bodies and lives (Regus, 2007).

Prevalence

The evolution in the definition and understanding of the disorder to include the prenatal period is especially significant since most recent studies show depressive symptoms can be more prevalent or severe during pregnancy (Evans et al., 2001; Gelaye, Rondon, Araya, & Williams, 2016; Sidebottom, Hellerstedt, Harrison, & Hennrikus, 2014; Verreault, Da Costa, Marchand, Ireland, Dritsa, & Khalifé, 2014). Still, the lack of clarity in the definition of perinatal depression also contributes to the disagreement on the rates of prevalence (the proportion of new or newly diagnosed cases at a given time) of the disorder. Researchers have found the estimates of the prevalence of perinatal depression might vary greatly based on the characteristics of the

population, time frame, and the methods used for measuring and diagnosis. The first paragraph of the Report of the Task Force to Study Maternal Mental Health (Mental Health Association of Maryland, 2016) reads:

One in seven women will experience depression during pregnancy or in the first 12 months after delivery, and more than 400,000 infants every year are born to mothers who are depressed, making perinatal depression the most under diagnosed and untreated obstetric complication in the United States. (p. 2)

Estimates referring only to clinical diagnosed depression (up to four weeks after delivery and presenting the symptoms established by the DSM-5) estimate the prevalence of the disorder to be 9 to 14% in the USA (Milgrom & Gemmill, 2014; Siu & U.S. Preventive Services Task Force [USPSTF], 2016). Other researchers have found that 20 to 30% of women experience depression before delivery and another 20 to 30% during the weeks following birth, while up to 80% of women experience the baby blues (NYSDH, 2012; Patton et al., 2015; World Health Organization [WHO], 2016;).

Woody et al. (2017) believed there has not been a clear effort to produce global estimates of prevalence and incidence of perinatal depression. The researchers considered it to be highly important to quantify the proportion of Major Depressive Disorder (MDD) that is attributable to perinatal depression, knowing that MDD is one of the principal causes of disease for women of childbearing age (Woody et al., 2017). They performed a systematic review of 101 identified studies reporting on the prevalence and incidence of perinatal depression that met criteria for DSM-5 or ICD diagnosis. Results from the study show overall pooled prevalence of 11.9% of diagnosed MDD attributable to PND.

Researchers have found PND prevalence to be higher during the prenatal period than after delivery. In a review of longitudinal studies researchers found higher rates of depression during pregnancy (mean= 17.2 %) compared with postpartum depression (mean = 13.1 %). They argued that cross-sectional approaches are not adequate to explore perinatal depression, painting an imprecise picture of incidence, factors, and time of onset since different methods and time points are used to evaluate symptoms and factors. But this study also presented significant limitations. The reviewed studies relied mostly on data from self-reported symptom scales instead of diagnostic instruments, mothers were not assessed using consistent time points during pregnancy and after childbirth, and many of these measurements took place during a time frame outside of that established for a DSM or ICD diagnosis (4 and 6 weeks after delivery respectively). Some studies were also limited by the exclusion of women with previous history of mental health issues, although past history is nowadays considered a main predictor of perinatal depression (Underwood, Waldie, D'Souza, Peterson, & Morton, 2016; Woody et al., 2017). Gelaye et al. (2016) found the prevalence of prenatal depression in low and middle-income countries to be higher than postnatal (25.8% vs.19.7%), and both significantly higher than prevalence of the disorder in high-income countries when compared to other studies.

In spite of the lack of a clear definition, researchers around the world agree that perinatal depression is a global issue. Evagorou, Arvaniti, and Samakouri (2016) found in their systematic literature review the incidence of PPD in non-Western cultures ranges between 0.5% up to 63.3%. They concluded the occurrence of the disease is directly related to the care and social surrounding of women after delivery (Evagorou et al., 2016). Asian mothers display higher levels of symptomatology, expressed mostly in physical disturbances, when compared to European and Australian counterparts. In Africa PPD is also described mainly by physical

symptoms, mostly due to the fear of stigmatization of mental issues. Extreme poverty conditions might play a role on the incidence of PPD in Africa. In this continent postnatal care comes mostly from the families and social systems and is centered on offering support to the new mother and child. The incidence of PPD in Central Europe, Western Europe, North American countries, and Australia is similar to that in the USA (10-20%). The manifestation of the disorder happens through the typical depressive symptoms described on the DSM or the ICD. In these areas of the world, mental health professionals are the main source for support to mothers experiencing depression, and the use of technological devices to monitor their wellbeing is on the rise. Nevertheless there is a meaningful difference among countries when it comes to programs, therapeutic interventions, and policies aimed to support maternal mental health. But their review excluded studies on prenatal depression, baby blues, and psychotic disorders.

Several ideas seem to be clear across studies. First, prevalence rates appear to be higher during pregnancy than during the postpartum period. Second, women with a past history of mental health issues present the highest risk for PND. Third, other factors such as socioeconomic status and age play also a very important role. Fourth, PND is a global issue. Finally, the disorder can have serious negative effects on mothers, children, and the family unit (Howard, Piot, & Stein, 2014; Patton et al., 2015).

Screening for PND

There is consensus among researchers and experts on the importance of identifying women experiencing depressive mood symptoms in the perinatal period (Howard et al., 2014; Underwood et al., 2016). There is evidence of the positive impact early identification and treatment of depression can have on mothers and children (Dennis & Dowswell, 2013; Milgrom & Gemmill, 2014; Gelaye et al., 2016).

Milgrom and Gemmil (2014) noted the prerequisites for undertaking screening efforts and established the rationale for perinatal depression screening. They indicated the screening process is worthwhile when there is an accurate screening procedure for a serious, prevalent, under-detected and treatable condition, resulting in a decrease in morbidity linked to the condition in those screened. Such is the case for perinatal depression. The most effective outcomes will result from screening by trained health professionals through tools that are adequate, validated, and affordable (Milgrom & Gemmill, 2014). Most women experience increased contact with health services during the prenatal period, which enhances the possibility for screening programs within health care settings (Underwood et al., 2016). Screening for mothers with difficulty or lack of access to health care could also be of great importance (Woody et al., 2017).

After thoroughly researching depression in the USA, the U.S. Preventive Services Task Force (USPSTF) issued a recommendation in 2016 to screen all pregnant women and new mothers for PND, citing the possibility of accurate diagnosis and successful treatment and the harmful effects of untreated depression extending to the child. The task force also recognized screening as just the first step and that screening might be insufficient in offering treatment options (Siu & USPSTF, 2016).

Experts have identified the perinatal period as one of high contact with health care professionals, offering a sometimes-rare opportunity for the identification of depression and co-occurring disorders such as intimate partner violence, substance use, and other psychosocial issues (Connelly, Hazen, Baker-Ericzén, Landsverk, & Horwitz, 2013). Other authors assert universal screening for maternal depression is only part of the solution for improving maternal mental health and consider it to be currently limited (Laios, Rio & Judd, 2013). Although

screening contributes to the detection of perinatal depression, it does not necessarily increase treatment entry or improves outcomes (Miller, McGlynn, Suberlak, Rubin, Miller & Pirec, 2012). In a study conducted in Illinois, researchers reported that none of the patients who screened positive for possible perinatal depression sought treatment afterwards. When diagnostic assessment was incorporated into the perinatal care visit, and patients diagnosed were referred to psychological care, 90% entered treatment (Miller et al., 2012).

Laios et al. (2013) proposed an approach that is holistic and personalized by situation and population. In their approach, mental health would become an integrated to perinatal maternal care for all women. This approach would include an emphasis on identification and services for mothers suffering from mental disorders beyond depression and anxiety. It would address illnesses such as schizophrenia, bipolar, or borderline personality disorder, which present the highest morbidity and mortality (Laios et al., 2013).

The Edinburg Postnatal Depression Scale (EPDS) as a screening tool

In any case, screening for perinatal depression is an important first step that might open the door for women to seek the support and help they need during this stage of life. In order to conduct effective screening, professionals need a valid, reliable, and widely available screening tool. Several meta-analyses found the EPDS to be the most widely used tool to assess depression surrounding pregnancy (Milgrom, & Gemmill, 2014; Underwood et al., 2016). The EPDS was designed as a 10-item screening questionnaire for prenatal and postpartum depression, eliminating the confounding effect of symptoms that could be related exclusively to pregnancy and childbirth (Gordon, Cardone, Kim, Gordon, & Silver, 2006; Yonkers et al., 2001). Experts consider the EPDS a fast and affordable screening tool with the most established psychometric

properties of any depression-screening tool for perinatal populations (Milgrom, & Gemmill, 2014).

The EPDS has an internal consistency of 0.83. It shows sensitivity between 86 % and 92%, specificity between 73% and 78 %, and thus good reliability for a screening instrument (Bunevicius, Bunevicius, & Kusminskas, 2009; Kozinszky & Dudas, 2015; Shrestha et al., 2016).

The EPDS has been used and validated across languages and cultures, including French (Guedeney & Fermanian, 1998), Spanish (Garcia-Esteve, Ascaso, Ojuel, & Navarro, 2003), Iranian (Montazeri, Torkan, & Omidvari, 2007), Swedish (Rubertsson, Börjesson, Berglund, Josefsson, & Sydsjö, 2011), Thai (Limlomwongse & Liabsuetrakul, 2006), Chinese (Hawley & Gale, 1998), and Arabic (Ghubash, Abou-Saleh, & Daradkeh, 1997). It has also been validated for its screening depression in new fathers (Matthey, Barnett, Kavanagh, & Howie, 2001), high-risk pregnancies (Adouard, Glangeaud-Freudenthal, & Golse, 2005), and low and lower-middle income countries (Shrestha et al., 2016). The EDPS is also the most systematically studied screening tool used in the prenatal period (Gaynes, Gavin, Meltzer-Brody, Lohr, Swinson, Gartlehner, Brody, & Miller, 2005).

Laios, Rio, and Judd (2013) expressed concern that the EPDS frequently yields false positive and negatives. Nevertheless, it is clear in the supportive literature that the EPDS was designed to be used as a screening tool instead of a diagnostic one. The cutoff scores for the EPDS are open to interpretation that this requires clinical judgment (Center for Perinatal Excellence [COPE], 2014). That being said, the developers of the instrument found a cutout score of 12-13 identified all the participants with diagnosed MDD and two-thirds of participants with possible MDD (Cox, Holden, & Sagovsky, 1987). Most researchers consider 13 or 14

points to be the adequate threshold for assessing depression (Gaynes et al., 2005). Some studies that included mothers with symptomatology of minor depression used a cutoff score of 10 points and above (Verreault et al., 2014), but this is because the developers had recommended a cutoff score of 9/10 in order to reduce the failure to detect cases to fewer than 10% (Cox et al., 1987). The self-report nature of the EPDS might also play a part in the challenges establishing the prevalence of PND.

Treatment and interventions for PND during pregnancy

Once perinatal depression is identified, the issue of treatment options and effective support can be contentious (Waters, Hay, Simmonds, & van Goozen, 2014). Exposure to antidepressant medications in some instances has been associated with adverse outcomes, or at least inconclusive results, including neonatal abstinence syndrome (Field, 2010). But researchers argue that the risks associated with untreated depression, for both mother and child, might be greater than the risks of using antidepressants (Field, 2010; Waters et al., 2014).

Based on a review of studies, Marcus (2009) estimated that 89% of women in the perinatal period who engage in treatment for depression prefer psychosocial interventions. There is evidence confirming the effectiveness of these approaches (Sockol, Epperson, & Barber, 2011). In a review conducted by Dennis and Dowswell (2013) involving close to 17,000 women in 28 trials, the researchers found women participating in psychosocial interventions were significantly less likely to develop postpartum depression. These interventions included postpartum home visits and phone support by either a professional provider or a peer, and interpersonal psychotherapy. The identification of at-risk mothers was a significant contributor to the prevention of postpartum depression (Dennis & Dowswell, 2013). Researchers assert there

is more conclusive data supporting the efficacy of psychotherapy for the treatment of perinatal depression than for the use of psychotropic medication (Stuart & Koleva, 2014).

In 2011, Choate and Gintner published a pivotal article in the *Journal Of Counseling & Development* that defined counselors' understanding of prenatal depression and established guidelines that defined the role of counselors in the diagnosis and treatment of this condition. During the decade previous to this publication, there were no articles on counseling issues connected to prenatal depression or any other issues related to pregnancy published by the American Counseling Association (ACA) (Choate & Gintner, 2011). The authors discussed three major results of their literature review: (1) depression in pregnant women is under-detected, mostly due to its resemblance with common symptoms of pregnancy or related health issues, such as sleep deprivation, fatigue, or anemia; (2) pregnant women are faced with the difficult decision to treat depression pharmacologically; and (3) counseling literature and training programs do not appropriately disseminate information regarding psychotherapeutic treatment. Therefore, many counselors lack the necessary knowledge and training to effectively support pregnant women experiencing depression. The authors recommended psychotherapy to be included in the best practice guidelines for the treatment of prenatal depression, as first-line treatment for mild to moderate depression, or in combination with antidepressants when the symptoms are severe (Choate & Gintner, 2011).

Treatment Approaches

Choate and Gintner (2011) asserted that Interpersonal Therapy (IPT) and Cognitive Behavioral Therapy (CBT) were the approaches most supported by evidence for the treatment of perinatal depression, but most studies have concentrated only on the post-partum period. In randomized controlled trials conducted specifically during pregnancy, Interpersonal Therapy for

Pregnancy (IPT-P) and Interpersonal Therapy Brief (IPT-B) proved to significantly decrease depressive symptoms, with a recovery rate of up to 60%. This was compared to the control groups receiving parenting classes or regular gynecological care, showing a recovery rate of only up to 15% (Grote, Bledsoe, Swartz, & Frank, 2004; Spinelli & Endicott, 2003).

There is also evidence of the effectiveness of CBT modified for the perinatal period (Burns, O'Mahen, Baxter, Bennert, Wiles, Ramchandani, & Evans, 2013; McGregor, Coghlan, & Dennis, 2014; O'Mahen, Himle, Fedock, Henshaw, & Flynn, 2013). In a randomized controlled trial conducted during the prenatal period with women identified as at-risk of experiencing depression, 68.7% of women in the CBT group no longer met ICD-10 criteria for depression at the end of pregnancy (recovery rate), compared to 38.5% of women receiving treatment as usual (TAU) in the form of usual midwife care (Burns et al., 2013). In a similar randomized controlled trial using modified CBT (mCBT) for low-income perinatal women with MDD, women in the mCBT group showed a greater decrease in depressive symptoms than women in the control group 16 weeks post-randomization and at 3 months follow-up ($F(1, 32) = 6.27, P = .02$). Similar results were obtained in a quasi-experimental trial of physician-delivered brief CBT during the prenatal period (McGregor et al., 2014). The researchers concluded individual CBT was a feasible and effective intervention for women with prenatal depression, especially when incorporating intensive outreach efforts and delivery of treatment in flexible times and locations (Burns et al., 2013; McGregor et al., 2014; O'Mahen et al., 2013).

