

IMPROVING PERINATAL MENTAL HEALTH:
A PILOT STUDY OF THE ONLINE MOTHERS AND BABIES COURSE WITH COUPLES

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The undersigned, appointed by the dean of the Graduate School, have examined the
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work, and hereby certify that, in their opinion, it is worthy of acceptance.

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DEDICATION

I am dedicating this dissertation to Pete, Lily, and Chad. Pete and Lily, there have been times in my life that I did not fully feel. You helped me find the courage to let feelings in, to heal. And for Chad, whose hand has never wavered. I love you three so much it sometimes hurts, and I am forever grateful.

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ABSTRACT

Untreated perinatal mood and anxiety disorders (PMADs) have short- and long-term consequences for mental, physical, developmental, social, and economic outcomes affecting the mother, infant, family, and community. Online health interventions effectively treat mental health disorders and increase access to care for people at risk of experiencing PMADs. Successful interventions utilize cognitive behavioral therapy to deliver psycho-educational materials, targeting women at various perinatal times, and suggest the content applicable for key support people (i.e., partner, family, friends). Perception of social support is known to be protective for PMADs, and partners are a primary source. However, less is known about engaging the couple in preventative programming, and few studies have included or recruited partners.

This pilot study is one of the first to engage couples ($N = 31$) in a sequential, mixed-methods research project using randomized control trial to test the efficacy of an existing Online Mothers and Babies Course (eMB) for reducing symptoms of anxiety, depression, or perception of stress and adds a new population of participants in the programming-the couple. Participants were cluster-randomized as treatment with eMB or control. Validated instruments were used to measure anxiety, depression, and stress outcomes three times over eight weeks. An intent-to-treat analytic strategy using a factorial ANOVA with repeated measures on group and couple roles (i.e., pregnant woman or partner) and SPSS was used to test the study hypotheses. Post-hoc comparisons were conducted when higher-order interactions were significant. An inductive, thematic analysis was used to analyze qualitative data from post-study intervention group interviews ($n = 15$). Data were coded with Dedoose analytic software; primary and secondary themes were identified and defined in response to the study research question. Data from surveys

and interviews were used to explore participant satisfaction and feelings about partner support while using eMB.

There were significant higher-order interactions for all hypotheses. Pairwise comparisons revealed significant role differences for anxiety and depression at various study times, with partners scoring lower than pregnant women on average. Similarly, there were significant differences between women across groups for anxiety and perception of stress in favor of the intervention. In general, participants found the eMB satisfactory and suggested thoughtful inclusion of partner-related materials. Regarding feelings about partner supportiveness, participants described eMB as promoting PMAD awareness for both members of the couple and described engaging in or becoming aware of socio-cultural tensions including “end goal” thoughts and behaviors, partners putting off their mental health needs in efforts to be supportive of the pregnant woman, and women describing feeling like “a vessel”.

In sum, eMB participants were satisfied with the course content, yet there was a clear desire for material applicable and relatable to all end users indicating the need for modifications in future studies. Inclusion of partners in accessible interventions may increase perceived support within couples through increased awareness of perinatal mental health experiences and needs. Addressing socio-cultural tensions through education, policy, and practice changes more supportive of perinatal mental health are needed.

CHAPTER ONE

Introduction: Framing the Problem

Women are more likely than men to experience mental illness across the lifespan; gender is considered a critical determinant of mental health (World Health Organization, 2019a). The perinatal period is particularly concerning with chronically low rates of adequate health care and poor physical and mental health outcomes (Agnihotri et al., 2016; American College of Obstetricians and Gynecologists, 2013; Bolin et al., 2015). Maternal and infant health outcomes in the United States (U.S.) is on par with many developing countries despite the high average per capita spending on health and social services (Bradley & Taylor, 2013). Adequate access to quality and efficacious health care across the perinatal period bolsters interventions addressing women's mental health needs and creates a more equitable society— all are key to social work's core mission.

Women face burdens balancing home and employment workloads and social factors affecting reproductive and overall health in general, but particularly around periods of transitions, which can increase the need for mental health care (Baxter et al., 2008; ESHRE Capri Workshop Group, 2016; Sengupta et al., 2017). A particularly vulnerable time for women surrounds pregnancy, a time partners can buffer stressors, yet few interventions for women involve partners (Alio et al., 2011; Alio et al., 2013). Early research found pregnancy to be a time of overall emotional well-being (Zajicek, 1981). However, current evidence finds perinatal mood and anxiety disorders (PMADs) commonly occurring (Ashley et al., 2016; Bassi et al., 2017; Bennett et al., 2004; Blackmore et al., 2016; Falah-Hassani et al., 2017; Jones et al., 2014; Rusner et al., 2016). The perinatal period is from conception through one year postpartum. Women of childbearing age experience mood or anxiety disorders at twice the rate of men, with a

peak during reproductive years (Gater et al., 1998; Kessler et al., 1993). Biological and cultural factors contribute to these differences (Altemus et al., 2014; World Health Organization, 2019a).

People who identify as Black, Indigenous, a Person of Color (BIPOC), an ethnic minority, an immigrant or refugee, low-income, having less education, disabled, or a sexual or gender minority are at significantly higher risk of poor perinatal mental health (Anderson et al., 2017; Hoffkling et al., 2017; Kozhimannil et al., 2011; Pilkington et al., 2015; Substance Abuse and Mental Health Services Administration, 2018; Wenzel et al., 2014). The Grand Challenges in Social Work identifies the need to directly or indirectly intervene with the multiple systems that impact maternal mental health through combatting stigma, advancing health equity, strengthening health systems and access to care, utilizing technology for practice innovation, and decreasing the prevalence of mental health issues across the lifespan (Rahman et al., 2013; Uehara et al., 2014). As such, this project utilizes a lens of intersectional and ecological theories as they promote a fuller understanding of systemic inequities.

This proposal identifies theoretically sound, malleable intervention points to combat PMADs and tests an intervention that aims to decrease symptoms and increase perceptions of social support during pregnancy. In the following paragraphs, I briefly discuss classification and identification practices for regularly occurring mood and anxiety disorders. Next, I describe the prevalence, risk factors, and consequences of PMADs. I offer a review of associated PMAD consequences for women, fetuses, and infants and include partners' PMAD prevalence, risks, and consequences. This chapter concludes with an overview and the significance of the proposed research.

Epidemiology of PMADs

Classification and Identification

Depression and anxiety are common topics among maternal mental health intervention programs, research, and scholarship due to the high perinatal prevalence rates. The classification and identification of PMADs rely upon assessing the symptomology, severity, and scope of a disorder. The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) defines current technical criteria for clinical diagnosis and symptom identification (American Psychiatric Association, 2013). The World Health Organization International Classification of Diseases (ICD-10) is also used in the medical profession to diagnose the spectrum of symptoms associated with depression and anxiety (Loranger et al., 1997; Regier et al., 2013).

Mild to severe depression and bipolar disorders are mood disorders occurring in both antenatal and postpartum times (Sit et al., 2006). Clinically significant depression, or major depressive disorder, is characterized by one or more major depressive episodes that persist for at least two weeks with a cluster of symptoms resulting in clinically significant distress and impairment. Symptoms can include depressed mood, a depressed state, a decrease in pleasure, weight loss or gain, insomnia, fatigue or diminished energy, feelings of worthlessness, shame, guilt, inability to concentrate, diminished interest in activities, and thoughts of death or suicide (American Psychological Association, 2013). In cases where depression is present, but a person is not fully meeting the criteria of major depressive disorder, a diagnosis of “depressive disorder, unspecified, or other” can be used (American Psychiatric Association, 2000). Subsyndromal or minor depression is a potential early stage of major depressive disorder, yet it is not a diagnosable condition (American Psychological Association, 2013). Thus, for research purposes,

symptom severity measures are commonly utilized to capture depressive symptoms on a continuum (Cohen et al., 1983; Kroenke et al., 2001; Sinesi et al., 2019).

Bipolar disorders are affective disorders characterized by elevated and expansive mood, irritability, and symptoms that include changes in energy or activity levels. The perinatal period is a time when onset or recurrence of bipolar disorders is more prevalent. Moreover, bipolar disorders correlate with depressive disorders in both antenatal and postpartum periods (American Psychiatric Association, 2013; Nonacs et al., 2005). Perinatal anxiety and related disorders (i.e., generalized anxiety disorder, obsessive-compulsive disorder, and posttraumatic stress disorder) include feelings of anxiousness, extreme worry, panic or panic attacks, tiring quickly or difficulty sleeping, feeling restless, difficulty concentrating and experiencing physical aches and pains (Willis; et al., 2018). Identifying PMADs requires routine screening by a knowledgeable care provider with a validated instrument. Once a provider identifies a PMAD, they refer the client/patient to an evidence-based, accessible, and sustainable treatment fitting the patient's needs to meet best practice recommendations (Legere et al., 2017; Thota et al., 2012; Toler et al., 2018).

Maternal PMAD Prevalence

This review focuses on anxiety and depression due to the high prevalence rates and increased risk of developing another, or more severe, PMADs when these disorders are present. Additional and related disorders, including phobias, panic disorder, social anxiety disorder, obsessive-compulsive disorder, and post-traumatic stress disorder, are detrimental to health and wellbeing in perinatal times and beyond; risk for these disorders increase with perinatal anxiety or depression (Office on Women's Health, 2016; Postpartum Support International, 2018; World Health Organization, 2019a).

Mood or affective disorders. Experts estimate that 12 to 22% of women experience perinatal depression, twice the general female population's prevalence (Accortt & Wong, 2017; Andersson et al., 2003; Bennett et al., 2004). Antenatal depression occurs in approximately 16% of women, a rate significantly higher than rates among non-pregnant women (Ashley et al., 2016; Bennett et al., 2004). Bennett et al. (2004) found rising rates of depression between the first (7%) and second trimesters (13%) and a decrease by the third (12%).

In the U.S., the average prevalence of postpartum depression is generally accepted as about 13%, a figure similar to that of other developed countries worldwide (Office on Women's Health, 2016; World Health Organization, 2019b). The term "baby blues" is used to describe mood changes and feelings of sadness, unhappiness, and worry in the first two to three weeks following birth. Two weeks following birth, approximately 50 to 85% of women experience the "baby blues". Postpartum depression occurs after the first two weeks following birth, is a mood disorder, and is characterized by feelings of extreme sadness, anxiety, and fatigue, making it difficult to carry out daily living activities, including caring for oneself or others. Postpartum depression affects 10 to 15% of women during the three weeks after birth through one year (American College of Obstetricians and Gynecologists, 2018b; Gaynes et al., 2005; Nonacs et al., 2005; World Health Organization, 2019b). Puerperal psychosis was historically lumped into depressive disorders but is now considered a psychotic break. Current prevalence reports indicate psychotic breaks occur with approximately 0.1 to 0.2% of women (Robakis et al., 2017).

Research indicates that 1 to 2% of women in the general population have bipolar disorder in a given year, yet it is the sixth leading cause of disability (Kessler et al., 1994; Merikangas et al., 2007). Perinatal bipolar disorder is complicated to identify. A 2008 study found that the average perinatal prevalence of bipolar disorders is 3% (Vesga-Lopez et al., 2008). A decade

later, a systematic review of bipolar prevalence reveals a wide variation in range (Stevens et al., 2019). These variations across time in prevalence rates likely result from the challenges associated with measurement, identification (e.g., new cases vs. recurrence), and the role of contextual factors (e.g., pregnancy intention, social support, social determinants of health) and quality of research studies (Stevens et al., 2019).

Prevalence rates of perinatal mood disorders range widely among women (Anderson et al., 2017; Centers for Disease Control and Prevention [CDC], 2017; Kozhimannil et al., 2011). The variation is mainly attributable to social determinants of health. Women who are BIPOC, those with low socioeconomic status, low educational attainment, depending on residence (i.e., state or urban vs. rural), and U.S. immigrants experience more perinatal mood disorders. Among racial and ethnic minorities, depression prevalence ranges from 35 to 67% (Ceballos et al., 2017; Ko et al., 2017; O'Hara & McCabe, 2013). In general, disproportionately high rates of perinatal mood disorders exist for traditionally marginalized groups, and women experience a higher rate of associated poor health outcomes as a consequence (US Department Health Human Services Office of Minority Health, 2017).

Anxiety disorders. Fairbrother et al. (2015) estimated that 13 to 21% of women experience antenatal anxiety, and 11 to 17% experience postpartum anxiety. These figures align with earlier research where the prevalence of any anxiety disorder in the antenatal and postpartum periods is 13% and 12%, respectively (Vesga-Lopez et al., 2008). However, Leach et al.'s (2016) systematic review, including 98 studies, suggest the annual prevalence of perinatal anxiety generally could be much higher, ranging from 3 to 29% for any anxiety disorder.

Co-morbid conditions. A meta-analysis of 66 studies across 30 countries indicates mild to severe anxiety and depression co-occurs in approximately 10% of women in the antenatal

period (Falah-Hassani et al., 2017). The severity of comorbid symptoms was highest in the first trimester (12%) and declined somewhat in the second and third (10% each). During the postpartum period, the prevalence of co-morbid anxiety and depression is 8% in the 24 weeks following pregnancy. In general, Falah-Hassani et al. (2017) found that one in 10 women experience co-morbid anxiety and depression during the antenatal period and, one in 12 women have co-morbid symptoms during the postpartum period.

Risk Factors and Consequences of PMADs

Maternal Risk Factors

Over the past two decades, there have been advances in understanding risk factors for PMADs. To fully understand the scope of risks, a lifecycle perspective (see Figure 1) is necessary as perinatal mental health is associated with factors from the time a woman is born throughout her reproductive years; lifelong risk factors are carried forward by the next generation (Kieling et al., 2011). In the 1980s, Watson et al. (1984) identified a lack of social support, a history of affective disorders, the stress associated with home or work responsibilities as risk factors for PMADs. These findings hold today, although understanding of risk factors has become more nuanced. Loss in a previous pregnancy and medical complications in the past or current pregnancy can also increase risk (Bayrampour et al., 2018). Figure 2 illustrates Biaggi et al.'s (2016) findings of significant risk factors for antenatal anxiety or depressive disorders; research indicates that antenatal risk factors can increase the risk of occurrence in the postpartum period (Fairbrother et al., 2015).

Having bipolar disorders before pregnancy carry unique risks for women, including increased risk for developing antenatal or postpartum depression or postpartum psychosis (Mandelli et al., 2016). Mood stabilizing medication is not safe for the developing fetus, yet discontinuing medication is correlated with a high relapse rate (Nonacs et al., 2005; Stevens et al., 2019). In fact, across studies, 19% of women, on average, with bipolar disorder had a

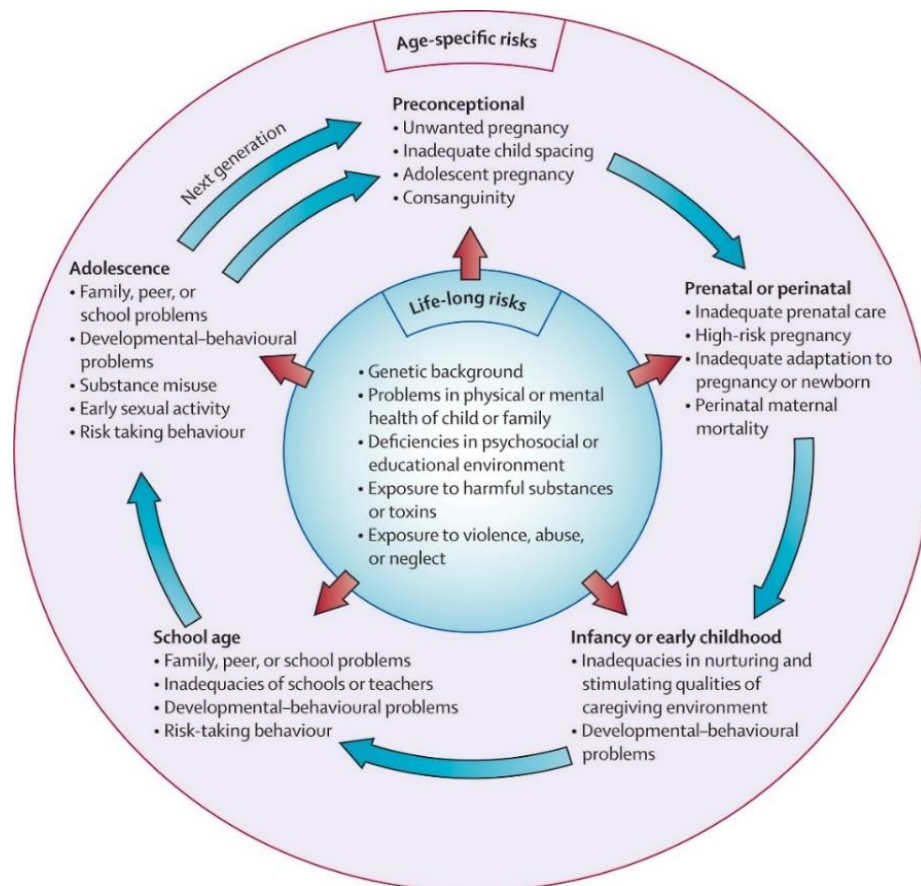


Figure 1. The lifecycle approach and risk factors for mental disorders. From Kieling et al. (2011).

recurrent episode in the antenatal period of subsequent pregnancies (Stevens et al., 2019). For primiparous women (i.e., bearing young for the first time), changes in bipolar disorder medication and history of familial bipolar disorder are risk factors, whereas having a supportive partner is protective (Jones et al., 2014).

Physical and biological risk factors for PMADs exist. In a prospective, population-based study exploring risk factors for postpartum depression, Silverman et al. (2016) found women are at risk due to advanced age and gestational diabetes regardless of history of mental illness. Study

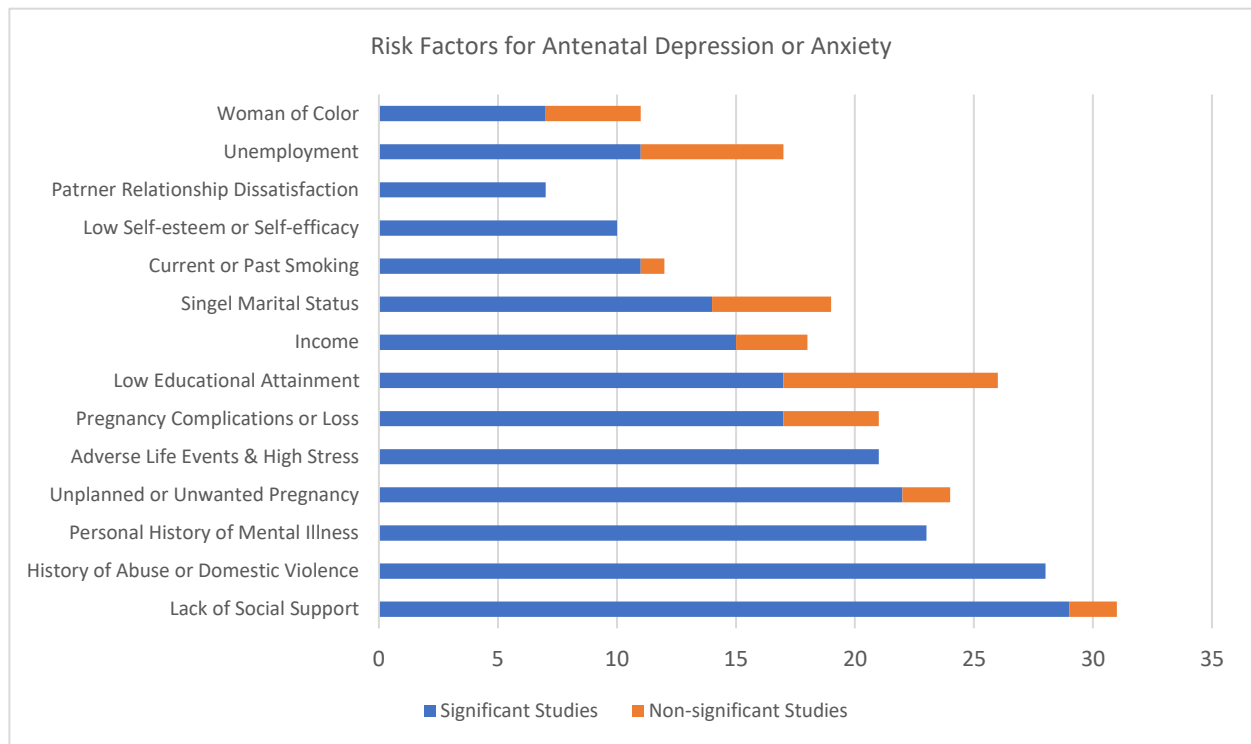


Figure 2. Antenatal risk factors associated with depression or anxiety. Adapted from Biaggi et al. (2016).

findings indicated that women with no history of depression, young age, instrument-assisted delivery or via cesarean, or moderate preterm delivery also experienced an increased risk of PMADs. Pregestational diabetes is a risk factor for women with a history of depression (Nonacs et al., 2005; Silverman et al., 2017). There is an increased risk of gestational hypertension and antenatal hemorrhage for those with bipolar disorder (Jones et al., 2014; Rusner et al., 2016).

Access-to-Care Risks

Across the perinatal period, limited access or engagement to healthcare services compounds the problem and risks of PMADs. Pregnancy intention and access to preconception

care correlate with the time of accessing prenatal care. Women with unintended pregnancies (i.e., unwanted or mistimed) engage in care later than those with intended pregnancies. Those without preconception care are more likely to engage in prenatal care later in the pregnancy (Wally et al., 2018). Women with unintended pregnancies have higher rates of PMADs and are known to access mental health care at lower rates (Bales et al., 2015; Mercier et al., 2013). Late or no access to prenatal care is higher among women experiencing PMADs and for women who experience intimate partner violence (Adler et al., 2016; Case & Deaton, 2015; Dietz et al., 1997; Gazmararian et al., 1995; Office of Minority Health & U.S. Department Health Human Services, 2017a, 2017b; Rossen et al., 2016).

Social determinants of health contribute to access barriers. Kozhimannil et al. (2011) found significant health disparities depending on insurance type, race, and ethnicity. For women utilizing Medicaid, overall initiation rates for postpartum mental health services are low. Race and ethnicity are also factors in postpartum care. White, Black, and Latina women access mental health services differently at 9%, 4%, and 5%, respectively. Women of color have significantly lower odds of accessing services. Black or Latina women are significantly less likely to receive follow-up treatment or continued care (Kozhimannil et al., 2011).

Institutional factors further contribute to inadequate mental healthcare access. Education about PMADs for healthcare providers is not uniformly administered (Legere et al., 2017), and providers often do not screen or refer due to lack of knowledge or availability of referral services (Accortt & Wong, 2017; Gaynes et al., 2005). Ineffective system tools and policies create barriers to consistent screening and treatment referrals across health care specialties (Earls & American Academy of Pediatrics, 2010; Hynan et al., 2015; Margolis et al., 2011; Toler et al.,

2018). These barriers are problematic for providers who wish to screen, treat, and refer patients when PMADs are present.

Consequences of PMADs

There are short- and long-term consequences of PMADs for the woman, fetus, infant, partner, and family unit (American College of Obstetricians and Gynecologists, 2013; Choi & Sikkema, 2016; National Institute of Mental Health, n.d.; Office on Women's Health, 2016; Poobalan et al., 2007). Infants and children of women experiencing PMADs can experience developmental delays (e.g., cognitive, psychomotor, behavioral, socio-emotional), reduced mother-infant relationship quality (e.g., decreased attachment and maternal attention), and an increased likelihood of maternal abuse (Kieling et al., 2011; Kingston et al., 2012; Meidan et al., 2015; Rusner et al., 2016; Willis et al., 2018). The child's risk of mood or affective disorders also increases (Choi & Sikkema, 2016; Dennis & McQueen, 2009; Gentile, 2017). In severe cases, maternal or infant death can occur (Palladino et al., 2011).

Antenatal and birth consequences. In the antenatal period, outcomes associated with PMADs include inadequate or late prenatal care, increased time off work, inability to conduct activities of daily living, difficulty caring for current children, increases in fatigue and nausea, feelings of anxiety, thoughts of self-harm, and suicide (America's Health Rankings, 2016; National Coalition Against Domestic Violence, 2015; Office on Violence Against Women, 2016; Palladino et al., 2011; U.S. Department of Justice, 2000). A significantly higher rate of anemia, gestational diabetes, preeclampsia, and hypertension among women experiencing PMADs than women without (Bansil et al., 2010). There is a higher likelihood of cesarean section during the birth, increased epidural usage, preterm labor, anemia, and maternal death (Andersson et al., 2004; Bansil et al., 2010; Jarde et al., 2016). The risk for poor fetal outcomes increases and

includes preterm birth, low birth weight, growth restriction, physical abnormalities, fetal distress, and fetal death (Bansil et al., 2010; Field et al., 2006; Jarde et al., 2016).

Postnatal Consequences. Maternal sensitivity (i.e., the mothers' ability to accurately read and respond to infant behavior) suffers due to PMADs, and there is a decrease of appropriate response to infant cues from birth to 12-months postpartum (Meins et al., 2001). Mothers with higher levels of depression have significantly lower maternal sensitivity levels, lower breastfeeding rates, and increased risk of infant failure to thrive (Bernard et al., 2018).

Longer-term consequences exist for untreated PMADs. A 30-year longitudinal study following offspring of depressed and non-depressed parents found a high risk for child depression, morbidity, and mortality persisting beyond the middle adult years (Weissman et al., 2016). Moore et al. (2019) published a systematic review of the literature, revealing the consequences of depression or anxiety in the postpartum period. Findings indicate decreased ability to conduct daily living activities, inability to work outside of the home, and less ability to care for an infant and another child in the home. The Moore et al. (2019) review indicated that as marital and social relationships experience strain, intimate partner violence increases, and the risk of abuse to a child increases. Finally, a woman's partner or child can experience adverse mental health outcomes due to maternal PMADs (Moore Simas et al., 2019).