The use of collaborative care interventions including professionals in the areas of medical care, nursing, mental health, social work, and nutrition, have also proved effective. A group of researchers evaluated whether MOMCare, a program that provided a choice of brief interpersonal psychotherapy and/or antidepressants, was related to better quality of care and

reductions of depressive symptoms compared to the intensive public health Maternity Support Services (MSS-Plus). Maternity Support Services (MSS) is the standard care for pregnant women on Medicaid in the public health system of Seattle-King County. Participants were randomly assigned to MOMCare (n=83) and MSS-Plus (n=85). Depression severity showed significant main effects for group (Wald's $\chi^2 = 6.09$, $df = 1$, $P = .01$) and time (Wald's $\chi^2 = 25.13$, $df = 3$, $P < .0001$). Forty eight percent of MOMCare patients achieved remission at 18 months post baseline, compared to 29% of MSS-Plus patients (Grote, Katon, Russo, Lohr, Curran, Galvin, & Carson, 2015).

Clinicians and researchers have proposed mindfulness-based interventions as a innovative approach for the promotion of perinatal mental health, although research on the effectiveness of such interventions has provided mixed results. Taylor, Cavanagh, & Strauss (2016) conducted a systematic review and meta-analysis of 17 studies on the effectiveness of mindfulness-based interventions for reducing depression and anxiety and improving mindfulness skills in the perinatal period. The researchers found no significant improvement in post-intervention outcomes and negligible effect sizes. But the researchers asserted the interventions offered in the included studies usually diverged from traditional mindfulness-based cognitive therapy or mindfulness-based stress reduction programs. The studies included also tended to address healthy populations, instead of clinical ones, and their major focus was the prevention of depressive symptoms (Taylor et al., 2016).

Yet individually, some of the studies conducted on mindfulness-based interventions in the treatment and prevention of perinatal depression have shown positive results. Duncan and Bardacke (2010) conducted a pilot study on the effectiveness of the Mindfulness-Based Childbirth and Parenting (MBCP) program, a formal adaptation of Mindfulness-Based Stress

Reduction (MBSR) program developed by Kabat-Zinn. Pregnant women participating in the study demonstrated statistically significant decrease in pregnancy anxiety, depression, and negative affect, and significant increase in mindfulness and positive affect (Duncan & Bardacke, 2010).

Dimidjian, Goodman, Felder, Gallop, Brown, and Beck (2015; 2016) studied an adaptation of mindfulness-based cognitive therapy (MBCT) specific to pregnant women with lifetime histories of major depression. The researchers established the acceptability and feasibility of MBCT as treatment intervention during pregnancy. Participants reported a significant decrease in depressive symptoms and low recurrence (18.8 %) during the six months following delivery. A study expanding on the results presented by Dimidjian et al. investigated the clinical effectiveness of MBCT for perinatal women experiencing MDD. Depression scores measured by the BDI-II significantly decreased from baseline ($M = 12.2$; $SD = 12.3$) to post-treatment ($M = 7.4$; $SD = 7.0$) [$F(1,30) = 8.10$, $p = .008$; Cohen's $d = .52$] (Miklowitz, Semple, Hauser, Elkun, Weintraub, & Dimidjian, 2015).

A systematic review of eight articles conducted by Matvienko-Sikar, Lee, Murphy, and Murphy (2016) indicated potential benefits of mindfulness during pregnancy. The authors found mindfulness has a potential effect for reducing negative affect, anxiety, and depression during the pregnancy months. These effects may be more evident in vulnerable populations, including those women lacking adequate prenatal well-being.

Another study conducted in Australia explored the effectiveness of a mindfulness intervention to reduce antenatal depression, anxiety and stress. The study was conducted with a non-randomized group of 20 women at risk of mental health problems and a randomized controlled trial of 32 women not considered at-risk. The intervention was developed for

expectant mothers as a 6-session mindfulness-based group therapy program called MindBabyBody. The program included formal and informal mindfulness practices, mindful movement, and cognitive exercises. The results of the non-randomized study showed significant improvements on the three depression scales used and significant increase in two of the Five Facet Mindfulness Questionnaire (FFMQ) mindfulness subscales. For the intervention group part of the randomized controlled trial, all post-test scores showed improvement, but only changes on the DASS-21 anxiety subscale showed statistical significance (Cohen's $d=0.7$). On the FFMQ, the intervention group showed significant increases on two of the five subscales. The control group showed no significant improvement in any area (Woolhouse, Mercuri, Judd, & Brown, 2014).

Researchers have also proposed yoga and other alternative interventions as effective in promoting prenatal wellness and improving mood, but their direct effect on depression has not been extensively studied (Rakhshani, Nagarathna, Sharma, Singh, & Nagendra, 2015). In a qualitative exploration of attitude towards yoga and their experience of stress and depression in pregnancy in a group of low-income African-American adolescents ($n=17$), four common themes were identified from the group discussions: pervasive stress and depression symptoms in their daily life; generalized sense of isolation; desire for interventions to be group-based and directed specifically to teenagers; and yoga as an appealing, feasible intervention over other mindful activities. The reasons expressed by the participants to prefer yoga included: yoga was perceived to be helpful for stress, yoga is a group activity that could reduce feelings of isolation, and participants believed yoga could help manage some of the physical aspects of pregnancy (Kinser, & Masho, 2015a). The authors also explored the experiences of 14 pregnant and postpartum women practicing prenatal yoga. They found women's interest in prenatal yoga increases in

relation to stress and depressive symptoms, prenatal yoga is perceived as beneficial both physically and psychologically, and prenatal yoga is perceived as more beneficial than other group classes (Kinser, & Masho, 2015b).

In another study researchers measured change in maternal depression severity before and after a yoga program adapted to pregnancy in women already exhibiting depressive symptoms (n=34). Based on observed and self-reported depression assessment measures, participants demonstrated a significant decrease in the severity of symptoms (Battle, Uebelacker, Magee, Sutton, & Miller, 2015). Muzik, Hamilton, Rosenblum, Waxler, and Hadi (2012) offered a mindfulness yoga (M-Yoga) intervention to 18 first-time pregnant women with high EPDS scores at baseline, as an alternative to pharmacological treatment. The participants also completed the Beck Depression Inventory (BDI-II), Five Facet Mindfulness Questionnaire-Revised (FFMQ-Revised) and the Maternal Fetal Attachment Scale (MFAS) before and after the interventions. The results showed a significant reduction of depressive symptoms ($p = 0.025$), and significant increase in mindfulness ($p = 0.007$) and maternal-fetal attachment ($p = 0.000$). The results suggested Mindfulness Yoga is a feasible and effective alternative treatment for perinatal depression.

Despite the availability of multiple modalities of treatment, many women exhibiting depression go untreated. Researchers at the University of Michigan found only 20% of women who experience symptoms of perinatal depression engage in treatment, either through pharmacotherapy or psychotherapy, with no difference between those experiencing subclinical depression and those with diagnosable clinical depression (Marcus, 2009; Underwood et al., 2016). Mothers' concerns about taking antidepressant medication, together with fears of stigmatization, discrimination, fear of involvement of social services, and limited access to

resources may be contributing factors to the low percentage of treatment-seeking women (Underwood et al., 2016; Woody et al., 2017).

Use of Technology in Mental Health Care

Mobile applications (apps) are ubiquitously available to the majority of the population, financially accessible, and available *at all times* to those who download them. They have the potential to offer support and promote the achievement of goals when most needed (Turvey, & Roberts, 2015). As outlined above, perinatal depression is commonly under-detected and under-treated, in part due to stigmatization and lack of access to services, and prevalence might be significantly higher in mothers from low- and middle-income areas (Woody, Ferrari, Siskind, Whiteford, & Harris, 2017). Putting these together, the rationale for the use of mobile technology in mental health care becomes abundantly clear. Further, the use of apps may also help individuals with mental health concerns in understanding their experiences and alleviating symptoms (Radovic, Vona, Santostefano, Ciaravino, Miller, & Stein, 2016).

By 2017 an estimated 44% of the world population will own a smart phone, compared to 39% in 2016. This penetration rate is estimated to increase to 59% by 2022 (Wu, 2016). The percentage is even higher in the USA. The Pew Research Center estimated 77% of the adult population owns a smartphone (Rainie & Perry, 2017). Of this group they found that 92% of 18 to 29-year-olds own smartphones, compared with 42% of those 65 and older (Rainie & Perry, 2017), demonstrating an age discrepancy favoring youth. There is also a discrepancy when it comes to socioeconomic status, with 95% of those with higher incomes owning a smart phone compared with only 64% of those with lower incomes. That being said, this signifies that nearly two-thirds of low-income America has access to a smart phone. Further, a growing number of

low-income Americans only access the Internet through a smartphone (Pew Research Center, 2017).

Of the available apps dedicated to the eight most prevalent health conditions determined by the World Health Organization, those related to depression are only second to those addressing diabetes. (Martinez-Perez, De La Torre-Díez, & López-Coronado, 2013). The availability of apps has been accompanied by extensive research into the utilization of mobile app technology related to mental health. A search for “mental health” and “app” OR “technology” OR “mobile” in the EBSCOhost database (Psychology and Behavioral Science Collection) yielded 1,051 results in the last five years. Researchers have determined the feasibility and appropriateness of the use of app technology to improve mental health. Apps can be an excellent platform to improve access to mental care, especially in low-income areas, thanks to their ease of use, availability of contact information, and the ability to rate mood/anxiety levels (Derbyshire & Dancey, 2013; Goodwin, Cummins, Behan, & O’Brien, 2016; Schlosser, Campellone, Truong, Anguera, Vergani, Vinogradov, & Arian, 2017).

Nevertheless, the quality or effectiveness of these technologies has not been extensively investigated. Experts are concerned by the sheer number of apps in the public domain for which effectiveness and safety has not been researched (Turvey & Roberts, 2015). More than 33% of depression apps available to the public endorse brainwave entrainment, music therapy, or nature sounds as therapeutic treatment interventions, and fail to cite a mental health professional as the source of information (Shen, Levitan, Johnson, Bender, Hamilton-Page, Jadad, & Wiljer, 2015). In a study of over 200 unique applications related to mental health, the majority did not include information about effectiveness of the application (59%; n = 123) nor did they address issues of privacy or security (89%; n = 185) (Radovic et al., 2016).

On the other hand, the few studies conducted on the adequate application, quality of apps, and the effectiveness of app technology in mental health have been promising. For example, the Patient Health Questionnaire (PHQ-9) and the Revised Suicidal Ideation Scale (RSI-S) have been validated as smartphone app instruments (Ameringen, Turna, Khalesi, Pullia, Patterson, & Van Ameringen, 2017). Participants using PRIME-D, a mobile app intervention to improve functioning and treat symptoms in adults with depression, showed a significant improvement on PHQ-9 scores over time (>50% reduction). Mood-related disability decreased significantly, and the benefits related to mood and functioning were prolonged over a 4-week follow-up (Schlosser et al., 2017). Programs such as Maternal Depression Online and Mom-Net have effectively used therapist-assisted, internet-delivered CBT (TA-ICBT) to decrease the symptoms of PPD and maternal depression after the postpartum period, when compared to a waitlist group (Pugh, Hadjistavropoulos, & Dirkse, 2016; Sheeber, Seeley, Feil, Davis, Sorensen, Kosty, & Lewinsohn, 2012).

Apps for Perinatal Depression

The use of mobile app technology might be especially valuable to promote maternal perinatal mental health. Researchers have suggested pregnant women are more likely to seek nontraditional treatment and informal support for depressive symptoms during pregnancy and soon after childbirth (Shivakumar et al., 2014). At the same time, the use of app technology increases significantly during pregnancy, smart phones being the most used internet-accessible device among pregnant and postpartum women (Derbyshire & Dancey, 2013; Osma, Barrera, & Ramphos, 2016). The results of a cross-sectional online survey conducted by Osma, Barrera, and Ramphos (2016) on 656 English and Spanish-speaking perinatal women (77.6% prenatal and 22.4% postpartum) indicated 90% of respondents (n = 267) used the Internet to search for health-

related information and 57% (n = 188) downloaded a health-related app. The results further indicated that mobile phones are the single device most commonly used to access this information. They concluded there is "preliminary evidence to suggest the need to design, develop, and test apps that aim to disseminate prevention programs for perinatal depression" (Osma, Barrera, & Ramphos, 2016, p. 412).

Although not thoroughly researched, investigators have addressed the use of app technology to improve mental health specifically during the perinatal period. Fjeldsoe, Miller, and Marshall (2010) conducted a randomized controlled trial on the efficacy of MobileMums, an SMS (text message) based mobile intervention to promote physical activity in postpartum women. The researchers found a statistically significant increase in physical activity and walking for exercise frequency in the intervention group. Eighty-four percent of intervention group participants were meeting their weekly physical activity goal, and 93% of the intervention group participants rated the intervention between somewhat useful and extremely useful, and the intervention was perceived to be motivating and mother-centered (Fjeldsoe et al., 2010).

Summary

This chapter provided an in-depth review of the existing research related to perinatal depression during pregnancy, its definition, prevalence, screening, and treatment interventions. It also provided a review of literature on the use of technology in mental health care, and more specifically, the use of apps in relation to wellness and depressive symptoms during pregnancy. The connection between the concepts and findings presented in this chapter and the findings obtained from this study is discussed in Chapter Five. The following chapter contains a discussion of the descriptive phenomenological method in psychology and descriptions of the

intervention (VeedaMom app), sample, instrumentation, and methodology utilized for data collection and analysis.

CHAPTER III: METHODOLOGY

The present study is an exploration of the lived experiences of pregnant women using a mobile application to promote maternal wellness and mental health by screening and managing depressive symptoms. To answer the research questions and gain a deeper understanding of the role the use of app technology can have in supporting women through their pregnancies, I designed a descriptive phenomenological study focused on exploring the perceptions, reactions, and experiences of women using the app as a form of support and companionship.