Partner PMADs

Partner PMAD Prevalence

Partners of women and fathers experience PMADs affecting wellbeing (Bartlett, 2004; Letourneau et al., 2012; Weitzman et al., 2011). Leach et al. (2016) estimate fathers' anxiety rates at 4 to 16% prenatally and 2 to 18% postpartum (Leach et al., 2016). Paulson et al. (2010) conducted a meta-analysis with findings that estimate the prevalence of paternal perinatal

depression to be approximately 10% (Paulson & Bazemore, 2010) while a more recent meta-analysis by Cameron et al. (2016) finds paternal depression rates to be closer to 8%. Paulson et al. (2010) also found fathers' PMADs are positively and moderately correlated with maternal depression three to six months postpartum. The study pointed to limitations in current research and suggested higher rates of paternal PMADs exist than once reported and warrants future research (Kessler et al., 2003; Paulson & Bazemore, 2010).

Risk Factors and Consequences

Partners who are men express a desire for interventions occurring in the prenatal period for themselves and the dyad; however, specific intervention for partners in this area is less common. There is a need for more research regarding partners and PMAD prevention (Fisher et al., 2012; Lee et al., 2018; O'Brien et al., 2017). Bronte-Tinkew et al. (2007) studied symptoms and correlates of depression. They found paternal depressive symptoms were negatively associated with father-child engagement, positively associated with paternal stress, and negatively associated with a higher quality of the mother-father relationship and co-parenting supportiveness (Bronte-Tinkew et al., 2007). Wee et al. (2011) found that the most common correlate of paternal depressive symptoms across the perinatal period was depression or elevated symptoms of maternal depression (Wee et al., 2011). Pilkington et al.'s (2015) recent review of modifiable risk factors for men found relationship satisfaction, communication, emotional closeness, instrumental or emotional support, and minimizing conflict between partners to be the essential factors in reducing the risk of depressive symptoms. Biaggi et al.'s (2016) systematic review supported these previous findings and highlighted that no studies had explored partners' psychopathology as a potential risk factor for maternal depression or anxiety in the antenatal period.

Partners with PMADs suffer many consequences similar to pregnant women (i.e., time off work, inability to conduct daily living activities, difficulty caring for current children, increases in fatigue and nausea, feelings of anxiety, thoughts of self-harm, or suicide). Research indicates that relationship strain for the couple increases, intimate partner violence incidence or severity increases, and relations with the child is more likely to suffer (O'Brien et al., 2017; Palladino et al., 2011; Weissman et al., 2016). Top et al. (2016) found a significant decrease in depression scores for both fathers and mothers when marital harmony existed. Fathers who wanted the pregnancy compared to those who did not also score differently on depression scales; men who wanted the pregnancy had lower depression scores, whereas men who did not want the pregnancy scored higher.

Potential for Treatment Innovation

Preventative, primary, and behavioral health care fields routinely use the internet and mobile health applications for various health needs (Carlbring et al., 2018; Josephine et al., 2017; Kooij et al., 2017; Rogers et al., 2017; Tan & Goonawardene, 2017). To date, only two systematic reviews have explored the efficacy of online interventions to prevent or reduce symptoms of PMADs. Among the reported findings, it is notable that no studies collected partner-participant data, and only two studies reported pregnancy intention data (Ashford et al., 2016; Lee et al., 2015). Since that time, innovative research has continued to add to the evidence of using online interventions; however, online interventions, including partners, are needed.

Problem Statement

PMADs are problematic and treatable, yet many women and men experience them. Physical and mental health outcomes are poor when disorders are left untreated, and there are detrimental and lifelong consequences for the entire family unit. The U.S. Preventative Services

Task Force (2019) promotes increasing accessibility of evidence-based psychoeducation with online or mobile applications. Additionally, addressing the partner dyad to increase social support perception is an understudied area of innovation and research (Biaggi et al., 2016; Dennis, 2013). The current use of online cognitive-behavioral or interpersonal therapies and psychoeducation for prevention of PMADs has not included the partner-participant or the effect of these interventions on a dyad, nor have these studies investigated pregnancy intention as a potentially confounding factor (Ashford et al., 2016; Lee et al., 2015).

Study Purpose

This study utilizes an existing and previously tested online intervention, *Mothers and Babies Course* (eMB), and includes the couple as a participating dyad (i.e., partners as participants alongside the pregnant women). The eMB program was designed with the perinatal woman in mind yet it contains content appropriate for partners, fathers, or others who provide support to the pregnant women. The eMB program includes eight psychoeducational modules. It is an evidence-based, cognitive-behavioral program intended to teach strategies that promote a healthy lifestyle for mothers and their newborns (Barrera et al., 2015; Muñoz et al., 2007). The program will be described further in Chapter Three. The developers of eMB support this replication study and provided access to the program for this study (see Appendix A).

The purpose of this pilot study is to explore the use of an online psychoeducation program intended to lessen the severity of PMADs for women when engaging the pregnant couple. For the purpose of this research, PMADs will include depression and anxiety symptom severity. This study examines the intervention's effect on participant antenatal mental health (i.e., anxiety or depression) and stress perception, describes participant satisfaction and views about

content applicability, and explores participants' perceptions of partner support during the study period.

Research Questions

1. Does eMB reduce symptoms of anxiety for pregnant women and their partners in the antenatal period?
2. Does eMB reduce symptoms of depression for pregnant women and their partners in the antenatal period?
3. Does eMB reduce the perception of stress for pregnant women and their partners in the antenatal period?
4. How do participants describe their satisfaction with the eMB course for meeting participant informational needs about perinatal mental health?
5. How do participants describe their feelings about partner support while using eMB?

Significance of Research

This pilot explores the effectiveness of an adapted evidence-based program (eMB) for couples to reduce depression and anxiety symptoms and stress and increase perceptions of support. Previous research investigated eMB's utility with mothers alone. This study extends the literature by examining program effectiveness for the pregnant couple. Given the importance of social support in the perinatal period for decreasing symptoms of PMADs, this research informs how symptoms and stress may be reduced and support increased through intervention with couples.

CHAPTER TWO

Literature Review and Theoretical Framework

Researchers, public health officials, and policymakers around the globe recognize PMADs as a public health concern. Studies continue to differentiate between mood and anxiety disorders in the antenatal vs. postpartum periods to understand correlated risk factors and addressing them (U.S. Preventive Services Task Force et al., 2019; Willis; et al., 2018; World Health Organization, 2019b). However, these issues are complex and require nuanced study, particularly regarding the social determinants of health (Yim et al., 2015).

This chapter explores stress, its impact on mental health, and its contribution to PMADs. In particular, the Transactional Model of Stress and Coping informs how intervention can alter and change mental health throughout and following pregnancy (Lazarus & Folkman, 1984). Appraisal and coping are essential functions during perinatal periods, while self-efficacy and perceived social support are mediating factors for mental and physical health outcomes. This chapter concludes with an overview of efficacious treatment approaches for PMADs and innovation opportunities to address gaps in the current literature.

Theoretical Framework

An ecological perspective promotes an understanding of how mood disorders at the individual level impact health and functioning for an entire society at micro, mezzo, and macro levels. Society impacts individual and interpersonal relations by facilitating, blocking, or interfering with mental health through treatment accessibility, formal and informal supports, and stigmatization. Mood disorders can be persistent, yet they are preventable and treatable for most people afflicted by them (Darling, 2007). Stigmatization of mental health disorders, including victimizing and blaming individuals who experience them, can have a devastating impact on

access to care, disclosure of symptoms, and long-term mental health. The lens of critical and feminist theories enables understanding how histories of patriarchy, racism, and capitalism create systemic inequities that degrade mental and physical health (Crenshaw, 1991).

Transactional Model of Stress and Coping

In the early stages of theorizing about stress and coping, Lazarus and Cohen's work conveyed that stress is a transactional phenomenon where the person experiencing a stimulus derives meaning from their appraisal of the event. Based on the appraisal, coping mechanisms are initiated and adapted to the stimuli (Lazarus, 1966; Lazarus & Cohen, 1977). This theoretical approach, heavily focusing on psychological responses, differs from that of Hans Selye, a key figure in early stress research, whose general adaptation syndrome framework focused on three stress response stages (i.e., alarm, resistance, exhaustion), all of which were focused primarily on physical responses to stress in the body (Selye, 1956). Lazarus and Folkman (1984) put forth the Transactional Model of Stress and Coping (see Figure 3) to provide a framework for evaluating the process of coping and adaptation in response to stressors where appraisal, the evaluative action, is a fundamental function. The model includes moderating effects where coping style and social support affect how one engages with meaning-making and coping efforts. To better understand appraisal processes, adaptive or maladaptive coping, causal inference, and further understanding of confounding factors, theoretical modifications have been put forth (Lazarus & Folkman, 1987). The perinatal period is one of significant change physiologically, psychologically, and interpersonally. It affects activities of daily living in virtually every environment. Change of this magnitude creates stress, whether perceived as positive, negative, or neutral.

Stress. Lazarus and Folkman (1984) suggest that stress be viewed as an organizing concept for many instances in life, internal and external, affecting physical and psychological wellbeing and requiring action to restore balance. Theorizing stress requires avoiding the

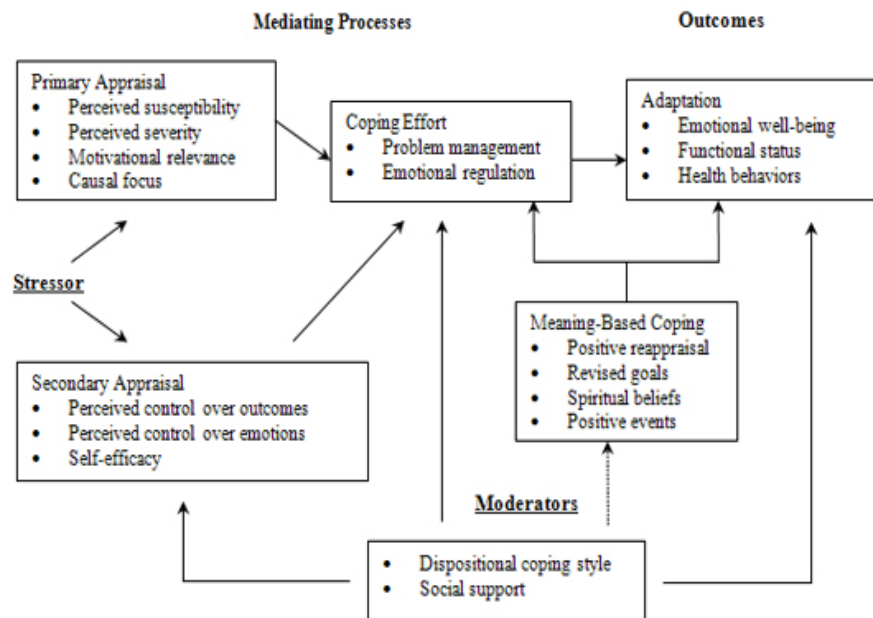


Figure 3. Transactional Model of Stress and Coping. From Lazarus and Folkman (1984).

tendency to understand stress as a simple cause and effect regarding any psychophysiological state. “Psychological stress is a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being” (Lazarus & Folkman, 1984, p.19). Thus, stress perceived as exceeding one’s ability to cope can result in adverse mental or physical outcomes wherein perception is crucial for the appraisal process.

Stress Appraisal. Lazarus and Folkman’s (1984) theoretical model describes cognitive appraisals of stress appraisals to include harm/loss (i.e., sustaining a damaging event), threat (i.e.,

an anticipated harm/loss requiring planning or anticipatory coping for adaptation), or challenge (i.e., focus on the potential for gain or growth, characterized by pleasurable emotion). The model includes primary and secondary stress appraisals- cognitive processes where a person mentally characterizes an event and assigns significance to well-being (Lazarus & Folkman, 1984).

“Primary” and “secondary” are terms to describe appraisal, however there is no inherent hierarchy or linearity of the process involved (Lazarus & Folkman, 1984, p. 31). A primary appraisal evaluates the severity of stress (i.e., magnitude of effect), motivational relevance (i.e., how applicable is the stressor temporally), and casual focus (i.e., understanding of the conditions as to why something occurs). A secondary stress appraisal evaluates one’s controllability of outcomes and emotions. Lazarus and Folkman’s (1984) model illustrates the appraisal processes, the association with adaption outcomes, and includes mediating and moderating factors- coping effort (a mediating factor), disposition (a moderating factor), and perception of social support (a moderating factor). Reappraisal is a potential cognition based on new information presented in the environment and serves to confirm or change one’s stress perception (Richard S. Lazarus & Folkman, 1984).

Lazarus and Folkman (1984) assert two factors affecting appraisals, person and situational/environmental. Person factors include commitments (i.e., choices, values, and goals), motivational factors (i.e., drive, cathexis, motive, investment, need, plan, and intention), and beliefs (i.e., personal or shared perceptions creating a lens for reality and existential meaning- includes situational understanding of power and control). Situational factors are novelty (i.e., an experience in which the person has no prior experience), predictability (i.e., discerning of environmental characteristics-discoverable, or learned), and event uncertainty (i.e., the likelihood of an event occurring; Lazarus & Folkman, 1994). Finally, the relationship between person,

situational and temporal factors (i.e., when the event occurs, duration, urgency, and intensity) can be ambiguous and affect appraisals and subsequent coping behaviors.

Coping. Lazarus and Folkman (1984, p. 141) characterize coping as “*constantly changing cognitive and behavioral efforts to manage specific external and or internal demands that are appraised as taxing or exceeding the resources of the person.*” Coping efforts include problem management (i.e., strategies directed at changing the events associated with the stressor), emotional regulation (i.e., strategies aimed at changing how one thinks or feels about the stress), and seeking, obtaining, and using social support (Lazarus & Folkman, 1984).

Lazarus (2000) describes three main thematic concepts as primary attributes of coping. First, there is no single effective coping strategy. Effective coping depends on the person and environmental factors during stress. Second, understanding a person’s coping process requires a detailed understanding of what they think and do in each threat stage. Finally, there are two primary types of coping: problem-focused (i.e., action based on information obtained to change the problem) and emotion-focused (i.e., efforts to regulate emotion associated with the stressful events). Lazarus (2000) cautions against oversimplifying a situation by promoting one type of coping strategy—problem or emotive—to produce the best outcome. Most people utilize both problem- and emotion-based functions to navigate highly complex situations. Emotion-focused coping is not illogical or irrational, though emotion can result in interference in evaluating situations. Cognition is responsible for attributing blame or credit in the emotive process and important in how one adapts (Lazarus, 2000).

Moderating Factors. Moderating factors are an essential consideration in the adaptation process. Moderating factors are causal antecedents affecting one’s ability to cope and adapt positively. Therefore, they can have an inverse relationship with appraisals, coping efforts, and

outcomes. Lazarus and Folkman (1984) describe coping resources as health and energy (i.e., physically well and with adequate energy), positive beliefs (i.e., a positive views of oneself, locus-of-control, and spirituality), problem-solving skills (i.e., the ability to search for information and perform analysis based on that information, generate courses of action, and utilization of personal experience), social skills (i.e., the ability to communicate and behave with others in socially appropriate ways), social support (i.e., people from which one receives emotional, tangible, or informational resources), and material resources (i.e., monetary means to obtain goods and services). Further, there are constraints (e.g., personal, environmental, or threats) to utilizing resources for coping with stressors potentially too complex or inadequate (Lazarus & Folkman, 1984).

Stressors are unique and numerous in the context of pregnancy, birth, and post-partum periods and are extensions to existing life circumstances accentuated throughout the perinatal time. Application of the theoretical lens regarding primary appraisal of stress (i.e., irrelevant, benign-positive, stressful) in the perinatal period promotes understanding of factors regarding a woman or her partner's perception of susceptibility (i.e., knowledge regarding the likelihood of a stressful event occurring; Lazarus & Folkman, 1984). The following paragraphs describe perinatal stressors, the associated appraisal of risk factors, and the perception of control concerning coping and stressors. This review includes the applicability of prevention and treatment approaches relevant to adaptation and subsequent PMAD outcomes.

Literature Review of Prevention and Treatment of PMADs

Lazarus and Folkman's (1984) theoretical description of stress aligns with the seven most common stressors in the perinatal period: 1) anxiety and depression, 2) psychological symptomatology (not reduced to anxiety or depression), 3) daily hassles (i.e., minor/short-term

events), 4) life events (i.e., major/long-term events), 5) specific socio-environmental stressors (i.e., support systems, access to resources, neighborhood safety, environmental hazards), 6) stress related to pregnancy (i.e., physical, mental, social changes) and 7) stress related to parenting (i.e., role transitions, adherence to philosophical paradigms, increased physical, mental and financial demands; Nast, Bolten, Meinschmidt, & Hellhammer, 2013). Stressful life events impacting perinatal health are numerous. They include financial (i.e., monetary resources, existing assets, accumulated wealth to meet increased demands), partner-associated (i.e., relationship cohesion, perception of support, abuse or violence), emotional (i.e., history of mental health disorders, ability to cope, feelings about pregnancy), and traumatic (i.e., history of violence or abuse, previous loss in pregnancy, poor maternal or fetal birth outcomes, maternal or fetal, or infant death) events (Ahluwalia et al., 2001; Centers for Disease Control and Prevention, 2017a, 2017b). A woman and her partner's appraisals of stressors influence coping strategies initiated individually and as a dyad.

Stress that is often associated with pregnancy begins for many women before conception and continues throughout the perinatal period. Unintended pregnancy is associated with perinatal stress and is a risk factor for PMADs for women and their partners (Gauthreaux et al., 2017; Mercier et al., 2013; Top et al., 2016). Additional factors contributing to stress before conception include infertility or difficulty conceiving (Abajobir et al., 2016), trauma associated with past pregnancies, including poor maternal and infant health or birth outcomes (Andersen et al., 2012), pregnancy loss (Farren et al., 2018), and occurrence or escalation of intimate partner violence (Globevnik Velikonja et al., 2018). Once pregnant or in the postpartum period, risk factors including using tobacco, alcohol, and other substances compound stress; poor physical health (i.e., chronic disease (hypertension, diabetes, obesity); infectious disease (i.e., sexually

transmitted infections); and poor nutritional habits are associated outcomes. Detrimental situational factors include lack of access to healthcare, inadequate access to nutritious foods, the existence of violence in the home, and poor social support (CDC, 2017a).

The coping response to stress and risk factors can be adaptive or maladaptive, thereby increasing or reducing the risk of PMADs (Biaggi et al., 2016; Lancaster et al., 2010; Lazarus & Folkman, 1984). In the perinatal period, contextual factors of stress, person or environmental factors influence appraisal and positive adaption. Intervention during periods of high stress and exposure to risk can prevent and treat PMADs by enhancing coping strategies, adjusting appraisals, and modifying personal and environmental factors contributing to stress. The following paragraphs describe interventions to promote positive adaptation aimed to reduce PMADs.

Identifying and Treating PMADs

Identification. Health professionals are instrumental in reducing symptom severity and occurrence of PMADs through screening, early detection of symptoms, and appropriately treating PMADs. Best practices suggest that screening and treatment referrals should occur during routine health care visits. Physicians or other obstetrics professionals are often the first line of defense against PMADs as they interact with women and partners throughout the perinatal period (Lind et al., 2017; Lupattelli et al., 2014; O'Connor et al., 2016). Treatments including pharmaceutical and psychiatric/counseling therapies show significant risk reduction (Lupattelli et al., 2014; Stevens et al., 2019).

Health experts recommend that all women have mental health screening in the perinatal period (Accortt & Wong, 2017; Committee on Obstetric Practice, 2015; Earls & American Academy of Pediatrics, 2010; Hynan et al., 2015; Legere et al., 2017; Lind et al., 2017; Siu et al.,

2016). With a better understanding of the risks and consequences of PMADs, there has been an increase in routine screening (Lind et al., 2017). Resources, infrastructure, and policy changes are needed to ensure equitable and accessible screening, referral, and treatment for all populations.

Individual Treatment. There is evidence that strategies for increasing sleep (Kempler et al., 2016), use of exercise (Daley et al., 2015; Rosenbaum et al., 2014; Saligheh et al., 2017; Teychenne & York, 2013), and educational interventions (Suto et al., 2016) can decrease the occurrence and severity of PMADs. Additionally, strategies promoting formal (i.e., clinicians, therapists, and helping professions such as social workers and public health workers) and informal (i.e., family, friends, church groups, or community) social supports to increase maternal autonomy and self-efficacy are effective. Interventions to increase social supports include home-visiting, breastfeeding support, peer support initiatives, and educational programming, all of which are evidence-based and decrease in severity or occurrence of PMADs (Dennis, 2013; Dias & Figueiredo, 2015; Leger & Letourneau, 2015; Legere et al., 2017; Shaw et al., 2006; Thota et al., 2012). The aforementioned promising interventions reflect what women and partners say they want and need for care and support throughout the birth continuum (American College of Obstetricians and Gynecologists, 2018a; Bohren, 2017; Harris Interactive, 2015; Hetherington, 2015; Lothian, 2017; Mazzoni, 2017; Smith et al., 2015). However, even when successful, these programs are typically grant-funded and time-limited, require a highly skilled workforce, raising questions about sustainability and reach for women and partners.

The U.S. Preventative Services Task Force commissioned a systematic review of the literature and meta-analysis to guide evidence-based recommendations to prevent PMADs as prevalence rates are high despite promising interventions (Dennis, 2013; U.S. Preventive

Services Task Force et al., 2019). Dennis et al. (2013) conducted a systematic review that identified cognitive-behavioral and interpersonal therapies as the most efficacious interventions across the perinatal period. There are barriers to providing this care, including too few qualified therapists available and treatment costs (Legere et al., 2017). Although pharmacological interventions are known to be an effective treatment for mental health disorders, potential harm to the fetus and infant are possible due to the transference of the drug via placenta or breastmilk (Abel, 2008; Badker & Misri, 2017; P. Cuijpers et al., 2008; Pim Cuijpers et al., 2008; DeJong et al., 2016; Dennis, 2013; Furuta et al., 2016; Lever Taylor et al., 2016; Nillni et al., 2018). Therefore, experts often suggest using cognitive-behavioral or interpersonal therapies as an initial treatment approach (Broich et al., 2015; Deligiannidis, 2010; Leong et al., 2017; Petersen et al., 2016; Robinson, 2015).

Addressing the perinatal dyad. Including partners in interventions is understudied despite the large body of evidence that lack of perceived partner support is the most highly correlated risk factor for antenatal depression or anxiety (Biaggi et al., 2016). Perinatal studies exploring mental health outcomes that include measures regarding the maternal perception of partner support typically assess PMAD prevalence, correlates, and symptomology (Bernard et al., 2018; Lee et al., 2018; Leger & Letourneau, 2015; Records & Rice, 2007; Srinivasan et al., 2015), and risk or protective factors (Cheng et al., 2016; Jeong et al., 2013). Study findings indicate a strong correlation of perceived lack of partner support with an increased likelihood of maternal or partner PMADs. Studies collecting data from non-participant partners typically aim to identify aspects of support in interpersonal relationships (Caldwell et al., 2018) or assess the severity of PMAD symptoms across the dyad (Nasreen et al., 2018). Findings across studies in the antenatal period indicate the pregnant woman and the dyad's experience of PMADs in the

postpartum period have an inverse correlation with sleep quality and marital harmony and a positive correlation with loss in a previous pregnancy, low parenting efficacy, and marital discord or violence (Demontigny et al., 2013; Goodman, 2004; Lee et al., 2018; Ramchandani et al., 2011; Saxbe et al., 2016; Wee et al., 2011; Wilson & Durbin, 2010).

Perinatal intervention studies, including partner participants, are less common than prevalence or descriptive studies. Tested interventions utilize psychoeducation to increase coping self-efficacy and supportive relations (Diemer, 1997; Gambrel & Piercy, 2015) and to reduce maternal pain (Field, 2009). Gambrel et al. (2015) found significant relationship satisfaction results for men in the treatment group (medium effect size, $\eta^2 = .13$). However, women's treatment group scores were non-significant compared to the controls and had a small effect size ($\eta^2 = .01$). There was a significant reduction of PMADs with childbirth education classes (Diemer, 1997) and mindfulness-based stress interventions (Gambrel & Piercy, 2015). Significant findings and effect sizes (not consistently reported) varied across studies.

There is not enough evidence yet to suggest that providing psychoeducation alone will have lasting effects in the postpartum period (Mihelic et al., 2018). The evidence suggests the use of interventions to increase coping and perceived social support have great potential (Lee et al., 2018; Niela-Vilen et al., 2014; Taylor, 2016). However, such studies conducted thus far describe several limitations or inconclusive results, indicating the need for more research (Lee et al., 2018; Niela-Vilen et al., 2014; Taylor, 2016).

Description of online interventions. The internet as an intervention modality is useful in a variety of general health-related efforts, including chronic disease management (Hamine et al., 2015; Kooij et al., 2017; Webb et al., 2010), mental health treatment (Carlbring et al., 2018; Josephine et al., 2017), education and resource identification or generation (Eldredge et al., 2016;

Webb et al., 2010), and social connectivity (Maher et al., 2014; Webb et al., 2010). The internet provides access to health promotion programs for a range of consumers and benefits those who experience barriers to care such as lack of insurance or ability to pay for services, lack of transportation or ability to get time off work, and distrust in healthcare services or institutions (Berland et al., 2001; Griffiths et al., 2006). There is a need for online interventions combating PMADs as the body of research in this area is limited (Ashford et al., 2017; Lau et al., 2017; Lee et al., 2016; Niela-Vilen et al., 2014; U.S. Preventive Services Task Force et al., 2019; van den Heuvel et al., 2018).

Similar to in-person interventions, online interventions aim to reduce symptoms of PMADs, provide education and strategies for management of symptoms, increased coping, and promote ways to increase the perception of support. Studies in the antenatal period utilized cognitive-behavioral, interpersonal, and mindfulness therapy via online psychoeducational modules. Interventions taught strategies to identify and label thoughts, connect thoughts to behaviors, create meaning around thoughts, increase self-efficacy (Erik Forsell et al., 2017; Kim et al., 2014; Loughnan Sa, 2018; Scherer et al., 2016), provided general education about pregnancy (Song et al., 2013), attention modification (Dennis & Brown, 2017).