Descriptive Phenomenological Psychological Method Rationale

Among the many studies addressing perinatal depression, only very few have concentrated in the use of app technology in screening and managing depressive symptoms or promoting maternal wellness and mental health. In its exploratory nature, phenomenological research aims to discover constructed meaning and draw conclusions derived from data (Creswell, 2013; Hill et al., 1997), which makes it an appropriate approach to study topics for which there is limited information available. For phenomenological inquirers truth is contextual and relational and therefore meant to start explorations and conversations instead of providing closing arguments (Nolen & Talbert, 2011).

The descriptive phenomenological psychological method is a four-step research approach proposed by Amadeo Giorgi using Husserlian phenomenology as its philosophical underpinning (Broome, 2011). Edmund Husserl developed phenomenological inquiry as a scientific method to study concepts through consciousness, lived experience, and existence by going back to things themselves (Wertz et al., 2016). Giorgi further developed this research approach by proposing formal procedures specifically intended to explore psychological phenomena, studying persons-in-context with scientific rigor (Wertz, 2005; Wertz et al., 2016). These formal procedures

provide systematic rigor to the method while treating the person studied in a holistic rather than reductionistic manner (Broome, 2011). The descriptive phenomenological approach is oriented towards discovery rather than verification (Broome, 2011). Thus I do not propose a hypothesis, nor I intend to find supporting evidence for it. My objective with this inquiry is to describe the structure of the phenomenon to gain a deeper, holistic, and more comprehensive understanding of it through the meaning given by individuals to a lived experience.

This study utilized Giorgi's descriptive phenomenological methodology to answer two primary research questions: (1) what are the lived experiences of pregnant women using an electronic intervention as a companion during their pregnancies? and (2) what are the experiences of pregnant women in regard to anxiety, depression, and wellness while using an electronic intervention? In order to seek answers, I analyzed expectant mothers' in-depth, conscious descriptions of their lived experiences using the app as described in individual interviews, in-app journals, and a focus group.

Design Methodology

For the descriptive phenomenological method, data collection involves gathering the revelatory descriptions offered by the participants (the conscious expressions of their experiences) without hypothesizing about their viewpoints or attaching extra meaning through the researcher's analysis. The descriptive phenomenological method starts with the collection of descriptions of psychological life in ordinary language from the perspective of the person who experienced the subject matter. Because participants are usually free from the scientific knowledge of the subject matter, these descriptions are not controlled by hypotheses, previous research, or biases (Wertz, 2005; Wertz et al., 2016).

Giorgi (2009) explained the descriptive phenomenological method provides not only the lived experiences, but also the lived-context of the participants by focusing on their perspective without deception or the use of artificial environments such as labs. The data is not limited to reactions and behaviors, but it expands to include thoughts, impressions, feelings, interpretations, and understandings provided by the participants (Broome, 2011). In explaining Giorgi's methodology, De Castro (2003) affirmed that researchers must not separate an experience from the concrete meaning structure of the individual who is sharing it; otherwise we risk losing the meaning that an individual is trying to convey from their everyday life (De Castro, 2003).

Role of the Researcher

In qualitative research, the role of the researcher is intrinsically connected to the methodological procedures. The researcher acts as the primary instrument of data collection and analysis and thus there is a mutual influence between the researcher and the participants (Merriam & Tisdell, 2015; Robson, 2002; Patton, 2014). One specific characteristic of Giorgi's methodology is that the researcher abstains from making abstract explanations of the participant's experience without regard to the experience as it appears in the participant's consciousness. Instead of offering an explanation derived from a personal theoretical stance, the researcher offers the analysis and interpretation of the experience only after following the concrete description of the experience as it appears in the subject's consciousness. Nevertheless, the lived experience of the researcher plays in the discriminations taking place (Giorgi, 2009). In order to successfully perform this analysis, and to lend rigor and trustworthiness to the study, the researcher must adopt the phenomenological reduction attitude (Giorgi, 2009). This attitude is comprised by two different bracketing stances or epochēs (Giorgi, 2009; Wertz, 2005; Wertz et al., 2016). The word epochē originated from Greek philosophy to mean a "suspension of

judgment" (Epochē, n.d.). Husserl adopted the term to describe a necessary research attitude for phenomenological reduction in which the researcher separates the act of perceiving from the act of positing or theorizing (Giorgi, 2009; Wertz, 2005).

The first attitudinal shift proposed by Husserl and Giorgi is the epochē of natural attitude. It requires the researcher to abstain from conceiving life in a naturalistic but naïve way, assuming existence without noticing conscious and experiential processes. This epochē enables the researcher to explore consciousness as it is experienced and reflect on meaning and subjectivity without making claims on its existence. The epochē of natural science is merely a methodological abstention to suspend the knowledge of what exists. It does not imply the ascription to a specific philosophical understanding of existence (Wertz, 2005).

The second epochē of scientific knowledge, or natural science, refers to the bracketing from previously obtained scientific knowledge, conceptualizations, or hypotheses on the subject matter (Wertz et al., 2016). This attitude allows the researcher to gain access and explore the life-world (lebenswelt), which is the world as experienced and described by the experiencer (Wertz, 2005).

It is through this faithful analysis of the described experiences that researchers may arrive at the true meaning as given by participants (De Castro, 2003). Thus, I was an interpreter of conscious experiences instead of a creator of meaning. This role is consistent with an insider (emic) perspective.

Lens of the Researcher

My interest in perinatal depression derived from my personal experiences during my two pregnancies and the stories of important women in my life who have experienced perinatal depression. My own experiences have undoubtedly shaped my thoughts, beliefs, and feelings

regarding the topic. Conversations with respected colleagues and experts in the field have informed my point of view on the phenomenon.

In addition, I co-created the app used in this study. I co-designed the videos and audios presented in the app based on my understanding of ACT, DBT and mindfulness interventions. I believed the app could be effective in supporting women during pregnancy. I collaborated in the production of the content and the presentation of the assessment tool that make up the app. I contributed in the process of graphic and formatting design. I am also featured in the videos and audios delivered as interventions.

Researcher's Reflective Journal

Giorgi did not propose the use of reflective journals as a tool to ensure quality and trustworthiness of the qualitative inquiry. The practice of researcher's journaling is more clearly connected to feminist and poststructuralist research paradigms since it aims to acknowledge the opinions, thoughts, feelings, and experiences of the researcher as part of the research process (Ortlipp, 2008). On the contrary, Giorgi proposed to prevent the influence of the researcher values through the use of a rigorous method and by bracketing assumptions (Giorgi, 2009). For this study, I utilized a reflective journaling practice as a mean to achieve the epochēs or bracketing of my assumptions instead of as a way to incorporate them into the research process. By reflecting on my opinions, thoughts, and feelings, I was able to separate those reactions and explanations that may have arisen from my previous knowledge or experiences.

Population and Setting

This study was conducted at a maternal-fetal clinic located in South Texas. As the principal investigator, I obtained informed consent from the participants and introduced them to the use of the app. During our initial individual meeting I explained the app features and the

requirements of usage for the purpose of the study, which included: completing the EPDS once a week, watching the psycho-educational videos provided by the app, practicing the mindfulness exercises provided through the app, and recording their experiences in the in-app journal.

Participants also agreed to participate in individual interviews and a focus group at the end of the study.

Study Participants

The participants in this study were selected from a sample of 13 pregnant women on a first-come basis. Six of the pregnant women who agreed to participate in the study completed the individual interviews, and three of them participated in the focus group. Five were between 25-34 years old, and one was between 35 and 44 years old. Two participants identified as white, one as Asian/white, and three as of Hispanic or Latino origin. Five were married or in a domestic partnership, and one was single/never married. One was pregnant for the first time, three for the second time, one for the third time, and one for the fourth or more time. There were no established eligibility criteria for previous experiences with mental health care or depression. During the interviews, one participant volunteered she was currently attending counseling to treat situational depression.

Pregnant women were invited to participate in the study during their doctor's appointment, provided they owned a smart phone (iPhone) that could support the VeedaMom application. Once they expressed their interest in participating, they reviewed and signed informed consent documents, downloaded the app and learned how to use it, and were informed of the different features available to them through VeedaMom.

Setting

The setting for inviting participants to the study was a maternal-fetal clinic located in South Texas. The clinic is located in a historically Hispanic community and serves a large number of women of Hispanic descent. Six physicians serve the clinic attending to women with high-risk pregnancies. Under the guidance of the clinic director, all physicians agreed to allow their nurses to give information to their patients and refer them to the PI. The nurses referred patients who owned an iPhone. The PI was on site to explain the study and obtain informed consent. Because VeedaMom is a mobile application, participants experienced the VeedaMom app at times of their own choosing. The interviews were conducted over the phone or face-to-face at a secured room in the maternal-fetal clinic. The focus group was conducted through a conference phone call.

Instrumentation

Participants were required to use the VeedaMom app and answer the in-app EDPS (see Appendices E and F) on a regular basis, preferably once a week. They were also instructed to watch the psycho-educational videos, practice the provided mindfulness exercises, and use the in-app journal. The use of other features of the app was optional.

VeedaMom App

VeedaMom is a mobile application designed as a companion tool to educate women about PND, help screen for it, and manage depressive symptoms during the perinatal period. The app features are divided into two main categories: (1) screening and identifying depressive symptoms; and (2) preventing/managing depressive symptoms and promoting wellbeing.

For the screening aspect of the app, users assess and track their emotional wellbeing using the Edinburgh Postnatal Depression Scale (EPDS). The app sends weekly reminders for

users to complete the 10 items included in the EPDS and creates a graph to visually track their progress or change in mood based on their answers. Based on the results obtained after each completion of the EPDS, the app presents users with recommendations or comments. If the responses showed a risk or tendency to depression, the app directs users to the psycho-educational videos and mindfulness exercises or suggests trying one of the activities in a *feel-good activity list*. During the registration process, the app requests users to input emergency contact numbers without further identification of the person to whom those numbers belong. When results show scores that indicate eminent risk for depression or harm to self and others, the app prompts users to call their emergency contact whose number pops up on the screen. If a mother responds positively to the question assessing for suicidal ideation, the app will prompt her to immediately call her physician, her emergency contact, or a suicide hotline, the number for which appears on the screen.

In terms of preventing and managing depressive symptoms and promoting wellness, the app presents users with six psycho-educational videos and six audio mindfulness exercises for stress and anxiety adapted to the perinatal period. The psycho-educational videos and mindfulness exercises are grounded on acceptance and mindfulness theories and practices. Users have access to all the videos and audios at any time. Users are also prompted to watch the videos and practice the exercises based on their responses to the EPDS. All the videos introduce and explain a construct or idea important to perinatal depression.

Psycho-educational Videos.

- Introduction: This video introduces the VeedaMom app, its creators, and the reasons the app came to be. The video briefly explains the app screening feature and discloses it is not a substitute for face-to-face therapy.

- Video 1: Perinatal depression. In this video the counselor introduces the concept of perinatal depression and discusses possible symptoms and time frame and aims to normalize feelings of depression during and after pregnancy. She expands on the use of the EPDS as a screening tool for perinatal depression. The counselor discusses mindfulness as a tool to prevent or manage depressive symptoms. At the end, users are invited to practice the basic deep breathing exercise offered in the *Meditation Routines* feature of the app.
- Video 2: Mindfulness. In this video the counselor describes mindfulness and why it is important to be mindful. She describes the concepts of intention, attention, and attitude as they relate to mindfulness. At the end, users are invited to practice the *Noises Around You* exercise.
- Video 3: Social support. In this video the counselor explains the meaning of social support and its different types. She addresses the importance of social support during and after pregnancy. The counselor discusses what mothers can do to secure the support they need and the importance of being able to accept the help and support offered by others. At the end, users are invited to practice the loving kindness (*Metta*) meditation exercise.
- Video 4: Acceptance. In this video the counselor introduces the construct of acceptance in the way it is understood in third wave behavioral therapies such as ACT and DBT. She clarifies the difference between psychological acceptance of what is versus permitting harm or unfairness to happen. At the end, users are invited to practice the body scan exercise.
- Video 5: Distress tolerance and mindfulness of pain. The counselor introduces the concept of distress tolerance, the different types of pain, and the acceptance of

unavoidable pain or discomfort during pregnancy in this video. At the end, she introduces the *Feel Good Activity List* and invites users to practice the mindfulness exercise for pain and discomfort.

- Video 6: Mindfulness of thoughts and emotions. In this video the counselor discusses the definition of emotions and their role in our lives. She examines the differences between thoughts and emotions. At the end, users are invited to practice the mindfulness exercise for emotion regulation.

Mindfulness Exercises

At the end of each video, the featured counselor prompts users to practice a specific mindfulness exercise presented by the app. These exercises were designed to address each of the constructs or ideas introduced in the psycho-educational videos. Users have access to the mindfulness exercises at any time and are able to practice them at their own pace, independent from any prompt or psycho-educational video. Users are encouraged to practice these exercises on a daily basis. The audio mindfulness exercises offered through the app include:

- Basic deep breathing: The importance of breath to achieve relaxation. Introduction of diaphragmatic breathing.
- Listening to noises: Introduction of the use of sensory awareness for mindfulness.
- Loving kindness meditation for baby and people helping with the birthing (partner, family, friends): Directing kindness and love towards self and others.
- Body scan: Discussion of awareness of the body. Introduction of the body scan technique.
- Mindfulness exercise for pain and discomfort: Acceptance and management of pain and discomfort.

- Mindfulness exercise for emotion regulation: Identifying emotions and accepting emotions as a tool to for emotion regulation.

Other features related to the prevention or management of depression include the in-app journal, in which users can voice-record or type their experiences, and the *Feel Good Activity List*, which suggest an inventory of activities that could promote feelings of wellbeing such as a walk in the park, painting, singing, or taking a bath. The app offers other features with the purpose of facilitating social interaction or making the use of the app for fun. These features include photo sharing, sharing of possible baby names, disclosing baby's gender through the app, and other resources such as a map of the nearest health centers and hospitals.

Data Collection

The majority of raw data for this study consisted of the direct descriptions and accounts of the experience using the VeedaMom app while being pregnant, as lived and understood by each participant in her natural way of understanding everyday life.

Participant's In-app Journals

Participants had access to an in-app journal that allowed them to record or type their thoughts, feelings, or reactions at any given time. Participants were requested to use the journaling feature, but no prompts or reminders were offered to participants for recording their experiences. All the entries were considered raw data and analyzed according to Giorgi's descriptive phenomenological method.