Postpartum interventions use tenants of cognitive-behavioral therapy and provide psychoeducation (Ayers et al., 2015; Danaher et al., 2013; Milgrom et al., 2016; Pugh et al., 2016), behavioral activation (O'Mahen et al., 2014; O'Mahen et al., 2013), promotion of social support (Baumel et al., 2018; Hudson et al., 2012), and methods to increase breastfeeding (Ahmed et al., 2016). Two postpartum studies include web-based information for partners but did not collect data from them (Danaher et al., 2013; Milgrom et al., 2016). Studies that spanned the perinatal period used psychoeducation with cognitive-behavioral therapy (Barrera et al., 2015;

Kelman, 2018) or sent educational text regarding typical pregnancy development or abnormal symptoms generated via smartphone text support with education (Jareethum et al., 2008).

Of the studies discussed in previous paragraphs, participants were primarily White, educated, and middle to upper-class, except three studies that targeted traditionally underserved populations and people of color (Baumel et al., 2018; Hudson et al., 2012; Song et al., 2013). Despite the strong correlation of partner support and PMADs, the inclusion of partners in online studies to reduce PMADs is limited to downloads of resources or participation in online social media; measurement of partner participation is inadequate (Danaher et al., 2013; Milgrom et al., 2016).

There was a significant reduction in antenatal depression and anxiety scores across studies (Ashwin & Watts, 2010; Barber et al., 2013; E. Forsell et al., 2017; Kim et al., 2014; Loughnan et al., 2019; Scherer et al., 2016) or, as was found in one study, an online intervention prevented an increase in symptoms in high-risk groups (Felder et al., 2017). Several studies explored factors correlated with PMADs and found strong relationships between PMADs and coping self-efficacy, stress appraisal (Dennis-Tiway et al., 2017; Matvienko-Sikar & Dockray, 2017; Scherer et al., 2016; Song et al., 2013), perception of partner support, and general perception of social support (Loughnan et al., 2019). Studies using psychoeducation found significant improvement in coping self-efficacy (Barber et al., 2013), reduction in cortisol (Dennis-Tiway et al., 2017), and perceived stress (Scherer et al., 2016); while non-significant results included little to no reductions in stress (Barber et al., 2013) or improved perception of social supports (partner or general; Kim et al., 2014; Loughnan et al., 2019).

Studies examining symptoms during the postpartum period primarily assess depression, although some do include measures of anxiety. Several studies had significant results for the

intervention group indicating a reduction in depression symptoms (Danaher et al., 2013; Milgrom et al., 2016; O'Mahen et al., 2014; O'Mahen et al., 2013; Pugh et al., 2016). Ayers et al. (2015) reported a significant reduction in mood scores in favor of the treatment group, with a large effect size ($\eta^2 = .21$). Danaher et al. (2013) reported depression scores significantly decreased from pretest to posttest with large effects at posttest (partial $r = .77$) and six-month follow-up (partial $r = .82$). Milgrom et al. (2016) found depression scores significantly reduced in favor of the treatment group with a large effect size ($d = .83$), but there was no significant reduction between groups for anxiety. O'Mahen et al. (2014) found significant group difference with a large effect size for anxiety (*Cohen d* = -0.59) and depression (*Cohen d* = -0.87) scores in favor of the intervention. At 17 weeks post-intervention, the scores remained in favor of the intervention. O'Mahen et al. (2014) is the only study to report a significant reduction in anxiety outcomes.

Postpartum studies that explored correlates of PMADs measured change in parenting self-efficacy (Ayers et al., 2015; Milgrom et al., 2016), perceived stress (Hudson et al., 2012; Milgrom et al., 2016; Pugh et al., 2016), perception of social support (Baumel et al., 2018; Hudson et al., 2012; O'Mahen Ha, 2014; Pugh et al., 2016) or partner support (Danaher et al., 2013; Milgrom et al., 2016). Of these studies, only Danher et al. (2013) found a significant change in behavioral self-efficacy. Baumel et al. (2018) reported non-significant results for depression symptoms reducing over time between treatment groups, yet the effect size was medium, favoring the treatment group (*Cohen d* = 0.58).

Studies spanning perinatal periods assessed the impact of interventions on depression and anxiety (Barrera et al., 2015; Jareethum, 2008; Kelman, Evare, Barrera, Munoz, & Gilbert, 2018). Barrera et al. (2015) did not find a significant decrease in anxiety or depression, however

results trended in that direction. Kelman et al. (2018) found significant changes in depression scores when using compassionate mind training intervention compared to cognitive-behavioral therapy; however, anxiety changes were not significant, nor was coping self-efficacy. Studies with significant results utilized psychoeducational, therapeutic frameworks to guide the intervention among antenatal or postpartum studies. Among the aforementioned online studies, usability and acceptability was generally reported to be satisfactory; Ahmed et. al., (2016) and Hudson et. al., 2012 did not collect data for these measures.

Gaps in Treatment and Innovation for PMADs

The antenatal period is an optimal time to intervene to prevent or reduce symptoms of PMADs across the perinatal period (Biaggi et al., 2016; Dennis, 2013). Online and mobile applications are an area of innovation that provides the opportunity to overcome barriers to care and is promoted by perinatal health experts (U.S. Preventive Services Task Force et al., 2019). Despite the research of online therapy and psychoeducation for the prevention of PMADs, none include partner participants, nor do they analyze pregnancy intention as a critical determinant (Ashford et al., 2016; Lee et al., 2015). Addressing the dyad to increase coping self-efficacy and perception of support are essential factors, but an understudied area of intervention innovation (Biaggi et al., 2016; Dennis, 2013). Online interventions have been proven to be as effective as in-person treatment and address several known barriers to care, including fear of mental health stigma, lack of treatment options, and geographic barriers (Foulkes, 2011; Legere et al., 2017) (Hofmann et al., 2012).

Summary

In sum, perinatal health outcomes and access to care in the U.S. is on par with many developing countries despite the high average per capita spending on health and social services

(Bradley, 2013). A previous history of a mood disorder, perception of lacking partner support, pregnancy intention, and perinatal stress are risk factors for poor health outcomes (Biaggi et al., 2016). Access to adequate healthcare services compounds the problem as the lack of screening, referral, or treatment are not routinely utilized or available (Accortt & Wong, 2017; Legere et al., 2017; Thota et al., 2012; Toler et al., 2018).

Low rates of accessible prenatal healthcare and education challenges connecting women and their partners to resources for rural and urban geographies are significant and results in poor health (Agnihotri et al., 2016; American College of Obstetricians and Gynecologists, 2013; Bolin et al., 2015). Consequences include late or inadequate prenatal care, time off work, inability to conduct daily activities, difficulty caring for current children, adverse health and attachment outcomes for mother, infant, and partner across the lifespan (Ashley et al., 2016; Biaggi et al., 2016; Cameron et al., 2016; Fairbrother et al., 2015; Falah-Hassani et al., 2017; Leach et al., 2017; Wee et al., 2011).

PMAD prevention research for women and their partners is needed (Biaggi et al., 2016; Dennis & Dowswell, 2013). The antenatal period is an optimal time to intervene to reduce symptoms of PMADs, and cognitive-behavioral therapy accessed online is suggested as an effective intervention (Biaggi et al., 2016; Dennis & Dowswell, 2013; U.S. Preventative Services Task Force, 2019). Despite the research of online interventions, PMAD preventative efforts fail to include strategies that include partners in treatment efforts (Ashford et al., 2017; Lee et al., 2016). Addressing the dyad to increase the perception of support by using an online cognitive-behavioral therapy intervention is an understudied area of innovation and research (Biaggi et al., 2016; Dennis & Dowswell, 2013).

CHAPTER THREE

Approach

Conceptual Model

Lazarus and Folkman's (1984) stress theory sheds light on malleable intervention points for preventing PMADs and guides conceptualization for pilot testing eMB with couples (see Figure 4). The model depicts the *eMB* Course (X) as the intervention decreasing symptoms of (Y) depression, anxiety, and stress perception (i.e., relationship of the person and the environment appraised as taxing or exceeding one's resources and endangering well-being) outcomes. The model indicates participant satisfaction with eMB. Perception of partner support

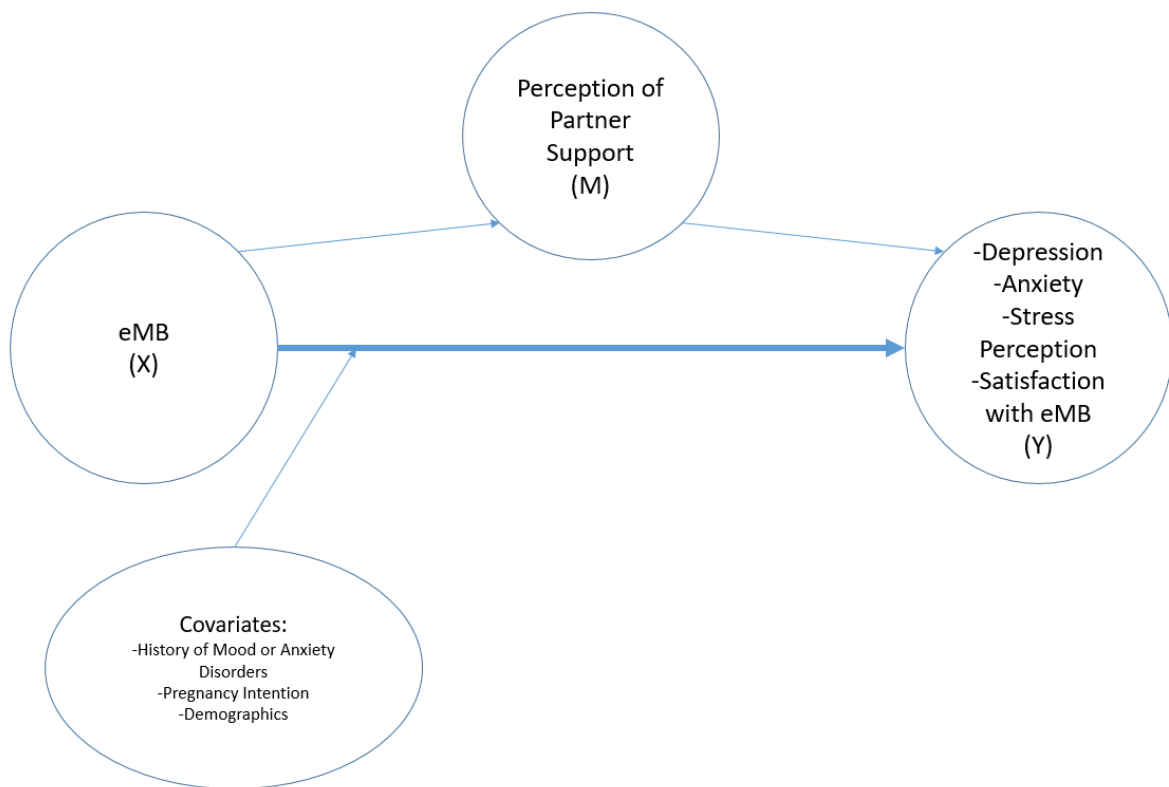


Figure 4. Conceptual model of pilot eMB with couples and the effect on outcomes of interest.

(M) is a mediating variable and covariates are included as potential modifying or confounding variables. The pilot study is represented with the bolded blue line from X to Y.

The in-person *Mothers and Babies Course* was adapted for an online platform (eMB) and is a psychoeducational intervention approach based on Beck's (1976) cognitive-behavioral theory and Bowlby's (1978) theory of attachment. The in-person program is proven to be efficacious and recommended for reducing PMADs; studies of the online adaptation eMB show promise for decreasing mental health symptoms (Barrera et al., 2015; Muñoz et al., 2007; U.S. Preventive Services Task Force et al., 2019). The online eMB course was designed and tested for pregnant women. The program developers envisioned partners, family members, and other informal supports could participate when appropriate but have yet to study the effect of adding co-participants but it has not yet been tested with these support people (Muñoz et al., 2007). The online intervention may improve communication with support systems (i.e., partner, family, friends, community, and institutional resources) and promote understanding of needs, thereby increasing perception of social support.

The eMB includes eight evidence-based psychoeducation modules, lasting approximately 20 minutes each, including online learning arranged as modules, containing various content such as YouTube videos and vignettes, interactive quizzes, homework, guided meditations, and downloadable resources. The program delivers information on three distinct programmatic concepts: pleasant activities, thoughts, and contact with others. Barrera et al.'s (2015) eMB is outlined in Table 1 and was created using the in-person field manual found in Appendix A.

With permission from the developer (see Appendix B), this study utilizes the eMB program and includes adult (i.e., aged 18 or over) couples. Other than minor modifications to "resources" with updates and information regarding community and mental health resources and

Table 1			
Overview of eMB content			
	#	Topic	Supplements & Activities
Course Intro.	1	1: Stressors that can affect the mother-baby relationship 2: How the course can help you 3: Purpose & overview of course	Stressors that can affect the parent-baby relationship How the program can help you Video; Course overview
	2	1: Your mood & your personal reality 2: Quick mood scale	Your mood & personal reality Quick mood scale
Pleasant Activities	3	1: Quick mood scale review 2: Violet & Mary's days (case example) 3: How does what we do affect how we feel?	What we do can affect how we feel What do you like to do?
	4	1: What do you like to do? 2: Overcoming obstacles to pleasant activities	Pleasant activities list Reflection activity
	5	1: Review of pleasant activity checklist 2: What do babies like to do? 3: How do babies learn?	Reflection activity Birth-Age 1: Things babies like to do Pleasant activities & my baby
Thoughts	6	1: Violet & Mary's days (case example) 2: What are thoughts? 3: Helpful thoughts & harmful thoughts	Thoughts & situations Reflection activity The path leading to a healthy mood; Helpful & harmful thoughts
	7	1: Types of harmful thought patterns & talking back 2: Ways to change harmful thoughts that affect my baby & me	Harmful thought patterns & talking back Ways to change harmful thoughts
	8	1: Thoughts about being a mother	Reflection activity
Contact with Others	9	1: Mary & Violet's day (case examples) 2: The relationship between mood & contact with others 3: Breaking the cycle: negative mood	Reciprocal nature of interpersonal problems & depression Reflection activity Mood & personal reality
	10	1: The people in my life 2: People in my life & ways they support me	The people in my life People who provide support
	11	1: Communication styles & your mood in interpersonal situations 2: Getting your needs met 3: Interpersonal relationships & depression 4: Role disagreements/disputes	Explore communication style It is ok to ask for help & how Role change/transition Reflection activity
Course Review	12	1: Review the main concepts 2: Planning for the future	Course review support materials Reflection activity
Note. Information is adapted from the Home Visitor Field Guide (Tandon, Snyder, Ward, Perry, & Le 2001).			

COVID-19 information sources, there were no modifications to the program content. The University of Missouri Institutional Review Board (IRB) approved this study.

Research Questions and Hypothesis

This research uses primary data collection to explore the effect of eMB with pregnant couples (i.e., pregnant women and their partners). More specifically, this study examines if eMB reduces antenatal depression, anxiety, or perceived stress for pregnant women or their partners. Additionally, the study explores whether participants find the eMB course satisfactory for meeting participant informational needs about perinatal mental health, and how engaging in the course promotes perceived partner support. A sequential, mixed-methods study design with independent quantitative and qualitative analysis is used to answer the following five research questions:

1. Does eMB reduce symptoms of anxiety for pregnant women and their partners in the antenatal period?
2. Does eMB reduce symptoms of depression for pregnant women and their partners in the antenatal period?
3. Does eMB reduce the perception of stress for pregnant women and their partners in the antenatal period?
4. How do participants describe their satisfaction with the eMB Course for meeting participant informational needs about perinatal mental health?
5. How do participants describe their feelings about partner support while using eMB?

Questions one through three will be answered using quantitative analyses. Based on Lazarus and Folkman's (1984) stress theory and previous research findings, the following hypotheses were developed:

Hypothesis 1: On average, anxiety symptoms is significantly lower for participants who receive eMB compared to participants in the control group.

Hypothesis 2: On average, depression symptoms is significantly lower for participants who receive eMB compared to participants in the control group.

Hypothesis 3: On average, perception of stress is significantly lower for participants who receive eMB compared to participants in the control group.

Questions four and five will be addressed using qualitative analyses.

Research Design and Methods

Research Design

This study uses a sequential mixed-methods approach with independent analysis of quantitative and qualitative primary data. Quantitative data were collected over eight weeks as part of a cluster-randomized control trial, and qualitative data were collected by interview once participants completed the eight-week trial. Although this intervention effectively reduces symptoms in previous research, this pilot study is needed to explore the effect of engaging the couple, not just the individual. Including couples in the course changes program administration and potentially the program effect for participants' mental health outcomes (Ashford et al., 2016; Lee et al., 2016). This project required a design to ascertain intervention effectiveness and explore participants' descriptions of how the programming influenced them.

As described by Teddlie and Tashakkori's (2009) mixed-method typologies, a sequential mixed-method design is appropriate for this study. This design uses quantitative and qualitative strands of data collection across chronological phases, where the results from the last strand build upon those from the previous (Teddlie & Tashakkori, 2009). A mixed-method approach includes multiple major dimensions — the purpose of mixing, theoretical drive, timing, and point of integration — in study design considerations responsive to the research question

(Schoonenboom & Johnson, 2017). The approach enhances and provides elaboration, illustration, or clarification of results from one method to that of the other to strengthen study validity (Greene et al., 1989). Quantitative data objectively measures the effect of the eMB on anxiety, depression, stress perception over time, while qualitative data provides insights about the contextual factors related to satisfaction and perceptions of partner support through descriptive data (Bryman, 2006). Thus, the use of complementary mixed methods in the pilot period allows for examination of programmatic effectiveness while considering programmatic modifications to increase the potential for future uptake of eMB when engaging the dyad.

Mixed methods research also helps confirm results or generate hypotheses for future studies. This study uses a cluster-randomized design with dyads randomly assigned to control or treatment groups. In this research design, the researcher uses quantitative data deductively (i.e., evaluating program effectiveness) and qualitative data inductively (i.e., allows for the emergence of themes from the data rather than necessitating they are bound to a theoretical framework). There is not an inherent hierarchy in methods where the purpose of the study is primarily explorative or predictive, as described by Morse and Niehaus (2016). Instead, it allows for equal status, as described by Johnson et al. (2007). An equal status approach is appropriate for understanding effectiveness given testing with a new population and identifying emergent qualitative themes about participants' impressions of the content and engagement with eMB.

In this study, quantitative and qualitative data collection were conducted sequentially. First, surveys were administered at predetermined time points throughout the intervention to collect quantitative outcome data and descriptive characteristics. Within two weeks after the intervention ended, the researcher interviewed participants to learn about their experiences and

perceptions of eMB. Using Johnson and Christensen (2017) adaptation of Morse's (1991) timing notation, data collection was:

QUAN → QUAL (equal-status sequential design)

Intervention administration was not reliant on the analysis results, and these components were independent.

Methodological integration of mixed-method data occurred during analysis, in the presentation, and discussion of the results. Creswell and Plano Clark (2017) describe using a theoretical framework to bind together the data sets. As described in Chapter Two and the approach section of this current chapter, Lazarus and Folkman's (1984) Transactional Model of Stress and coping informs the theory of change used in this study's conceptualization. That framework guides the methodological integration of data and presentation of results.

Data Sources & Data Collection

Multiple data sources were used in this project, including information gathered during screening procedures, online surveys, and semi-structured interviews. These data were collected at four time points: Time 1: verbal screening process and baseline surveys, (2) Time 2: a survey at Week 4, (3) Time 3: survey at Week 8, and (4) Time 4: post-intervention interview (only with a subset of participants). During the screening process, the researcher verbally collected quantitative data by administering scales to assess anxiety and depression symptom severity data from each potential participant. At that same time, the researcher asked the pregnant woman to disclose the number of weeks gestation. For individuals that agreed to participate and gave consent in the first survey, screening data were combined with Time 1 survey data. For surveys, all eligible people received emails (i.e., sent to individual email accounts) containing a link to the Qualtrics surveys.

Figure 5 illustrates the data collection flow. At Time 1, eligible individuals read study information and provided consent. The survey items captured data about participant stress perception, perception of social support, and symptoms of depression and anxiety. At time two, each participant was again surveyed using an emailed link to a Qualtrics survey. Time two surveys collected the same screening and Time 1 measures of anxiety, depression, stress perception, and social support perception. The researcher used the same process and survey items as in time two for the time three surveys. Time three surveys added categorical questions about

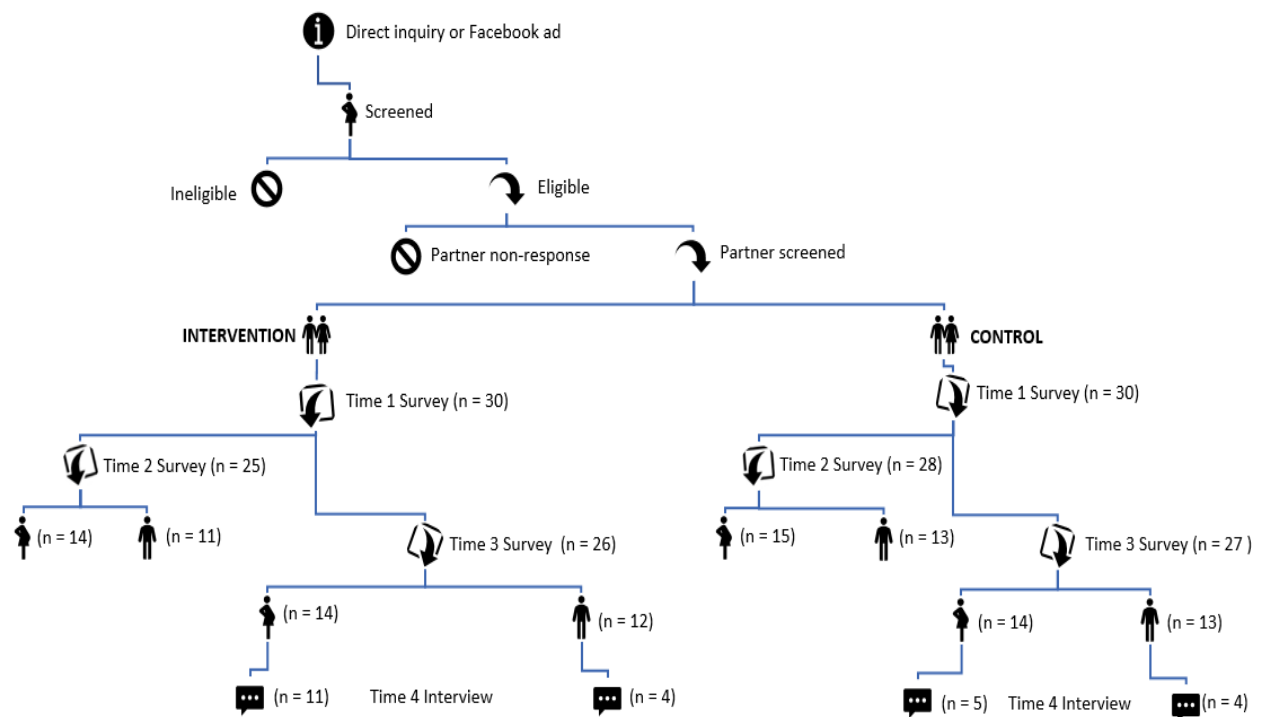


Figure 5. Study flow of recruitment and participant study activities. To be eligible, potential participants needed to reside in Missouri, be at least 18 years old, identify as cisgender, in an intimate heterosexual relationship, cohabitating, with both people in the intimate relationship willing to participate, and the woman being between 13 and 30 weeks gestation and experiencing elevated symptoms of anxiety or depression.

mental health history and treatment, major life events during the study period, and eMB satisfaction questions. Finally, participants were invited to participate in an interview following the time three survey. Qualitative interview data were collected from participants who answered

"yes" to the final survey question, "Would you be willing to participate in a phone or online interview to talk about your experiences during this study?" and then followed through with scheduling and attending the interview using the online meeting platform Zoom. With the permission of the participant, the researcher used Zoom to audio record and transcribe interviews. Additional details related to data collection procedures are presented in the following sections.

Setting and Sample

Missouri has a population of 6,137,428 (United States Census Bureau, 2019). There are 114 counties and one independent city. Nearly 40% of those living in Missouri are considered rural. Missouri is 51% female, and 58% of the civilian workforce are women aged 16 or older. Missouri's racial and ethnic composition is 83% White alone, 79% White Alone non-Hispanic, and 12% Black or African American. 90% of the population is a high school graduate or higher, and 30% of those 25 years or older have a bachelor's degree. 13% of Missourians live in poverty. According to BroadbandNow.com, an independent broadband availability website, 83% of Missourians have access to 100mbps broadband or faster, an estimate in line with earlier data from the 2015-2019 U.S. Census. Census reports for 2015-2019 indicate 89% of households reporting a computer in the household (Cooper, 2021; United States Census Bureau, 2019).

Among the general population, 10% were uninsured in 2019 (America's Health Rankings, 2020; Norris, 2020). According to America's Health Rankings (2020), Missouri ranks 23rd of 50 for overall behavioral health indicators. 14% of Missourians report frequent mental distress, and 23% report depression. There are 209.8 behavioral health providers per 100,000 people, a rate lower than the national average of 268.6 per 100,000 (America's Health Rankings, 2020).

Publicly available Pregnancy Risk Assessment Monitoring System data (PRAMS, 2014) includes postpartum health outcomes, with 14% of women reporting depression in that period.

There were 77,180 known pregnancies and 65,007 healthy live births (of known pregnancies) in 2019 (Missouri Department of Health and Senior Services, 2019). In 2010, 54,000 pregnancies were unintended (Missouri Department of Health and Senior Services, 2019). Women using prenatal Medicaid in 2019 was 39%. In 2019, 71% of care began in the first trimester, 26% in the second or third trimester, and 2% had no prenatal care. Missouri's inadequate prenatal care index was 21% (Department of Health and Human Services, 2019). The rate of inadequate prenatal care is 17% for Whites and 35% for Black or African Americans.

Participants. This online study includes 30 adult cohabitating couples (i.e., 30 women identifying as a cisgender, heterosexual female, and 30 partners identifying as a cisgender, heterosexual male) in an intimate relationship and living in Missouri at the time of enrollment. Inclusion criteria for enrollment required women to be between 13- and 30-weeks of gestation and a positive screen for anxiety or depression using a 10 or greater cut-off score on the PHQ-9 or the GAD-7 (Kroenke, Spitzer, & Williams, 2001; Spitzer, Kroenke, Williams, & Lowe, 2006). Participants needed to have internet access and the ability to read and write in English. Women and their co-participating partners (i.e., identifying as a cisgender, heterosexual male) had to be cohabitating and in an intimate relationship at enrollment

Exclusion criteria included those couples where the pregnant women scored below the cut-off of 10 for the GAD-7 and the PHQ-9, either person in the couple endorsing suicide risk, couples that were not cohabitating in the state of Missouri, couples without internet access, couples that did not speak, read or write in English, or people not able to comprehend the consent document (i.e., someone cognitively unable to provide consent).