Individual Interviews

An external IRB-approved interviewer and I conducted semi-structured individual interviews guided by open-ended questions (see Appendix D) intended to offer the participants an open space to verbally describe their experiences. Follow-up questions were designed to

obtain a deeper understanding of an aspect that might have not been entirely described by the participant.

Focus Group

The focus group was conducted after analyzing individual phenomenal descriptions and arriving at a preliminary psychological analysis of the general (Wertz, 1983). I presented the themes and structured to a group of three participants who agreed to take part in the group. They expressed opinions and comments about the findings being presented. The conversations that took place in the group were recorded and transcribed. The group served the purpose of *critical other* as proposed by Giorgi (2009), in order to achieve triangulation of data and scientific rigor.

Data Analysis

Individual Psychological Structures

The first step in conducting a descriptive phenomenological analysis consists of adopting the scientific phenomenological reduction attitude, which includes the two epochēs. This psychological perspective allowed me to be perceptive of the implications the data had in respect to the phenomenon researched (Giorgi, 2009). This means that I intentionally bracketed any assumptions I might have had based on my previous knowledge and scientific understanding of the phenomenon. I also bracketed my natural attitude in order to be able to perceive the meaning inherently expressed in the participants descriptions.

After adopting the epochēs attitudes, I transcribed the recordings made by the external interviewer of each participant description of their experience without the intention of analyzing them at this point. During the process of transcribing, I substituted any possible identifier that might have been present in the data for pseudonyms or other representations. After reading the transcripts for the first time, I extracted only the information that was relevant to the subject

matter, ridding the transcript of salutations, the interviewer questions, and any other expression or comments that might have arisen as a distraction or side note. The transcriptions, using the everyday language of the experiencer but excluding all irrelevant statements, became the revelatory descriptions Wertz (1983) called the *individual phenomenal descriptions*. I then read the *individual phenomenal descriptions* to get a sense of the whole. Giorgi (2009) explains this understanding of the whole is a necessary first step. Meanings within a description can appear at any time, thus a holistic awareness is necessary to achieve a complete sense of each unit of meaning (Giorgi, 2009).

For the second step, I re-read each individual phenomenal description with strong mindfulness of the phenomenon of using an app related to perinatal depression during pregnancy. I attained awareness of the whole and at the same time discriminated the intentional psychological objects provided by the participants, breaking them into parts to establish units of meaning (Giorgi, 2009). The meaning units needed to be determined from a phenomenological psychological criterion in order to fulfill the objectives of the descriptive phenomenological methodology (Giorgi, 2009).

I highlighted whole phrases and sentences that carried meaning, leaving out only connectors, prepositions, or similar phrases. With a highlighter of a different color, I used a slash to mark each time the participant's descriptions showed a shift of meaning. The text within each unit could be comprised of one simple phrase or several sentences, as long as the fundamental meaning stayed the same.

Giorgi (2009) explained what ultimately matters for the descriptive phenomenological method is the third step: a transformation from the participant's natural attitude descriptions into its psychological and phenomenological expression. Wertz (1983) clarified the limits of the

individual phenomenal description is that usually participants don't go as far as expressing the underlying psychology of the subject matter, in this case using an app related to perinatal depression during pregnancy. The researcher aim is to articulate the inherent psychological meanings of the descriptions, even those that are concealed or taken for granted by the participants, and present them in the most revelatory way possible. Wertz (1983) used the term Individual Psychological Structure to name the result of this first transformation from naturalistic description to psychological dimensions.

To arrive to the individual psychological structures I organized each document into two columns as illustrated by Giorgi (2009) and Wertz (1983). In the left column I placed the individual phenomenal descriptions content separated into one unit of meaning per cell, however long it was, using the words of the participants. I read the content in each cell, questioning each unit of meaning in order to discern or uncover how to best express the psychological dimension. On the right column, in the cell pertaining to each unit of meaning, I placed the transformed psychological expressions of the meaning I derived from their life-world descriptions.

As demonstrated by Giorgi (2009) and Wertz (1983), there was often more than one psychological dimension per unit of meaning. There is not necessarily a one-to-one relationship between columns, since the context should be taken into account and implicit psychological meanings not stated by participants are noted (Giorgi, 2009). I repeated this process for each individual description, including the data obtained from the in-app journals and focus group.

Psychological Analysis of the General

Giorgi (2009) postulated the given data must be imagined differently in order to discover a higher level of categories of meaning. These categories retain the same psychological meaning but are not contingent on individual facts or events. Researchers must arrive to a level of

invariance beyond the variables presented, since "even if facts differ, the psychological meaning can be identical" (Giorgi, 2009, p. 132). Psychological meanings can be expressed in a manner that can integrate data from several participants. Through this process researchers can arrive to a level of generality appropriate for revealing the psychological essence, or essential characteristics, of the subject matter, although not to the universality envisioned in philosophy or quantitative research (Giorgi, 2009).

Wertz (1983) labeled the result of the movement from the individual to the general the General Psychological Structure. This movement is to happen within the psychological dimension, since the transformation from everyday experience to the psychological matter must occur in the previous steps (Wertz, 1983).

Once I established the units of meaning and the individual psychological structure, I revisited my research questions to make sure I concentrated in the psychological subject matter defined in my objectives for this study. I re-read the psychological dimensions expressed in the individual psychological structures in order to arrive to the General Psychological Structure. Although Giorgi and Wertz gave detailed examples of how to differentiate meaning units and arrive at individual psychological structures, there were not clear steps exemplifying how to arrive to the general structure of the subject matter.

I was concerned about finding the best way to perform the second phase of analysis. I decided I needed a tangible method to help me organize my ideas. I printed out the individual phenomenal descriptions and individual psychological structures that I had previously arranged into two columns. I coded data from each participant using different colors and numbered each cell on the left and its corresponding cell one on the right so I could easily go back to the original description, and find who had said it. I separated the left from the right columns by cutting them

apart. I further separated each of the cells containing the psychological dimensions. I called these papers the dimension cards because cutting them up resulted in pieces of paper about the size of a small index card. I kept the original units of meaning gathered by participant and proceeded to further analyze the individual psychological dimensions I had obtained.

I wrote my original research questions on a large index card to keep them present and help focus my analysis on the phenomenon I set to explore. I re-read the content on the dimension cards and grouped these psychological dimensions into initial themes. I listed the themes as they came to my consciousness on index cards. When the themes repeated, I made a mark next to it on the list to track the instances in which the phenomenon was contained in the experiences (Giorgi, 2009). At this point, I decided to step away from the data and allow time to pass.

I went back to the dimension cards, this time organized per theme instead of per individual participant. On a separate piece of paper I wrote questions that could help me complete this step of the analysis: "What is the most obvious similarity between these?" and "What about each of these temporal sub-units is similar?" (Wertz, 1983, p. 230). Most of the dimension fit neatly into the initial themes I had proposed, showing obvious similarities across participants. Yet some seemed unique to an individual or event diverging from the general structure being discovered. When divergences are found, Wertz (1983) recommends going back to the individual phenomenal descriptions since often times a psychological insight or dimension will be found implicit in the data.

Going back to the original descriptions helped me to recognize more encompassing themes that allowed me to include the divergent dimensions. This process also reflects Giorgi's (2009) idea of the general structure as a second-order description of the phenomenon. The

general structure is often expressed in very different words from those used in the phenomenal descriptions in order to reflect the essential constituents of the experience and the relationship among them (Giorgi, 2009). To arrive to the essence of the experience, I questioned and posited each possible theme, wondering if the phenomena would continue to exist if the aspect being analyzed were to change or disappear. The essence of the subject matter is found in those themes or characteristics without which the phenomenon stops to exist (Giorgi, 2009)

At this point I arrived at nine preliminary themes I considered to encompass of all the revelatory data. I also wrote a paragraph, as proposed by Giorgi (2009), reflecting the General Psychological Structure of the phenomenon of using the VeedaMom app related to PND during pregnancy. Based on this structure I created a diagram to express the connections between each constituent or theme as part of the phenomenon (see Figure 1).

After establishing a preliminary general structure, I conducted a focus group to obtain validation, comments, and corrections from the participants as critical others. I analyzed this new set of data to reflect the emergent psychological dimensions and compared them to the previously obtained themes and constituents. The group validated my previous analysis and offered a deeper understanding of some constituents. I made changes to the themes and diagram of the structure to better reflect the content and connections of their experiences.

Summary

In this chapter I offered an in-depth description of the study's methodological design including the rationale, the lens and role of the researcher, instrumentation (including the VeedaMom app used as intervention), the population and setting in which the study took place, and the methods utilized for data collection and analysis. Chapter Four will provide the findings

obtained from the analysis using the General Psychological Structure description, the diagram that represents it, and excerpts from the original revelatory descriptions of the participants.

CHAPTER IV: FINDINGS

The process of data analysis required me to immerse myself in the data to understand the phenomenon of using the VeedaMom app during pregnancy from the revelatory descriptions of those who experienced it first-hand. The following nine themes or essential constituents of the experience emerged from the findings:

- Welcoming a new life: my own
- Defining myself through comparisons, with two subthemes:
 - Me vs. others
 - My different pregnancies
- Need to address many emotions
- Mommy-focused care
- The high value of insight and acceptance
- Apps are part of life
- Benefits of the in-app EPDS
- Teach me something new, now!
- . . . And please remind me.

I also present the general psychological structure of the experience, and a diagram of it, to represent context and connections. Although closely interconnected, the constituents belong in two different categories. On one hand, participants described their experiences of pregnancy and motherhood; on the other, they described their experiences in direct relation to the VeedaMom app. In respect to pregnancy and motherhood, I identified the following constituents:

Welcoming a New Life: My Own

The first theme, *welcoming a new life: my own*, is a reflection of the deep changes experienced by women once they become pregnant and have children. Ms. White said it bluntly and as a matter of fact, "Life changes when you are a mom. You feel different changes that you never even thought of, that worry and concern you . . . but my life is *momming*".

Participants made a clear distinction between life pre-motherhood (whether it means being pregnant or already having children) and life now. Participants talked about no longer having time for themselves or other activities and how much it takes to be a mom. Many instances of this constituent were found among the data. Ms. Rose said, "I think the hardest part for any new mom is finding the balance of still being you, being yourself, and taking care of the baby to the extent that you want to take care of the baby." Other participants agreed. Ms. White indicated:

There was a really big overall change, because you go from just you, your spouse, husband, whatever, and then there's three of you . . . you could get up and go to the store if you wanted, but now . . . I don't get to think about myself a lot. I barely get to put make up on nowadays . . . [it has] changed my relationship with God and the way I see life.

Ms. Blue described the experience from the perspective of not being able to do the things she wanted to and stated, "I was on bed rest, stuck in the house not doing much, and that was difficult!"

Having children emerged as the biggest influence in their experience of life and the main originator of these changes. Some participants described their challenges and difficulties while others its joys and rewards. Ms. White explained how the ability to do activities for her own sake is intrinsically connected to the activities she does with her children. About reading a book she

said, "I get to read about a pig and an elephant, you know, and this book [for myself] is just sitting there." She had a similar experience in relation to meditation, "I got to listen to one . . . while I was in the restroom. But I don't always get [the restroom] it for myself (laughs). But I am thinking, I can do it WITH the kids." Ms. Rose also described both sides of the experience of motherhood describing her pregnancies. She described her first pregnancy as the only thing happening in her life, in contrast to the second one, when she is already taking care of a toddler. In any case life is perceived differently following a pregnancy: "With my first there's nothing else happening. Well, life is happening but everything is so new! You enjoy every little thing. But with the second is hard to remember that, because I am taking care of a two year old!"

On the other hand, Ms. Green described the positive influence maternity can have in life while talking about not being excited for her difficult pregnancy: "but my kids are excited, so that kind of helps bringing me out of my funk." Whether experiencing maternity for the first time or not, having children already, or talking about the positive or negative changes experienced, the participants make a clear distinction between life pre-motherhood and their current lives.

Defining Myself Through Comparisons

The changes experienced with motherhood brought about a need for participants to redefine their identities. This new definition happened mostly through comparisons between self and others and between pregnancies. Subsequently, the constituent *defining myself through comparisons* was further grouped into two subthemes: (1) *Me vs. others* and (2) *my different pregnancies*. These comparisons were not only common across participants, but were also repeatedly present within each individual phenomenal description.

Me vs. Others

Participants often compared themselves to other moms in order to describe their own lived experience. Ms. Rose frequently framed her experience based on the experiences of her friends who had also recently become mothers or were pregnant. She explained,

At no point have I ever felt I lost myself because of my children, but I see it with so many friends . . . A lot of my friends went to like a million classes to learn about the children, how to bathe them, and how to burp them . . . I never went to one class.

Ms. Rose also justified or explained her experiences based on what she thought others might think, saying for example "others would probably say I have let go of myself. I don't know, to me it doesn't affect me." Ms. White described a similar experience when she said, "And then you see moms like breezing through, and you say, 'that must be a bottle-fed baby!'" in contrast with her experience of breastfeeding.

Ms. Rose noted she has redefined her identity as a mother with the help of comparisons, but she added:

It's also the pressure from society, and I think social media plays a big part, but at least for myself . . . there's a lot of pressure from the family saying: Oh but they did this, why aren't you doing that? This kid did that at five month, why isn't yours doing the same thing? There's definitely a lot of comparison everywhere! (Ms. Rose).

Ms. White agreed, adding she even worries about "these kids are going to be compared, like we are compared too".

My Different Pregnancies

Although there were no questions about previous experiences, the most common comparisons were those among pregnancies. Participants for whom there had already been at

least one previous pregnancy defined their experience based on the differences and similarities of the current pregnancy versus previous pregnancies. In some instances it was words or phrases such as *this time* or *my last* that gave away the psychological dimension of the experience. In other instances participants offered an explicit description. For Ms. Green the current pregnancy was difficult, and she expressed it as a comparison:

I never had to see a specialist, and with this pregnancy I see a specialist. I feel they find something different that's going wrong with this pregnancy . . . It really pressed me into a weird groove . . . I had really easy pregnancies for my first two.

For Ms. Blue the contrast was also obvious: "I was not expecting to have another one [baby] right away, so it was this kind of emotions about that . . . I spent a lot of time with anxiety attacks during this pregnancy."

Ms. White explained emotions she experienced only while pregnant, and how these comparisons helped her identify this occurrence. She talked about the heightened worry she defined as paranoia: "For sure this one [third pregnancy] has confirmed that, but for my second one my husband was like, 'you got like this last time [first pregnancy]'". Ms. Rose offered a more explicit description of the experience when she said, "I kind of kept comparing what happened with this pregnancy to my previous pregnancy, like 'Oh! This thing happened before and is not happening now', so it made me more worried to make that comparison." Ms. Green also said "I know every single pregnancy is different, but I wanted all to be the same. The first two pregnancies were easy, and I wanted this one to be the same."

Need to Address Many Emotions

Participants wanted to expand on the discussion of emotions instead of concentrating on depression. Some participants expressed the app helped them discover and identify these

emotions, while others wished the app would be more comprehensive and address feelings beyond depression. They explained being pregnant made them experience a wide range of emotions that they did not identify as depression. The most evident emotions described in their experiences were anxiety, guilt, doubt, fear, worry, frustration, and anger.

Many participants expressed doubt, self-blame, and guilt. When faced with the news that her baby might have health issues, Ms. Rose first thought, "What could I have done differently?" She also wondered "Am I actually taking the time that I need for myself and my baby to be healthy?" Very similar was the case for Ms. Green, who expressed she wondered "what did I do wrong? What could I have. . . ? Self Blame." Ms. White was very eloquent in expressing these feelings throughout her interview. For example she said: "Those are the things that I think my mind goes away with, like what am I doing wrong? or how am I going to raise this kiddo?" She also explained "I could be washing the clothes, or I could be cleaning this, or I could be organizing this, or getting ready for the baby. There's almost like guilt when you are not just doing anything."

Some experiences in pregnancy were also frustrating. Ms. Green offered a heartfelt description of her experience: "I get frustrated, really frustrated with the doctors." Ms. Mustard said, "Of course, I am human, so I felt uncomfortable emotions, but it's not lasting, and I don't think it has to do with depression, a moment would happen and you get frustrated or you get mad". Ms. Blue contributed "When I got pregnant this time I was working full time, it was just irritating".

Ms. Rose never felt she had emotional issues during her pregnancy, especially not depression. She talked about being very happy to be pregnant, hence becoming one of only two participants discussing pleasant feelings surrounding pregnancy. Nevertheless she expressed

having other emotions that were difficult to identify, "I don't know if it was frustration or sadness that I didn't have the time to enjoy the pregnancy much." She also talked about being worried, especially about the face of uncertainty when comparing this pregnancy to the previous one, and said "there was a lot of uncertainty in the beginning of the pregnancy, so there were a lot of sad times and uncertain times."

Some participants experienced anger. Ms. White said after her first pregnancy she "was mad because nobody told me that you might poop when you have a baby." For Ms. Green anger derived from the lack of control she was experiencing over her pregnancy. She found fault on the app and the questionnaire because neither addressed being angry. She said:

It would just ask me the questions like am I sadder than usual, and I am not sad! I'm probably more angry, but the app just ask me more if I am sad, or if I cry more, or . . . not necessarily do I cry more, not necessarily am I sad, as I am angry (Ms. Green).

Participants described worry and fear among the emotions most commonly experienced. Ms. White described her fear and worry as paranoia and feeling panicky, and explained it happens only during pregnancy:

I get paranoid [about] everything, kind of like my mind goes Final Destination. Kind of like whatever can go wrong . . . even with my husband and my kids, there's just more worry. My worry is heightened to an extreme . . . There is a worry that can I do three [kids]? Because two is good, so can I do three? . . . You just worry you want to be the best mom, and you want to raise them right.

Ms. Blue described feeling anxiety; "One big thing is I had a lot of anxiety issues, which is something else that I don't know if the app does very well. It focuses more on depression than anxiety." During the focus group they added there is more "worry about the balancing act, than

actually being depressed." (Ms. White), in other words, they worry about being "enough person, is it going to be enough of you?"

There is also a fear for experiencing depression, especially among those participants with a history of mental health issues. Ms. White explained "I had depression in the past, so there is always that fear in the back of my head." She further explained:

One of my fears is postpartum [depression], because I know you are more likely when you've had depression before . . . One thing too that I am afraid of is once you've had the baby you get even more hormonal. . . They don't tell you, so after I had the [first] baby I did get very emotional, and it scared me because I didn't want to go back to where I was ever! That's something that I am always worried about (Ms. White).

Ms. Blue had also experienced what she labeled as mental illness. Her concern was to "have a big handle in my emotions . . . because I deal so much with it on a daily basis." During her pregnancy she experienced what she described as situational depression in order to differentiate it from PND. She was attending therapy during the study, and completing the EPDS with her therapist and in the app.

Mommy-focused Care

The theme of *mommy-focused help* was present among the descriptions under two different categories, depending whether the mom receiving the help was themselves or others. There was an explicit concern among participants to offer help and support to other moms. Some described this phenomenon referring to face-to-face interactions while others referred to online interactions via the app. Ms. White provided a concise description of this type of concern when she explained that four women in her family were pregnant at the same time. She made sure they were checking on each other, asking "are you ok?" and being open with each other. She also

comforted her sister-in-law, letting her know what her feelings were "normal, you are tired, you are exhausted!"

Most participants thought the app could be a good resource to support and help others. They described the app as "great and I did share with some other pregnant people, so they know it's out there" (Ms. Mustard). All but one expressed having joined the study with the intention of supporting other mothers who might need it in the future. Some recommended adding a connectivity feature or forums with a "group of mothers communicating some questions" (Ms. Jewel).

The topic of mommy-focused help directed at themselves was described in a more implicit manner. Yet Ms. White eloquently presented it while comparing VeedaMom to other apps. She explained how "as far as wellbeing" she obtained support from VeedaMom that was not provided by other apps. She added, "It's more like the baby's growth and development. It's baby focused, not so much mommy focused. But it's important! the stress and everything." During the focus group Ms. White and Ms. Green agreed they need to think about themselves in order to be able to take care of others.

The High Value of Insight and Acceptance

The third theme or constituent discovered as part of the general psychological structure was *the high value of insight and acceptance*. All participants discussed the importance of insight, and related this self-awareness to the app. This theme is highly interconnected to other constituencies as revealed in the General Psychological Structure Diagram (see Figure 1).

Ms. White described the different instances in which the app promoted insight, and the situations in which insight is a positive and valuable asset. She described her reaction to the first time the EPDS yielded a higher score, the app showed her a sad face, and it recommended

watching a video, "it wasn't a happy face. So I had to kind of take a step back and think what am I doing? What's going on? You know? Kind of like, what's different?"

She concisely described the adverse effects of lack of insight, and how the app might be helping her achieve self-awareness:

Because it is kind of like [depression] it happens without you knowing it. If I look back and think, it was of course probably actions and things like that, thoughts that I didn't know were bothering me. Because you don't take the time to deal with them, or think about them, or life gets busy. And so, to kind of . . . you are keeping an eye on yourself.

Other participants also valued the insight promoted by the app, pointing out the benefit of obtaining results immediately. Ms. Green explained, "I would answer the questions, you know, how are you doing this week, etc. And that was helpful. That was interesting . . . I liked the fact that it would tell me how I was doing fast."

Ms. Mustard described insight as a crucial first step to "wellness and healing." She described how the EPDS was helpful, but a previous step might be necessary to help identify emotions,

To help notice when you are having an emotion that is not necessarily healthy. Because sometimes the first step to knowing you are depressed isn't knowing: I am depressed! It is identifying that you are even feeling a [certain] way.

For Ms. Blue the questions in the EPDS were repetitive, since she had been answering them every week with her therapist. Still, she commented, "it does, you know, help me keep track of my emotions." She further explained her need to take into account other aspects and events in her life "versus my actual depression. Because I do have mental illness. So I can go back and forth: ok, is this really what is going on or is it because I am having real depression problems?"

Participants also discussed how the app might have helped in identifying pleasant feelings related to their pregnancy. Ms. Mustard was excited to know she had "been in good spirits", and specified, "I think the most I ever had was a one [EPDS score], which I think that's pretty happy!"

In analyzing the revelatory descriptions offered by participants, it became apparent that after insight, acceptance was a helpful emotion for those who achieved it. Ms. Green described how acceptance helped her cope and overcome her anger, "I kind of accepted the fact that this pregnancy just is what it is, and I am not going to be able to control it, now I am becoming ok". Ms. Rose expressed one specific video in the app helped her arrive at acceptance and stated, "So that video stuck with me to say forget what happened during your last pregnancy, now focus on this one. Things are different." Ms. White ended her interview alluding to acceptance:

It's ok to feel like I am not doing this right or I'm so exhausted. It is ok to be like that. And it is something that I think with the app you get to gauge. This is just a mommy thing!

The importance of acceptance became more obvious during the focus group, with participants agreeing that just "accepting what it is keeps me sane. . . we just never clock out of being a mom. We have to be fine with the fact we are always clocked in!" (Ms. Rose). Participants agreed they just "have to be ok with the fact that I am not perfect" (Ms. White).

Apps are Part of Life

Participants also offered revelatory descriptions of their experience directly related to the use of the VeedaMom app. There were few comments in relation to the use of apps in general, which was a telling sign of the ubiquitous manner in which apps have entered everyday life. Participants' approach to using the app was very natural and matter-of-fact. None had concerns

or felt intimidated about downloading, navigating, or learning how to use the app. Some disclosed having "a couple of baby apps" (Ms. Green) or sharing their time among features offered by other apps, as illustrated by Ms. Mustard: "Overall [my experience] was positive, I think it is a good app. . . I was already in a forum on The Bump." Participants in the focus group corroborated Ms. Rose's statement that "apps are everywhere, I don't even think much about it, just use them."

Benefits of the in-app EPDS

The fourth constituent of the general structure, *Benefits of the in-app EPDS*, correlates to the high value placed on insight. All participants discussed the questions extensively. Some expressed they did not need it, but still recognized how it "would have been helpful had I had any issues" (Ms. Rose). Others described it as their favorite feature in the app, as illustrated by Ms. Green: "for my personal use the best thing were the questions."

Some participants recognized the EPDS since they were answering the same questions for another specialist or an insurance company. They had mixed reactions about having to repeat the questionnaire. Ms. Mustard "did notice the questions were the same, so it must be a standard . . . I thought: well that's wonderful!" On the other hand Ms. Blue didn't find it helpful, and described how she "got to answer the same questions every week with my therapist, so it was like doing it again, so it was not terribly helpful. But it does, you know, help me track of my emotions."

Mostly, they described the benefit of answering the in-app EPDS over doing it in person or over the phone because it was faster, private, and yielded results:

So this way it's quick. On the app is quicker to get it done and you can take it into your . . . you actually have a physical result, you know, the written result to take it to your doctor.

Ms. Green "liked the fact that it would tell me how I was doing fast", and was respectful of their privacy, "without it being intrusive or anything like that, because you know with the app is very comfortable" (Ms. White).

Participants described how accurately "the app has been reflecting my feelings" (Ms. Mustard), and two described the instances in which the EPDS identified a risk for depression "I've been more overwhelmed so I took it. . . It used to tell me you are doing great, and smiley face. . . but right now. . . I did one and it gave me a sad face." (Ms. White). For some, there was also a greater chance of them watching a psycho-educational video or practicing a mindfulness exercise right after they had obtained results from the EPDS. Ms. Green explained, "There was a week that I was more sad than usual, and that's when [the app] recommended I watch a video. That week when I was sad, it did help me."

Teach Me Something New, Now!

With the newly acquired insight supported by the EPDS, participants expected to learn new things or take different actions to the ones they were accustomed. They also expected the app to serve as the vehicle to transmit new information or promote behavioral change, and they want it to be an immediate response to their needs.

Some participants appreciated the new knowledge and the immediacy of advice, and wished the app offered more new information. Ms. Rose described the "thing that stuck with me" was the psycho-educational video that introduced a new understanding of thoughts and emotions. Ms. Blue said activity list in the app invited her to try new things and served as a "reminder to do

something that I care about and not just get stuck into the treacheries of everyday." Ms. Green had been feeling she was learning nothing new, until one week that she felt sadder than usual. Because she "was in the app I went ahead and did the video right away". After that experience, she wished the app would "be tailored to ask more questions like how are you feeling this week? are you ok?" that could incorporate other emotions apart from depression and sadness, and offer videos related to those: "had it ask about more emotions, and it been able to provide more resources like it did the week that I was sad I would have definitely use that" (Ms. Green).

Participants appreciated perceived mindfulness as a beneficial tool to have during pregnancy. But participants seem to value its novelty, more than the ease for practicing it. Some of the comments describing this experience expressed "the most useful was the meditation thing because it is not something I would have thought of without the app." (Ms. Rose), "I have looked at the meditations but not necessarily use them. Ms. Mustard added

But I think anything mindfulness helps calm down. That might be something useful to build upon . . . I was really excited when she was talking about the meditation. . . it was never something that I used. It was kind of like something different. Because unless you are familiar with it, you don't know, so I was kind of excited. But then to actually try to do that was hard.

In some instances they lamented not learning anything new. Ms. Blue shared

I think the app is a great idea but there was not much I got out of it, but again because I am kind of familiar with a lot of the techniques and strategies. So a lot of it were things that I already knew and it might help somebody that has not have the experience.

Ms. Jewel was also "looking for maybe some different questions." Ms. Rose found some information presented was the least helpful because she "didn't need any of the walking me

through the emotions of pregnancy" since she already knew that information, and felt it was not adding to her present experience. Another instance in which they wanted more immediate information from the app was in identifying "when they most need a therapist" (Ms. Green).

. . . And Please Remind Me

The last constituent addressed, . . . *and please remind me*, made its way to revelatory descriptions as a stroke of luck, after a glitch caused the app to stop sending reminders. Had it work perfectly; this could have been one of those inherent elements of an experience that are taken for granted by the participants, and in consequence, the researcher. Participants agreed the reminders are not only convenient, but necessary to be able to keep track of their mood using the EPDS, or to develop a mindfulness practice. Ms. Mustard expressed concerned "The reminder, of course, it's supposed to be there, it's just not working!" explaining how she was not reliable in answering the questions every week. Ms. Green explained, "If the reminders had been more constant I would have keep up with it better. I don't like to see notifications in my phone, so when I do check on it I go click on everything so they would disappear. And Ms. Blue said this technical issue bothered her, "Reminders to take the evaluation only come up when the app is open. It needs to be set to send push notifications even if the app is closed, which it is not doing." Two of the participants that took part in the focused group didn't experience problems with the reminders, but when this theme was presented they concluded, "The only reason I was able to answer the questions, was because the app reminded me."