The researcher used a purposive sampling strategy. The sampling frame included women living in Missouri who were informed of the study in one of three ways: 1) directly receiving information (i.e., word of mouth, email, Facebook post sharing, a printed flyer) about the study or by someone in their social network (i.e., family, friends, intimate partner, care provider, or an organization providing pregnancy-related community services/resources), 2) indirectly (i.e., interested parties viewed a posted flyer containing study information in space providing services for pregnant people), or 3) women who viewed and responded to an ad on Facebook. Facebook ads targeted users living in Missouri, between 18-40 years old, and identifying as "women." As described in the following Procedures section, all interested parties were screened for eligibility according to study criteria.

Procedures

Recruitment and enrollment. Recruitment and enrollment procedures ensued after receiving human subjects' approval from the IRB. With support from key stakeholders (see Appendix C), informational emails and flyers were sent to clinicians of obstetrics and gynecology, family and community medicine, internal medicine, and to local agencies that routinely serve women requesting they share the information pregnant women or their partners living in Missouri. Following referral to the study, or in response to an advertisement through Facebook, study information was provided by email to people expressing interest in the study (see Appendix D for recruitment materials). If the participant was interested in enrolling, a phone call was arranged to determine eligibility, share more study details, and check for understanding of consent materials (see Appendix E for a copy of the screening protocol). Calls occurred first with the pregnant woman and, following these calls, with the pregnant woman's partner. The pregnant woman was screened first. If the pregnant woman scored ten or greater on the PHQ-9

or the GAD-7 (described below in the "measures" section), had no suicidal intention, and met other eligibility requirements, she was eligible for enrollment contingent on her partner's agreement to participate. During the screening the PI asked all potential participants if they identified as cisgender, heterosexual and identified the terms if the person did not indicate understanding the meaning. , if both people in the couple were eligible and wanted to enroll, the dyad was randomly assigned into the control or intervention group based on computer randomization. Next, eligible participants received an email indicating group placement and a link to a Qualtrics survey containing consent materials and the first study survey.

The study recruitment period was from June 26 to October 26, 2020. There were 414 leads generated from Facebook ad interest after duplicates were removed. All of those 414 people were contacted by the PI with an email containing study details, consent information, and an invitation to discuss the study by phone; the same process took place for the 27 people that contacted the study PI directly by phone or email. There were 78 pregnant women screened for study participation. Of those 45, reasons for non-enrollment were score below the required cut-off for anxiety or depression (13), non-response from the partner or partner not interested (16), the woman indicated she did not have a partner (4), they did not reside in Missouri (4), or they were more than 30 weeks pregnant (8). There were 33 partners screened, eligible, and sent the consent and Time 1 survey. Two couples were not enrolled due to non-completion of the Time 1 survey.

Data collection. After participants received group assignments (couples were clustered) and instructions, this study received IRB approval for a waiver of documentation of consent. Participants were consented via Qualtrics by clicking on the "I consent" button before completing the Time 1 survey. Data captured during the screening process was retained and

integrated with Time 1 data. After time one survey, participants received a survey link every four weeks until the 8-week study period ended. Each survey took about 10-15 minutes to complete. For those who did not respond to a survey, up to two reminders were sent at 7-day intervals. All participants received emailed incentives in the form of an Amazon eGift card for completing surveys; \$10 at Time 1, \$15 at Time 2, and \$25 at Time 3; all participants were offered the option of a 30–45-minute interview following the completion of all surveys. The interview was conducted and recorded with the participant's consent via Zoom, a secure, online meeting service (Banyai, 1995). Transcripts were created by Zoom from the video recording. Participants received a \$25 Amazon eGiftcard for completing the interview.

Participants in the intervention group received instructions on eMB access after the couple completed the Time 1 survey. They were directed to complete one module per week and told they could complete the modules independently. Each time a survey was sent, intervention group participants were reminded to continue the eMB at a pace of about one module per week. Control group participants were surveyed at the same frequency and following the same protocols as intervention group participants. Control group participants received information about mental health and community resources via a PDF each time they completed a survey. Information contained in the PDF was identical to information available to eMB participants found on the "Resources" portion of the program site. After completing the final survey (week 8, Time 3), control group participants were given access to the eMB.

Data Management. All identifiable data associated with participants were replaced with a unique participant identifier to protect the confidentiality of participants. The database containing identifying information is stored separately from data used for analysis. Data are stored on REDcap, housed on secure servers at the University of Missouri, and collected using

the University license for Qualtrics, and all are IRB-approved, secure methods (Harris et al., 2009).

Instrumentation & Data Management

Definition of Variables

Dependent variables

In this study, the mental health outcome variables are depression, anxiety, and perception of stress. Participants' feelings about course satisfaction are explored using quantitative and qualitative measures.

Depression. Symptoms of depression include depressed mood, a markedly diminished interest or pleasure in activities, significant weight loss or gain, increase or decrease in appetite, slowing down of thought and reduction of physical movement that is observable by others, fatigue or loss of energy, feelings of worthlessness or inappropriate guilt, trouble thinking or concentrating, or indecisiveness, and recurring thoughts of death, suicidal ideation or attempt, or plan for committing suicide. The DSM-5 defines clinical depression as a person experiencing five or more symptoms, occurring over the prior two weeks, with at least one symptom being depressed mood or loss of interest or pleasure (American Psychological Association, 2013). For purposes of this study, depression is defined by the severity of the above symptoms and not a DSM-5 diagnosis of depression.

Anxiety. Anxiety is a heightened state of worry or fear about the future, occurring more days than not, for at least six months. Symptoms include irritability, muscle tension, difficulty concentrating, sleep disturbances, easy fatigue, restlessness, and feeling on edge (American Psychological Association, 2013). For purposes of this study, anxiety is defined by the severity of the above symptoms rather than a DSM-5 diagnosis.

Perceived Stress. Perceived stress is defined in this study as a person's feelings related to the uncontrollability and unpredictability of their life, how a person deals with irritating hassles, how much change is occurring in the person's life, and their confidence in their ability to deal with problems or difficulties. (Cohen et al., 1983)

Satisfaction. Satisfaction is a person's perceptions of the program's accessibility, availability of resources, the relevance of information, appealing interface, and perceived quality and applicability. The definition comprises factors from Ware, Davies-Avery, and Stewart's (1977) gold standard of client satisfaction for services, factors from Attkisson and Zwick's (1982) established measure of satisfaction in healthcare, and factors associated with the Unified Theory of Acceptance and Use of Technology (Attkisson & Zwick, 1982; Venkatesh & Davis, 2000; Ware Jr et al., 1977).

Participant characteristics. Demographic data, including age, race, ethnicity, household income, educational attainment, number of children living in the household, marital status, and insurance source, describe the sample participants. For purposes of this study, age is defined as the study participant's age when they entered the study. Participant race is reported as one or more category (i.e., White, Black or African American, Asian, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, Other). Educational attainment includes one's highest level of education received. The number of children living in the household includes dependents under the age of 18 at the time of the study. Marital status describes the current intimate relationship (i.e., married, divorced, separated, or never married). Household income includes all sources of income for the past year in U.S. dollars (USD). Finally, an insurance source is defined as a private, public, or a combination of the two.

Pregnancy attitudes and behavior variables include intention, feelings about timing, number of children, number of weeks gestation, and first prenatal care. Trying to get pregnant is defined as whether the pregnancy was intended or unintended (CDC, 2019). Unintended pregnancy is either mistimed (i.e., the pregnancy occurred earlier than desired) or unwanted (i.e., the pregnancy occurred when no children, or no more children, were desired). Feelings about timing are defined as wanted then, later, sooner, or not sure.

Measures

The following paragraphs describe measures used during each data collection period. Table 2 summarizes variables, measures, time, and data collection type.

Eligibility Screening. Eligibility screening included assessing current anxiety and depressive symptoms with the Patient Health Questionnaire (PHQ-9) and the Generalized Anxiety Disorder (GAD-7). Suicidal intent is assessed using question nine from the PHQ-9 and was followed by the Columbia-Suicide Severity Rating Scale as appropriate. The PHQ-9 is a self-report, nine-item scale used to measure depression severity with high internal reliability ($\alpha = .89$). Response options are on a 4-point scale ranging from not at all to nearly every day. In this project, the PHQ-9 internal reliability ($\alpha = .79$) was somewhat lower in than that of other studies, but still performed as acceptable for social science research (Gliem & Gliem, 2003). The summed score can range from zero to 27 and represent mild, moderate, moderately severe, and severe depression with scores of five, 10, 15, and 20 as respective cut-off scores. A score of 10 or greater has a sensitivity of 88% and specificity of 88% for major depression (Kroenke et al., 2001). Data from the PHQ-9, GAD-7, and the participant gender (i.e., pregnant woman, male partner) was retained as Time 1 data for participants that were fully enrolled in the study.

Table 2 <i>Summary of Variables, Measurement Time, and Data Collection Method</i>		
Independent Variables	Outcome Variables & Measures	Data Collection
Assignment (control, intervention; categorical)	Participant Characteristics (BRFSS, PRAMS; categorical)	Screening, Time 1 and Time 3, Survey
	Mean Depression Score (PHQ-9, EPDS; continuous)	Times 1-3, Survey
	Mean Anxiety Score (GAD-7, EDS-3A; continuous)	Times 1-3, Survey
	Mean Perceived Stress Score (PSS-10; continuous)	Times 1-3, Survey
Role (woman, partner; categorical)	Perception of Partner Support (MPSS-significant other, interview; continuous, descriptive)	Times 1-3, Survey Time 4, Interview
	Satisfaction (interview; continuous, descriptive)	Time 3, Survey Time 4, Interview

The GAD-7 is a self-report seven-item questionnaire to assess levels of general anxiety, with scores ranging from zero to 21 (Spitzer et al., 2006). Each item is scored from 0-3 based on the severity of symptoms; response options range from not at all to nearly every day. A summed score of five, 10, and 15 are taken as cut-off points for mild, moderate, and severe anxiety, respectively. A score 10 or greater is used as the cut point for further evaluation and has a sensitivity of 89% and specificity of 82%. The GAD-7 has good reliability and a criterion, construct factorial, and procedural validity ($\alpha = .89$; Spitzer et al., 2006). The internal reliability in this study was similar to those in other projects ($\alpha = .84$).

The Columbia-Suicide Severity Rating Scale (Screen Version) was used to assess suicidal intentions during the screening process if a person scored a three on item nine of the PHQ-9 (thoughts that you would be better off dead or of hurting yourself). This instrument asks a series of yes/no questions assessing suicidal ideation or intention (Fernandez et al., 2008). Administration of this scale does not increase the level of distress (Gould et al., 2005). The protocol specified that those who screened positive for suicidal intentions were ineligible for the

study and would be referred to seek immediate help in an emergency room and be given suicide hotline information.

Time 1. Treatment and control group participants provided demographical information and responded to questions as a second measure of anxiety and depression using the Edinburgh Postnatal Depression Scale (EPDS and EDS-3A). The perception of stress was assessed with the PSS-10. The following is a description of standardized instruments and questions for the study:

Standardized questions were taken from the Behavioral Risk Factor Surveillance System (BRFSS) to collect demographic variables, including gender, age, race, ethnicity, household income, education, intimate relationship status, and residence zip code. BRFSS was established in 1984 by the U.S. CDC (U.S. Department of Health and Human Services, 2004) and is used routinely for reporting national health statistics. Participants provided their age (a continuous variable), race (a nominal, categorical variable; response options include White, Black or African American, Asian, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, Other), ethnicity (a nominal, categorical variable; Hispanic or Latino/a), household income (an ordinal, categorical variable; increments of less than \$10,000-\$75,000 or more), educational attainment (an ordinal, categorical variable; some high school, high school graduate, some college or technical school, bachelor degree, graduate degree).

The EPDS is a 10-item self-report scale devised as a screening questionnaire for postpartum depression, has been validated for use in the prenatal period, and can be used with partners (Moran & O'Hara, 2006; Murray & Cox, 1990). For each item, responses were scored from 0-3 based on the severity of symptoms; items 3 and 5-10 are reverse-scored. Response options varied slightly by the question but were in the form of a range (e.g., not at all to as much as I ever could). The sum score ranges from zero to 30 and correlates with the severity of

depression. A score of 13 or greater has a sensitivity of 81% and good reliability ($\alpha = .87$). However, experts agree that a score of ten or more indicates high risk and is considered the optimal cut-off for further assessment or intervention (Khanlari et al., 2019; Murray & Cox, 1990). Internal reliability for this study was good ($\alpha = .86$).