General Psychological Structure

The psychological structure of the experience using the VeedaMom app as a companion tool related to PND during pregnancy can be comprised into two overarching dimensions. First, participants see themselves as pregnant-mothers or mothers. They come to the realization that

life as mothers brings about an essential change in their lives. There is a clear distinction between life pre and post motherhood. With this change comes the need for a re-definition of their identity. This new definition is commonly achieved through comparisons, either intrinsically across time and pregnancies; or interpersonally, by comparing themselves to other mothers. The change also results in a wide range of moods and emotions; hence concentrating on depression might be too limiting to explore this experience. In order to cope or navigate through these emotions, mothers need support that concentrates on them and their experiences (mommy-focused), and not only on taking care of the baby (baby-focused). They have incorporated the use of app technology to their everyday lives; therefore the VeedaMom app could play an important role in offering the mommy-focused support they seek. Mothers value insight. They want help identifying and coping with their emotions. From the app, they expect immediate results that could promote self-awareness, and new and relevant information connected to their discoveries. They also expect support for behavioral change in the form of reminders.

Interrelations of Constituents

The following diagram represents the essential constituents of the experience of using VeedaMom as a companion tool for PND during pregnancy and their correlations. Solid lines denote a direct relation between constituents, and the position in the diagram signifies the process or hierarchy among causal relations. The dotted lines denote the influence some themes have over others.

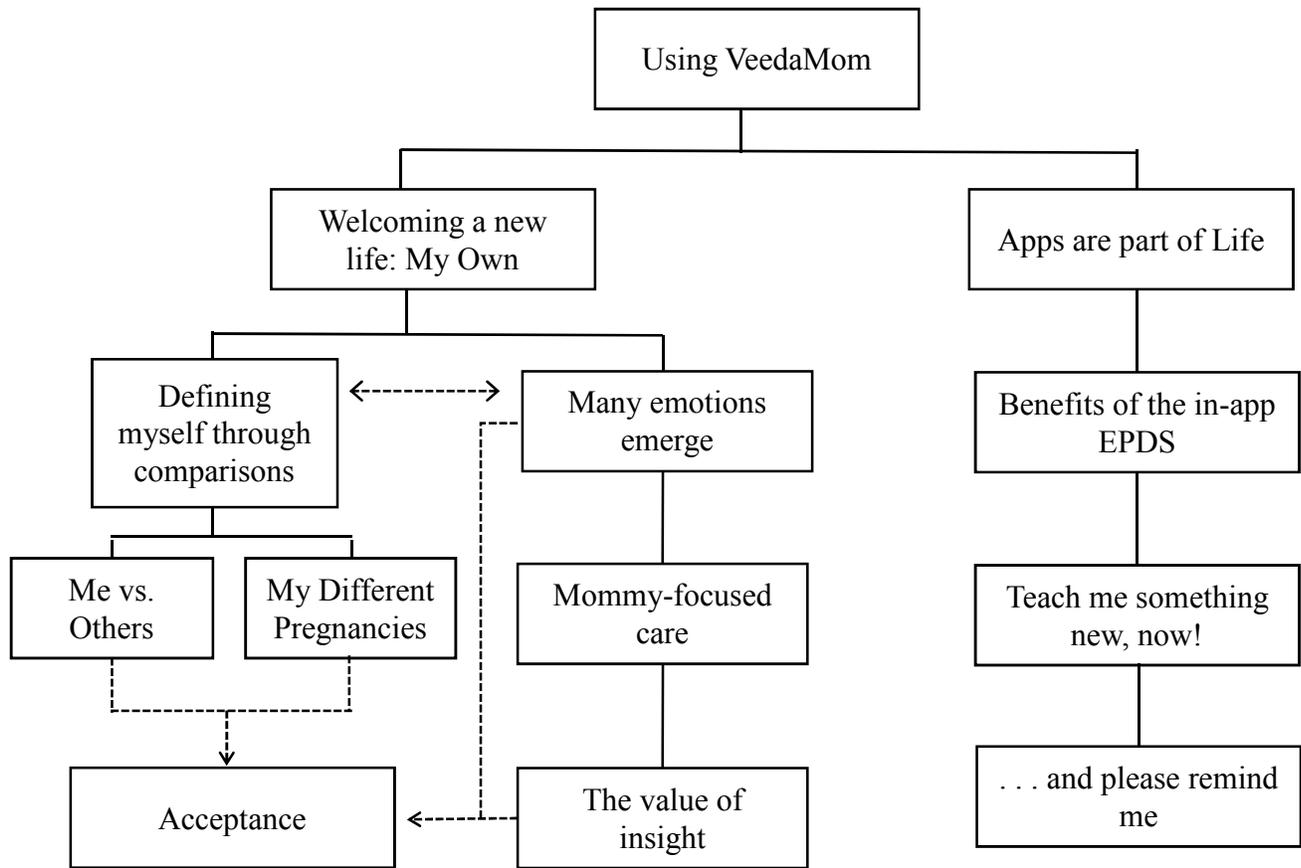


Figure 1. Interrelations and influence among the essential constituents of the experience of using VeedaMom as a companion tool for PND during pregnancy.

Summary

In this chapter I presented the themes and subthemes that emerged from the revelatory descriptions of the participant's own experience. These findings are concerned with the psychological dimension of the experience of using an app during pregnancy in relation to PND, and the emotions as experienced while using the app. The resulting nine themes include:

Welcoming a new life: my own, defining myself through comparisons (with two subthemes being me vs. others and my different pregnancies), need to address many emotions, mommy-focused help, the high value of insight and acceptance, apps are part of life, benefits of the in-app EPDS, teach me something new, now!, . . . and please remind me. I also presented the resulting general

psychological structure of the experience, and a representation of its context and connections in the form of a diagram. The next chapter will provide a discussion of the finding and how they fit into the existing research, implications for practice, and recommendations for future research.

CHAPTER V: DISCUSSION

The purpose of this descriptive phenomenological study was to explore the lived experiences of pregnant women using an electronic intervention to screen for and manage symptoms of perinatal depression and promote wellness during pregnancy. In order to achieve a better understanding of the psychological dimension of the phenomenon, this study focused on the perceptions, reactions, and experiences of the women using the VeedaMom app as a form of support and companionship. Smart phones, and consequently app technology, are widely available to a large percentage of the world population. Many attempts have been made to harness the benefits of using this technology to promote mental health. Still, research into the adequateness and effectiveness of pregnancy apps to promote maternal mental health is limited.

Pregnancy is a time of profound and significant change in the life of a woman. It is also surrounded by stigma and challenges for many women in need of mental health care. My personal interest in exploring the use of a mental-health promoting app during pregnancy arose from my belief in the need to offer mothers and mothers-to-be effective support during this time of profound change. I have experienced PND personally and witnessed many women struggling with depressive symptoms during and soon after pregnancy. I co-created the app with the intention of offering support, education, and a tool that could help women manage these symptoms. I designed psycho-educational videos and adapted mindfulness exercises to be specifically geared towards mothers who might experience PND. I researched and utilized the most widely available and validated screening instrument for PND, the EPDS.

I was profoundly interested in the lived experiences and psychological phenomenon of mothers using the VeedaMom app. Consequently, the research questions for this study were intended to explore the lived experiences of pregnant women using an electronic intervention, or

app, as a companion during their pregnancies and the experiences of pregnant women in regard to anxiety, depression, and wellness while using such an app. Existing research about the use of app technology to promote maternal mental health is limited. Research into the use of the VeedaMom app specifically was non-existent. Thus this study served as an exploratory inquiry into the phenomenon of using the VeedaMom app through the descriptive phenomenological methodology proposed by Giorgi to explore psychological matter.

Pregnant mothers were invited to use the app for a period of minimum six weeks. Participants were required to complete the EPDS screening on a regular basis, and were invited to watch psycho-educational videos and practice the mindfulness exercises offered through the app. I utilized data collected from the in-app journal feature, individual revelatory interviews, and a focus group to access the psychological dimensions of the phenomenon through the natural experiences of their lifeworld. Because of the limited research related to these topics, the findings from this study expanded on the understanding of the experience of pregnancy while using an app as a companion, and the understanding of the experienced emotions as related to the app. In this chapter, I provide a discussion of the findings and how they compare to the existing research. I also discuss implications for practice and recommendations for future research.

Welcoming a new life: My own

The theme *welcoming a new life: my own* emerged as related to the profound, life-altering, and ubiquitous changes experienced by mothers and mothers-to-be after they become pregnant and have kids. These changes are so impactful that they might result in women feeling they have lost themselves, and thus the need arises to redefine their identities. Participants agreed that most of the changes come from a drastic difference in routine and the fact they are now caring for others first, instead of themselves, with most activities geared toward their children.

This realization of a new life did not come as a discovery during the length of the study. It was rather conveyed as a fact of life that rarely needed to be explicitly expressed. What the participants did describe were the many ways in which their lives had changed with motherhood.

Invariably, stories about and references to their children made their way to the revelatory descriptions of the mothers as being an inherent part of their lives. They also described the influence motherhood had in their relationships with partners, friends, and other family members. Some participants expressed the challenges and difficulties of life with children, and others its joys and rewards, but in every case they referred to their kids as one, if not the biggest, influence in their experience of life.

Existing research into PND during pregnancy and postpartum makes little explicit reference to their efforts in promoting healthy adjustment to this significant change. But there might be an implicit understanding of the phenomenon observed in the type of interventions adapted to treat and prevent perinatal depression.

Redefining myself through comparisons

After experiencing the profound and ubiquitous change described by the participants, there is a natural need to redefine their identities, framed by their experience of motherhood. Participants in this study compared themselves to other mothers and compared their own experiences across pregnancies in an effort to redefine this new identity and uncover a new understanding of self.

Me vs. others

Explicitly, the comparisons between self and others were meant to validate their own actions or the feeling of being good mothers. Nevertheless, there was also an underlying sense of judgment in their descriptions, with nervousness and negative meaning attached to these

comparisons. The discussion held during the focus group helped validate and further understand this theme by shedding a light into the possible origin of these comparisons. Participants traced the source of these judgmental comparisons to others: close family members, friends, and societal pressure in general. They might have started comparing themselves to others as a consequence of this external pressure. The use of social media might have made it easier, and more pervasive, for mothers to experience these judgments and assessments about themselves.

This finding seems to correlate to previous researchers proposition that disclosing challenges and seeking mental health services is negatively affected by the stigmatization and taboo surrounding mental health disorders (Smith et al., 2009; Shivakumar et al., 2014). Women often feel inadequate for experiencing negative feelings towards themselves, their babies, or their pregnancies, and hesitate to seek support (Barrera & Nichols, 2015; Megnin-Viggars et al., 2015). In the USA, the low percentage of treatment-seeking women experiencing depressive symptoms during pregnancy is partially explained by their fear of stigmatization, discrimination, and involvement of social services (Underwood et al., 2016; Woody et al., 2017). There seems to be a connection between this and other findings of this study, especially to mothers experiencing doubt, self-blame, and other uncomfortable emotions.

My different pregnancies

Another way in which participants used comparisons to define their current experience was by exploring differences and similarities of the current pregnancy versus previous ones. Mothers hoped for all pregnancies to be similar, although they rationally understood each pregnancy is unique. These comparisons also have a close correlation with the next finding: pregnancy often causes women to experience a wide variety of emotions, many of them uncomfortable.

Need to Address Many Emotions

One of the objectives of this study was to explore how participants experienced emotions, specifically anxiety and depression, during pregnancy; and how using the VeedaMom app might relate to these experiences. Similar to other research findings, women in this study discussed a wide range of emotions, mostly uncomfortable, as related to their pregnancies. They described experiencing anxiety, guilt, doubt, fear, worry, frustration, and anger. Previous researchers confirmed this is a common occurrence among pregnant and postpartum women. A generally accepted definition of perinatal depression includes a wide range of mood and anxiety disorders characterized by feelings of anxiety, fear, insecurity, and sadness surrounding pregnancy (Knudson-Martin & Silverstein, 2009; NYSDH, 2012; Puryear, 2007; 2014). Authors of the DSM-5 acknowledged anxiety and the 'baby blues' might increase the risk for postpartum MDD, and included anxiety and panic attacks among common co-existing symptoms of perinatal depression (APA, 2013).

But participants in this study made a clear distinction between the emotions they felt and feeling depressed, thus defining their own experience. Previous findings have also clarified that some of the symptoms of depression might be naturally related to and occurring during pregnancy. These symptoms include fatigue, loss of energy, weight issues, and insomnia or hypersomnia (Choate & Gintner, 2011; Marcus, 2009). Yet the participants' determination to differentiate the wide range of emotions they felt from perinatal depression might be a unique finding of this study. One participant even distinguished what she identified as *situational depression* from PND.

Women in this study commonly experienced doubt, self-blame, and guilt in respect to their role as mothers. Anger and frustration emerged when facing perceived adversity related to

pregnancy. Fear, anxiety, and worry were described across participants, and heightened during the pregnancy period. Most of the participants' worry related to being a mom to either her unborn baby or previous children. Some participants also described an intensified concern about *everything*. Researchers have proposed depressive symptoms can be more prevalent or severe during pregnancy (Evans, Heron, Francomb, Oke, & Golding, 2001; Gelaye et al., 2016; Sidebottom et al., 2014; Verreault et al., 2014). This proposition might extend to other emotions, as suggested by this finding.

Some of the fear and worry described by mothers with a previous history of mental health issues was directly connected to the dread of experiencing depression again. Current research findings validate this fear, establishing past history of mental disorders as a principal predictor of perinatal depression (Underwood et al., 2016; Woody et al., 2017).

Mommy-Focused Care

The findings indicate that pregnant mothers seek support and information related to their own personal experience, and not just about their baby's growth and care. They understand that mother's wellbeing is important to be able to optimally care for others. Participants uncovered the connection between self-care and caring for their babies and their families, and yet disclosed it was difficult to take care of themselves.

Mommy-focused care also denotes the participants' concern about helping and supporting other moms. Offering support to other mothers might happen through face-to-face interactions, social media platforms, and even by participating in research studies. Participants in this study identified helping others as the most common reason to take part in this research project. In terms of social media platforms, participants recommended including a forum or blog in the app, through which they and other moms could ask questions and address concerns with peers who

have similar experiences. Other research findings have confirmed that pregnant women are more likely to seek nontraditional treatment and informal support for depressive symptoms during pregnancy, including peer-to-peer support (Shivakumar et al., 2014). Fjeldsoe, Miller, and Marshall (2010) also found that mothers placed a high value on mother-centered interventions.

The High Value of Insight and Acceptance

A noteworthy finding of this study was the value placed by mothers on insight and acceptance. Pregnant women in this study found the tools that promote insight and self-reflection to be important. The EPDS was perceived as one of those tools. Women approached answering the questions with intentionality in order to obtain meaningful results. Pregnant women also appreciated the ability to see scores immediately and in a way that was clearly understandable. Previous researchers had established the promotion of insight as also valuable for maternal and mental health care professionals, given the importance of early identification of depressive mood symptoms and co-occurring disorders such as intimate partner violence, substance use, and other psychosocial issues in the perinatal period (Connelly et al., 2013; Howard, Piot, & Stein, 2014; Underwood et al., 2016). Other researchers have arrived at similar conclusions, noting the use of apps may help individuals in understanding their experiences (Radovic et al., 2016).

Participants also placed high value in achieving acceptance. Acceptance was described as ultimately the most effective mechanism to cope with the challenges of pregnancy and motherhood. Acceptance was directed at events and situations outside of the participants' control, such as difficulties with the pregnancy or doctors' behaviors. It was also directed at themselves by accepting they are not, and can't be, perfect mothers. Through acceptance mothers expressed kindness and understanding to themselves, which seemed to help them cope with their worries, fears, and frustration. The notion of using acceptance to achieve well-being and mental health is

not new, but the connection between acceptance and well-being in the perinatal period might be a unique finding of this study.

Apps are Part of Life

In general, participants referred to apps as positive tools that were already part of their life. Participants' approach to using the app was very natural and matter-of-fact. Many disclosed using more than one pregnancy app, and offered comparisons among them. The invitation to download and use an app was welcomed without surprise, nervousness or intimidation. This finding seems to corroborate what researchers have previously proposed. Apps are accessible, and available at all times, having the potential to offer support, promote the achievement of goals, and help alleviate symptoms when is most needed (Radovic et al., 2016; Turvey & Roberts, 2015). It also seems to corroborate previous findings that the use of app technology increases significantly during pregnancy (Derbyshire & Dancey, 2013; Osma, Barrera, & Ramphos, 2016).

Benefits Of The In-App EPDS

Women in this study found the in-app EPDS one of the most helpful and important features. They described the benefit of answering the in-app EPDS over doing it in person or over the phone because it was faster, private, and yielded immediate results. Some participants had been answering the EPDS with another specialist. Some found the repetition unhelpful and some validating, but all agreed on the positive role the EPDS had in tracking and identifying their emotions and in gaining insight. Participants pointed to the effectiveness of the EPDS in identifying those weeks in which they experienced a change in mood.

This finding seems to validate previous research identifying the EPDS as a fast, widely used, and affordable screening tool with the most established psychometric properties of any

depression-screening tool for perinatal populations (Milgrom, & Gemmill, 2014; Underwood et al., 2016). It also corroborates the appropriateness of adapting screening and assessment tools to be used as app instruments and the ability of such instruments to rate mood/anxiety levels (Ameringen et al., 2017; Derbyshire & Dancey, 2013; Goodwin et al., 2016; Schlosser et al., 2017).

Teach Me Something New, Now!

With the acquired insight supported by the EPDS, participants expected to learn new things or take actions different from the ones they were accustomed. They also expected the app to serve as a vehicle to transmit new information or promote behavioral change. They wanted the app to offer an immediate response to their needs. Participants appreciated perceived mindfulness as a beneficial tool to have during pregnancy, but its value might derive more from its novelty than for the participant's ability to practice it.

The participants' desire to obtain relevant and new health related information seems to confirm previous research findings indicating pregnant women are interested in health related apps and obtaining health related information. Previous research indicates there is then a need to design, develop, and test apps that aim to disseminate prevention programs for perinatal depression (Osma et al., 2016).

. . . And Please Remind Me

The study findings indicate women perceived reminders as a convenient and indispensable part of the app. Women relied on this feature to remember completing the EPDS, watch videos, change behavioral patterns, or develop a mindfulness practice. Without reminders, most women decreased or stopped the number of visits to the app. Other researchers' findings

confirm interventions that offer reminders are perceived as useful and motivating in increasing health related behaviors (Fjeldsoe, Miller, and Marshall, 2010).

Limitations of the Study

Although the present study produced meaningful findings, there were some limitations present worth addressing. All participants were patients of a maternal-fetal clinic located in South Texas. The clinic services women whose pregnancies are considered high-risk, although in some cases there were no actual complicating issues. Facing the possibility for complications might have had a direct effect on the emotions experienced by the participants. The demographic characteristics of the sample were reflective of the clinic's location. The results of this study might not represent experiences of women who identify with different, or more specific, ethnic backgrounds, age groups, marital status. The study did not differentiate for specific instances of women experiencing mood disorders.

The principal investigator was featured in the psycho-educational videos and audio recordings offered through the app. Although an external interviewer conducted most of the individual interviews, it is possible the participants felt pressure to conform, especially during the focus group, which was lead by the PI. Nevertheless, the study design included measures to reduce participants' sense of pressure.

Implications for Practice

The benefits of using an app as companion during pregnancy were reveled through this study. Pregnant mothers endorsed care and support directed to helping them navigate through their experience, and not only to take care of their babies. Apps are ever-present and should be considered part of life. Mental health practitioners, nurses, and physicians might find it beneficial for their patients/clients if such professionals find a way to include apps in their practices since

they are convenient to use, seems to be readily accepted by the population, and could offer easily accessible and in-the-moment support. Rather than questioning whether apps could be used as treatment companions, the issue for health professionals seems to be how to better use app technology and embrace it as part of the therapeutic process. The use of app technology is ubiquitous and widespread. Mental health professionals should aim to advance the creation of effective apps. Otherwise, those without the knowledge and expertise to develop ethical and evidence-based interventions will do so.

It appears that two of the best ways to offer the mother-centered care pregnant women value is by offering tools to promote insight and acceptance, and to offer novel information relevant to a wide variety of topics and emotions. Dialectical Behavioral Therapy (DBT) and Acceptance and Commitment Therapy (ACT) are evidence-based approaches that incorporate insight and acceptance as valuable tools (Davison, Eppingstall, Runci, & O'Connor, 2017; Gregory & Sachdeva, 2016; Karlin, Walser, Yesavage, Zhang, Trockel, & Taylor, 2013; Ritschel, Cheavens, & Nelson, 2012). Theoretically, these approaches could offer the mindfulness, acceptance, and insight-promoting tools mothers seek, but neither approach has been adapted or studied for use during the perinatal period. It may be that tools and concepts from DBT such as practicing radical acceptance, distress tolerance, and emotion regulation (Linehan, 2014; McKay, Wood, & Brantley, 2010) or from ACT such as experiential exercises, acceptance of the current situation, and cognitive defusion (Hayes et al., 2012) would be useful to mothers.

When asked to describe and discuss emotions, the natural reaction of women in this study was to talk about negative or unpleasant feelings. Nevertheless, women spoke about the importance of validation and pleasant emotions when coping with the challenges of pregnancy.

Therapy, early intervention, and psycho-educational practices could be more effective if they serve to educate women in a whole range of emotions, including pleasant and unpleasant ones. To identify emotions that might be perceived as positive, even if they are not necessarily happiness, can help women as a coping mechanism, and improve distress tolerance and acceptance of the situation.

It is also important that mental health professionals understand the unique experiences of pregnancy and motherhood. It might be necessary to allow for a new definition of perinatal mental health that does not exclude the adjustment to changes experienced in pregnancy, instead of classifying the experiences as PND. As important as it is to treat clinical depression, mothers might highly benefit from preventive interventions aimed at promoting healthy adjustment. Because of mother's unique understanding of their experiences, self- disclosure might not be sufficient or reliable in identifying mental and emotional challenges. Screening instruments aimed at depression only might not be sufficient either. Professionals must keep in mind there is a discernable difference between screening instruments and diagnostic ones. Even the EPDS, which the findings demonstrate was accepted and perceived effective by the participants, is merely a tool for insight that could serve to open an exploratory conversation about women's experiences. Mental health professionals must take into account a wide variety of mood and emotions that mothers don't identify as depressive symptoms.

Recommendations for Future Research

The current study explored pregnant women experiences using an app as treatment companion. At the time of the study, there was limited existing research regarding this topic. This study could serve as instigator for future investigations, since further research into the use

of app technology to support pregnant women could assist in supporting the current findings and expand knowledge about the promotion of maternal mental health.

Researchers must continue to investigate the effectiveness and adequacy of interventions through app technology and other possible applications of this technology in promoting mental health. Although there is available research about the usage and characteristics of app technology, there is a gap in addressing the effectiveness of available interventions. These explorations might be especially important for app-delivered interventions designed for the perinatal period, since the use of app technology increases during this time. Quantitative and mixed method research could be used to obtain more knowledge on the use of app technology in promoting maternal mental health.

There is a clear need for more research about maternal wellness and mental health starting during pregnancy. There is also a need to research therapeutic approaches, effective interventions, and the experiences and characteristics of mental health professionals who work with perinatal women. Although there are some studies supporting the use of mindfulness based interventions to treat and prevent depressive symptoms during pregnancy, there is a need for more research into the effectiveness of these interventions. It might also be important to explore how much of their effectiveness derives from promoting insight and acceptance.

Although previous researchers have confirmed the effectiveness of Dialectical Behavioral Therapy (DBT) and Acceptance and Commitment Therapy (ACT) for the improvement of depressive symptoms in a variety of settings and population, neither approach has been adapted or studied for use with perinatal women. There is a need for the exploration on the use of these and other evidence-based approaches to address mother's needs during the perinatal period.

Summary and Conclusions

The findings of this study provide a deeper understanding of pregnant women's experiences in relation to perinatal depression while using the VeedaMom app as treatment companion. The participants' descriptions referred to two important aspects of the phenomenon: the experience of motherhood, and the experience of using an app during pregnancy. Participants described pregnancy as a time of profound and significant change that might lead them to redefine their own identity. The formation of a new identity seems closely affected by comparisons.

Life as a mother is surrounded by comparisons, judgment, and challenges that bring about a wide range of emotions. The emotions described by the participants were usually uncomfortable, and included doubt, guilt, anger, worry, anxiety, frustration, and fear. Nevertheless, they made an effort to clearly distinguish perinatal depression from the moods and emotions they described in their experiences. Two participants disclosed having a history of clinical depression and mental disorder. They also strived to separate their past experiences with depression from their experience of pregnancy, and even to discriminate situational depression from pregnancy related mood disorders. This could be a consequence of stigmatization of mental disorders during the pre and postpartum period, a lack of knowledge or understanding of the disorder, or an effort to define their experiences in their own terms. In any case, the use of disorder terminology seems to be inadequate in describing the experiences of pregnancy.

When asked about emotions, most participants described unpleasant or uncomfortable feelings. Some also described the positive or comforting emotions attached to motherhood. It seems that, for the participants in this study, talking about emotions implies speaking about negative or unpleasant feelings. Only a few included happiness, joy, or comfort in their

revelatory descriptions, although they described how identifying pleasant emotions might have a positive effect in mothers' experiences. An encompassing wellness approach seems more suitable in an app addressing emotions that surround pregnancy and childbirth.

Participants perceived the app as helpful and valuable, especially when related to important outcomes expected: mother-centered care, and the promotion of insight and acceptance. The use of the in-app EPDS was an essential tool to help them accomplish these outcomes. Some of the findings were unique to this study. The high value of acceptance during the perinatal period had not been discussed in previous findings. Neither have other researchers explicitly discussed the importance of presenting mothers with new and unique information, nor the essential role reminders play when using an app.

There is still much to be accomplished in advancing supportive interventions and quality of care for perinatal mothers. Through this study I aimed to gain a deeper understanding of pregnant mothers' experiences using the VeedaMom app as a treatment companion. Some findings were consistent with current literature in relation to the use of app technology for mental health care, including specifically its use during the pregnancy period. Unique findings on the experience of motherhood and app technology also emerged from this study.

I hope this study inspires further research that will contribute to the understanding of maternal experiences of pregnancy and motherhood, the needs of mothers in the perinatal period, and the best way mental health professionals can address those needs.

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APPENDIX A

Description of the App:

VeedaMom is a mobile application (app) designed to be used as a companion tool to help you prevent and/or manage perinatal depression. Perinatal depression refers to feelings of sadness or anxiety experienced during and after your pregnancy. Pregnant mothers will be able to start using this app from their 1st trimester as a wellness companion. You will be prompted to assess and track your emotional wellbeing answering the 10-item Edinburgh Postnatal Depression Scale. The app will offer you suggestions depending on the results. The app will offer you mindfulness and meditation exercises and tools, such as a mindfulness timer and music. Mindfulness refers to being 100% present in the now. The practice of mindfulness has been shown to alleviate and prevent symptoms of depression and anxiety. You will also obtain information related to your pregnancy through videos. You will be able to post pictures to social media sites. There is also an in-app journal where you can type or record voice messages to express how you are feeling or what you are experiencing in the moment. What is unique about our app is the fact that it includes psychological interventions that may help you prevent and manage symptoms of depression via mindfulness exercises and psycho-educational videos based on validated and evidence-based approaches.

Description of the study:

This study is a qualitative exploration of your experiences using the app. No information that might identify you will be used when publishing results and findings from this study. If you chose to participate, your responses to the in-app journal will be analyzed for common themes. If you are using the app, you might be chosen to participate in an individual interview with the researcher. The researcher wants to know your honest opinions, feelings, and impressions about using the app as they relate to your pregnancy. If you participate in an individual interview, you will also be asked to participate in a focus group, where several participants will meet with the researcher to further explore and discuss the findings. You can withdraw from participating in the study at any time, with no consequences. You will find more detailed information about the study in the Informed Consent form. You will be asked to choose a username when you register for the app. Please use a username that does not clearly identify you. You will use the same username as a pseudonym throughout the study, including the face-to-face interviews and focus groups.

APPENDIX B

Informed Consent Form to Participate

Use of a Mobile Application (App) as a Companion During Pregnancy

Introduction

The purpose of this form is to provide you information that may affect your decision as to whether or not to participate in this research study. If you decide to participate in this study, this form will also be used to record your consent. Research studies include only participants who choose to take part. You are being asked to take part in this study because you are pregnant. Please take your time to make your decision. Be sure to ask any questions that you may have.

Purpose

You have been asked to participate in a research project studying the use of a mobile application (App) for the screening, prevention, and management of perinatal depression. The purpose of this study is to investigate your experiences using a mobile application (App) during your pregnancy. You were selected to be a possible participant because you are pregnant and receive medical services from one of the clinics supporting this research study. This study is being conducted by Adriana Dyurich under the supervision of Dr. Marvarene Oliver. I am a doctoral student in the Department of Counseling and Educational Psychology at Texas A&M-Corpus Christi.

What will I be asked to do?

If you agree to participate in this study, you will be asked to download a mobile application, register as a user, and provide demographic information that includes a username, password, age, ethnic background, and number of times you have been pregnant. Each week, the app will remind you to answer 10 questions that will help determine if you are at risk of experiencing perinatal depression. You must answer all questions each week. The app will provide you with psycho-educational videos related to your feelings during pregnancy. It will also provide you with mindfulness exercises. I request that you watch all videos and practice the exercises during the length of the study. You will also have access to other information and functions of the app.

You will be able to post your pictures to social media sites and use one of the predesigned frames to keep your friends and family informed if you chose to do so. You are not required to post pictures or join social media sites for this study. You will be asked to record your experiences, thoughts, and feelings in a journal provided through the app. You can type your input or record a voice message. At the end of the study, you will be invited to participate in a face-to-face, Skype, or phone interview, depending on your preference. The interview will last approximately 45 minutes. You also will be asked to participate in a face-to-face, Skype, or phone focus group to discuss the findings. The focus group session will be approximately 1 hour long. Your participation in the groups and interviews will be audio or video recorded, depending on the format chosen by you, and later analyzed by the investigator.

What are the risks involved in this study?

The risks associated in this study are minimal, and are not greater than risks ordinarily encountered in daily life. Nevertheless, occasionally remembering or writing about unpleasant events, feelings, or thoughts can result in your experiencing discomfort or strong feelings that could be stressful. As with all research, there is a chance that confidentiality could be compromised; however, I am taking precautions to minimize this risk.

What are the possible benefits of this study?

The interventions delivered through the app are designed to alleviate signs of psychological distress and/or depression and to promote mothers' wellness. The use of the app might encourage you to engage in healthier behaviors during pregnancy and to help you experience your emotions in a healthier manner. Through participation in this study, you might help advance research and develop more adequate interventions for perinatal depression and other health issues.

Do I have to participate?

No. Your participation is voluntary. You may decide not to participate or to withdraw at any time without your current or future relations with Texas A&M University-Corpus Christi or your healthcare provider being affected.

Who will know about my participation in this research study?

This study is confidential. No identifiers linking you to this study will be included in any sort of report that might be published. Research records will be stored securely and only Adriana Dyurich will have access to the records.

If you choose to participate in this study, you will be audio and video recorded. Any audio and video recordings will be stored securely and only Adriana Dyurich will have access to the recordings. Recordings will be destroyed after being transcribed verbatim. The transcriptions will be kept for 3 years.

Whom do I contact with questions about the research?

If you have questions regarding this study, you may contact Adriana Dyurich at (516) 242-9354, or adriana.dyurich@tamucc.edu

Whom do I contact about my rights as a research participant?

This research study has been reviewed by the Research Compliance Office and/or the Institutional Review Board at Texas A&M University-Corpus Christi. For research-related problems or questions regarding your rights as a research participant, you can contact the Research Compliance Office, at (361) 825-2497 or send an email to IRB@tamucc.edu

Signature

Please be sure you have read the above information, asked questions and received answers to your satisfaction. You will be given a copy of the consent form for your records. By signing this document, you consent to participate in this study. You also certify that you are 18 years of age or older by signing this form.

Signature of Participant: _____ **Date:** _____

Printed Name: _____

APPENDIX C

Demographic Questionnaire

Name: _____ Username: _____

Phone Number: _____

Email address: _____

Age: What is your age?

- 18-24 years old
- 25-34 years old
- 35-44 years old
- 45-54 years old
- 55+ years old

Marital Status:

- Single, never married Married or domestic partnership
 Widowed Divorced
 Separated

Origin Race/Ethnicity:

- White
 Black or African American
 American Indian and Alaska Native
 Asian
 Native Hawaiian and Other Pacific Islander
 Other/Two or more (Please specify: _____)
 Hispanic or Latino origin

Is this your first pregnancy? Yes No

If not, please specify:

- 2nd pregnancy
 3rd pregnancy
 4th pregnancy or more

APPENDIX D

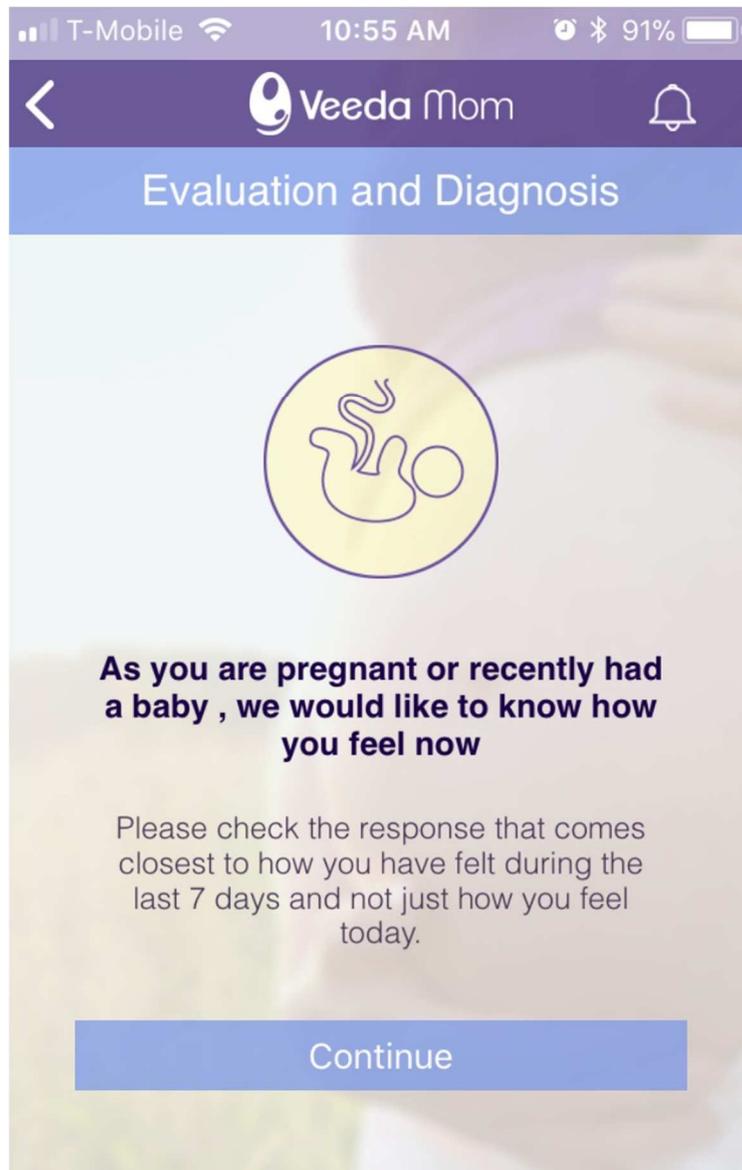
Semi-structured Interview Questions

1. How did you decide you would participate in this study?
2. Tell me about your experience using an app during pregnancy?
 - a. In what ways, if any, has the app been helpful to you?
 - b. In what ways, if any, was the app not helpful to you?
3. Tell me about emotions you have experienced during your pregnancy that stand out for you.
 - a. Tell me about any uncomfortable or unpleasant emotions during your pregnancy.
4. Tell me about any ways the app may have been helpful to you about emotions.
 - a. Tell me about any ways the app may have affected how you handle your emotions.
5. Tell me about any useful ideas, information, or encouragement you may have received from using the app.
 - a. Tell me about how the app could have been more useful.
6. Tell me about anything else that might be important about this topic.

APPENDIX E

EPDS Adapted for Veedamom App

Instructions



APPENDIX F

EPDS Adapted for VeedaMom App

Questions

1. I have been able to laugh and see the funny side of things as much as I always could.
 - As much as I always could.
 - Not quite so much now.
 - Definitely not so much now
 - Not at all

2. I have looked forward with enjoyment to things.
 - As much as I ever did
 - Rather less than I used to
 - Definitely less than I used to
 - Hardly at all

3. I have blamed myself unnecessarily when things went wrong.
 - Yes, most of the time.
 - Yes, some of the time
 - Not very often
 - No, never

4. I have been anxious or worried for no good reasons
 - No, not at all.
 - Hardly, ever
 - Yes, sometimes
 - Yes, very often.

5. I have felt scared or panicky for no very good reason.
 - Yes, quite a lot
 - Yes, sometimes
 - No, not much
 - No, not at all

6. Things have been getting on top of me.
 - Yes, most of the time I haven't been able to cope at all
 - Yes, sometimes I haven't been coping as well as usual
 - No, most of the time I have coped quite well
 - No, I have been coping as well as ever

7. I have been so unhappy that I have had difficulty sleeping
- Yes, most of the time
 - Yes, sometimes
 - Not very often
 - No, not at all
8. I have felt sad or miserable
- Yes, most of the time
 - Yes, sometimes
 - Not very often
 - No, not at all
9. I have been so unhappy that I have been crying
- Yes, most of the time
 - Yes, quite often
 - Only occasionally
 - No, never
10. The thought of harming myself has occurred to me.
- I'm thinking about it right now
 - Yes, quite often
 - Sometimes
 - Hardly ever
 - Never

APPENDIX G

Driscoll Children's Hospital Institutional Review Board Approval Letter



January 26, 2017

Adriana Dyurich, M.S., LPC-Intern
Doctoral Candidate
Department of Counseling and Educational Psychology
Texas A& M
Corpus Christi, Texas

Ryan Loftin, M.D., FACOG
Maternal Fetal Medicine Services
Driscoll Children's Hospital
3533 S. Alameda
Corpus Christi, TX, 78411

RE: New study application IRB number 17.001: Experiences of Pregnant Women Using a Mobile App as a Treatment Companion

Dear Investigators:

Your request for approval of the new study referenced above was reviewed and granted approval on January 26, 2017. The expedited review was conducted in accordance with the Federally-defined categories of expedited review stated in 45 CFR 46.110 and 21 CFR 56.110, research no more than minimal risk.

I have also determined that this research satisfies the requirements of 45 CFR 46.111 (a) (b) and 21 CFR 56.111 (a) (b). Informed consent is required for all prospective subjects. It is further noted that subjects are under the category of the vulnerable population group "pregnant women" therefore, additional safeguards have been included in the review and implementation of study to protect the rights and welfare of these subjects.

You are granted permission to post DCH IRB approved study flyer, identify and recruit participants at DCH Maternal Fetal Medicine Services Department.

The study is subject to continuing review (submit continuing review application and progress report) on or before **January 25, 2018** unless closed before that date.

If approval of the study expires without an approval to continue, research must stop. No research activities should occur after the expiration of approval.



Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review.

Please follow guidelines for research information use, storage and retention.

Should you have any questions or concerns regarding this review, please contact the IRB office at 361-694-4619 or email: Juleros.Nazareno@dchstx.org.

Thank you for keeping the board informed of your activities.

Sincerely,

A handwritten signature in blue ink, appearing to read "Kevin Schooler".

Kevin P. Schooler, MD
IRB Chairman

APPENDIX H

Invitational Poster Approved by Driscoll Children's Hospital IRB



Research study at Driscoll Maternal Fetal Medicine

What is it?

This study plans to explore the experiences of pregnant women using an app to promote maternal wellness and mental health by screening and managing depressive symptoms.

Who is eligible?

- Pregnant women.
- 18 y.o. and up.
- The app is only available in English for iPhone.

How do I refer a patient?

Specialists associated with the Driscoll Maternal Fetal Medicine department may refer a patient that meets criteria for the study. To refer please contact: Adriana Dyurich at adriana.dyurich@tamucc.edu



APPENDIX I

Texas A&M University – Corpus Christi Institutional Review Board Approval Letter



OFFICE OF RESEARCH COMPLIANCE
Division of Research, Commercialization and Outreach

6300 OCEAN DRIVE, UNIT 5844
CORPUS CHRISTI, TEXAS 78413
O 361.825.2497 • F 361.825.2755

Human Subjects Protection Program	Institutional Review Board
APPROVAL DATE:	February 17, 2017
TO:	Ms. Adriana Dyrich
CC:	Dr. Marvarene Oliver
FROM:	Office of Research Compliance Institutional Review Board
SUBJECT:	Initial Approval
Protocol Number:	HSRP #54-17
Title:	Experiences of Pregnant Women Using a Mobile App as a Treatment Companion
Review Category:	Expedited 7
Expiration Date:	February 17, 2018

Approval determination was based on the following Code of Federal Regulations:

Eligible for Expedited Approval (45 CFR 46.110): Identification of the subjects or their responses (or the remaining procedures involving identification of subjects or their responses) will NOT reasonably place them at risk of criminal or civil liability or be damaging to their financial standing, employability, insurability, reputation, or be stigmatizing, unless reasonable and appropriate protections will be implemented so that risks related to invasion of privacy and breach of confidentiality are no greater than minimal.

Criteria for Approval has been met (45 CFR 46.111) - The criteria for approval listed in 45 CFR 46.111 have been met (or if previously met, have not changed).

- (7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. (NOTE: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.101(b)(2) and (b)(3). This listing refers only to research that is not exempt.)

Provisions:

Comments: The TAMUCC Human Subjects Protections Program has implemented a post-approval monitoring program. All protocols are subject to selection for post-approval monitoring.

This research project has been approved. As Principal Investigator, you assume the following responsibilities:

1. Informed Consent: Information must be presented to enable persons to voluntarily decide whether or not to participate in the research project unless otherwise waived.
2. Amendments: Changes to the protocol must be requested by submitting an Amendment Application to the Research Compliance Office for review. The Amendment must be approved by the IRB before being implemented.

3. **Continuing Review:** The protocol must be renewed each year in order to continue with the research project. A Continuing Review Application, along with required documents must be submitted 45 days before the end of the approval period, to the Research Compliance Office. Failure to do so may result in processing delays and/or non-renewal.
4. **Completion Report:** Upon completion of the research project (including data analysis and final written papers), a Completion Report must be submitted to the Research Compliance Office.
5. **Records Retention:** All research related records must be retained for three years beyond the completion date of the study in a secure location. At a minimum these documents include: the research protocol, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to participants, all correspondence to or from the IRB or Office of Research Compliance, and any other pertinent documents.
6. **Adverse Events:** Adverse events must be reported to the Research Compliance Office immediately.
7. **Post-approval monitoring:** Requested materials for post-approval monitoring must be provided by dates requested.