The EPDS anxiety subscale (EDS-3A) sums items 3, 4, and 5 from the EDPS with a score range from zero to nine. Higher scores indicating increasing anxiety; the cut-off score for the subscale is five or more. The subscale is acceptable for use in the antenatal period to measure anxiety symptoms, and the anxiety subscale consistently exceeded $\alpha = .63$ in a recent review (Matthey et al., 2006; Sinesi et al., 2019). The internal reliability score was $\alpha = .87$.

Perceived Stress Scale (PSS) is a 10-item self-assessment scale measuring stress perception and has good internal reliability ($\alpha = .78$; Cohen et al., 1988, 1994). The internal reliability for this study was good ($\alpha = .88$). Response options range from never to very often and are scored from 0-4. Total scores range from zero to 40, with higher scores indicating greater stress. Scores of zero to 13 are considered low stress, 14 to 26 is considered moderate, and 27 to 40 is high perceived stress.

Time 2. Assessments included mental health instruments (PHQ-9, GAD, EPDS, and anxiety subscale) and perception of stress (PSS-10).

Time 3. Assessments at Time 3 included mental health instruments (PHQ-9, GAD, EPDS, and anxiety subscale) and perception of stress (PSS-10). Additionally, descriptive questions from PRAM, a national surveillance system of maternal attitudes, behaviors, and health outcomes, were included in the time-three survey (Centers for Disease Control and Prevention, 2017b). Variables include participant source of insurance (nominal, categorical variable with response options representing public and private insurance), and the number of

children in the household is a continuous variable. Participants were asked to select yes or no or experience of current or history of PMAD three months before the current pregnancy (i.e., anxiety, depression, PTSD, bipolar, OCD; dichotomous variables) and treatment for mental illness (i.e., medication and counseling; a nominal, dichotomous variable). Pregnancy intention is a nominal, dichotomous variable with option yes or no to the question “When you got pregnant with your new baby, were you trying to get pregnant?” (CDC, 2017b).

Intervention group participants were asked questions about their satisfaction with eMB in the time three survey using the CSQ-8. Questions were presented in a Likert format (i.e., strongly disagree to agree strongly, scored 1-4) with total scores from eight to 32. A satisfaction score between eight to 13 is interpreted as "poor," 14-19 is "fair," 20-25 is "good," and 26-32 is "excellent." The scale has high internal consistency and is routinely used in healthcare research ($\alpha = .91$; Attkisson & Greenfield, 1995). A usability question was added, the course was easy to navigate, and included responses ranging from strongly disagree to agree strongly as items in the survey. Finally, participants were asked if they used the course alone, with their partner, a combination of alone or with a partner, or not at all (nominal, categorical variable).

Participants were asked to self-report a mental health condition (i.e., anxiety, depression, PTSD, bipolar, OCD) in response to the question “During the 3 months before you got pregnant with your new baby, did you have any of the following health conditions? (For each one, check No if you did not have the condition or Yes if you did.)”. The response was a dichotomous, categorical variable (i.e., yes/no). Next, participants were asked to respond in the same manner for conditions that occurred during this pregnancy (dichotomous, categorical variable). If they checked any condition, skip logic moved them to questions about treatments. They were asked, “At any time during this pregnancy, did you take prescription medicine for mental health?” The

response was a dichotomous, categorical variable (i.e., yes/no). If they selected “yes,” skip logic prompted them to answer the question “For which conditions did you take a medication? (check all that apply)”. The same questions and logic were used for counseling treatment (all treatment variables were dichotomous, categorical).

Major life event(s) include participant report of one or more of the following nominal, categorical variables occurring during the study period: death of a family member or friend, divorce or separation, loss of job or income, diagnosis of illness, housing instability (i.e., temporary or permanent loss of stable housing), or other. The researcher categorized "other" according to themes found in open-ended responses: moved (i.e., change of residence), problems at work (i.e., changes to workflows or people quitting), premature birth (i.e., having the baby before 37 weeks gestation), and disruptive member in the household (i.e., a person outside of the couple such as a child, friend or relative having needs or behaving in a way that the participant felt was stressful or harmful in some way).

Time 4. Finally, intervention group participants who agreed were engaged in a semi-structured interview to assess eMB satisfaction. Participants were asked questions about their general impressions, helpfulness of materials, areas for improvement, whether the course improved coping behaviors, and how eMB promoted a supportive relationship during pregnancy.

Human Subject Protections

The University of Missouri IRB approved all procedures and human subject protections. Risks to subjects were kept to a minimum. The study engaged participants with an online tool, asked questions delivered by an online survey, and invited participants to participate in an optional interview following the study. Pregnant women are considered a vulnerable population in research. However, none of the study activities included physical or pharmaceutical

intervention. Potential harms included emotional or psychological discomfort due to engaging with study materials or responding to survey or interview questions. Protocols were in place if a subject needed a referral to behavioral health providers. This researcher was in full compliance with mandatory IRB training.

Analytic Strategy

Exploring the data. The study flow diagram (see Figure 5 above) illustrates recruitment phases and participation in study activities. The characterization of the sample includes descriptive tables generated using SPSS software (SPSS, 2006). A univariate analysis was conducted to describe the sample and bivariate analysis tests for between-group differences of demographic factors and selected participant characteristics. Histograms are produced to visualize the data, and tables including medians, means, and standard errors were generated to assess outcome score variability. Participant characteristics, attitudes, behaviors, self-report of mental health topics, and results from bivariate comparisons are presented in Chapter Four.

Quantitative analysis. An intent-to-treat analytic strategy using a three-way Analysis of Variance (ANOVA) with repeated measures on two factors was computed using SPSS to test the study hypotheses (Field, 2013; Field et al., 2012). This strategy is appropriate for testing the mean group differences and associated factors central to the eMB efficacy hypotheses because the factorial ANOVA is designed for the longitudinal structure of the dataset and accounts for the associated dependencies (i.e., error terms) inherent in the predictor variables time, role, and group (Field, 2013).

Assumptions for a factorial ANOVA were tested. Normality of data and sphericity were explored for each outcome of interest by modeling residuals in histograms, P-P plots, and Q-Q plots to evaluate normality (results are presented in Appendix F). Residuals were not found to be

grossly non-normal., The AIC (Akaike Information Criterion) was used to identify an optimal error structure for the two repeated factors, thus meeting the sphericity assumption.

In this study, within-subject repeated measures were recorded three times for each participant, for each outcome of interest (i.e., anxiety and depression, perception of stress). The factorial ANOVA evaluates the effect of the eMB course over time and if there is a significant interaction effect of time and between-subject assignment and role factors (i.e., time*assignment, time*role, time*role*assignment; Field, Miles & Field, 2012, p. 589). Planned contrasted using post hoc tests with pairwise comparisons were conducted to understand specifics about significant interaction effects (Field, Miles & Field, 2012, p. 456). The factorial ANOVA general procedure included the following steps (Field, Miles & Field, 2012, p. 562, 589). First, the data was entered into SPSS in the proper format (i.e., long/tall). Second, the researcher computed the ANOVA with predictor factors. Finally, the researcher conducted a follow-up, factorial ANOVA with pairwise contrasts as appropriate.

For the second step in the analytic process, a factorial ANOVA was computed based using the most parsimonious fit model, determined by the lowest AIC (Field, Miles & Field, 2012). Due to the nature of the study data (i.e., the dependencies in the error structure for repeated measures and role in the dyad), the AIC — evaluated with likelihood functions — is used to select the best model fit by identifying the model with an adequate but not overly large error structure. For the hypothesis testing in this study, all models contain fixed effects, two- and three-way interactions. The Kronecker method was used in this analysis and contained an unstructured structure for the dyad parameter estimates and autoregressive structure for time (Field, 2013). Next, the factorial ANOVA was computed with independent variables included. The factorial ANOVA computation included interactions with all terms in the initial phase. For

the final step, post hoc pairwise comparisons were computed for all significant interactions to understand better the within-subject effects that influence the between-subjects effect (Field, Miles & Field, 2012). Results are presented in Chapter Five.

Attrition and dropouts. At Time 1, 31 couples (totaling 62 individuals) were enrolled in the study and were randomly assigned to control (15 couples) or intervention (16 couples). One intervention couple was dropped before the Time 3 survey due to a pregnancy loss and was replaced with another intervention couple. Data from the dropped couple were excluded from the study. At Time 3, 15 control and 15 intervention couples remained. In the control group, one couple did not the Time three, and within that couple, the partner also failed to complete the Time 2 survey. In another control couple, the partner did not complete the Time 3 survey. In the intervention group, there were two couples of which partners did not complete the Time 2 or 3 surveys.

Missing data. Missing data are expected in randomized control trials, and how to evaluate and methodologically approach the data analysis is problematic and debated in social science research. The intention-to-treat principle guides this study, yet the approaches to dealing with missingness are inconsistent across randomized trials (Bell et al., 2014; Hill, 1955). The intention-to-treat philosophy is widely accepted in social science research (Gravel et al., 2007; Hollis & Campbell, 1999). A reporting of missingness and sensitivity analysis are common approaches when performing an intention to treat analysis and contribute to the robustness of results (Bell & Fairclough, 2014; Carpenter & Kenward, 2007; Thabane et al., 2013). Data missing in this study are considered missing at random and analyzed with maximum likelihood estimation (Little & Rubin, 2019). This study analysis drops cases at the time two or three that are missing but keeps the participant data for times in which data is available.

Qualitative Analysis. Participant interviews were conducted to explore satisfaction with the course, understand whether eMB content met the individual or couple's needs, describe ways the course facilitated coping strategies, and understand ways the program promoted supportive partner behaviors. This analysis was an inductive thematic analysis and emphasized semantic themes (Braun & Clarke, 2006; Braun et al., 2019). Themes were conceptualized by identifying trends, patterns, and meaning across data and were formulated using an inductive approach where themes are strongly linked to the data rather than being bound to a theoretical framework (Patton, 1990). Braun and Clarke (2006) describe a theme as inherently important and worthy of attention rather than solely bound by how often the concept appears in the data. Whether thematic relevance is "key" is determined by it answering the research question(s).

Following Braun and Clarke's (2006) process, the analysis included the following stages: preparing transcripts, data familiarization, coding, searching for themes, reviewing themes, defining and naming themes, and write up. A verbatim transcription was downloaded from Zoom, the online platform used for conducting interviews, and participant names were replaced with a numeric identifier (Banyai, 1995). Next, the researcher became familiar with the data by reading transcripts and creating memos for each interview. Next, all transcripts were uploaded and a coding process took place across the entire dataset using Dedoose, an online qualitative analysis tool (Dedoose, 2018). The coding process included highlighting segments of text and applying labels using a semantic approach (i.e., analyzing the data's explicate content).

Once coding was complete, the process of generating themes began. Coded transcripts were reviewed, and patterns were contextualized into themes (i.e., a broad collection of related codes). Codes that were vague or irrelevant to the research question were discarded. Some codes became themes in and of themselves, and some were derived from direct participant quotes.

Next, reviewing themes, and creating a thematic map, including primary and subthemes, was conducted using Coggle, an online concept mapping tool helpful for visualizing connections in data (Coggle, 2020; Wheeldon & Ahlberg, 2019). Themes were reviewed for usefulness in answering the research question, ensuring an accurate representation of the data. After the review process, themes were named and defined. This process involved the formulation of a clear definition, often using the codes that comprise the theme, to make them understandable for reporting. Descriptive results are reported in Chapter Six.

Summary

This chapter began with a description of the conceptual model used to guide the study design and an overview of the eMB intervention. Research questions and hypotheses were presented alongside the study purpose. There was a discussion of using a mixed-methods approach appropriate for pilot testing with couples, a population not studied with this intervention. There was a description of study procedures, setting, recruitment of the sample, data management, and human subject considerations. Next, variables were defined and operationalized. Finally, the quantitative and qualitative analytic strategy was presented. The following two chapters contain study results.

CHAPTER FOUR

As a preface to the presentation of results in this chapter, it is necessary to draw attention to the historical events that coincided with participation in this study. The recruitment period for this study was June 26 – October 10, 2020. The COVID-19 global pandemic began in the final months of 2019 and had reached the U.S. by early 2020 (AJMC, 2021). On April 3, 2020, the Director of the Missouri Department of Health and Senior Services and Governor issued stay-at-home orders (Williams & Parson, 2020). In early June 2020, the Nation experienced what has been called "The Largest Movement in U.S. History" following the killing of George Floyd (Buchanan et al., 2020) in protest of racial discrimination and police brutality of Black people. The last study data was collected on January 8, 2021, two days after the Capitol insurrection (Leatherby et al., 2021). The implications of these events are discussed in the final chapter.

Results from this study are presented in two chapters. Chapter 4 presents participant characteristics that include demographic information, attitudes, and behaviors about the current pregnancy, mental health outcomes and treatments, and major life events during the study period. Following the descriptive characteristics, results of the data exploration and hypothesis testing are presented. Chapter 5 contains results from study research questions concerning participant satisfaction with eMB and how participants described feelings of partner support while taking the course.

Results: Characterization of Study Participants

Demographic Description

There were 31 couple dyads comprised of 31 pregnant women and their partners ($n = 62$ individuals), cluster-randomized to control or intervention groups, and enrolled in the study (described in Chapter 3). One intervention group was dropped due to pregnancy loss and

replaced; their data was not included in the analysis. Demographic variables, including age, race, ethnicity, education, employment status, household income, and a description of their current relationship, are included in Table 3. The average age across groups was 31 years ($SD = 7.8$). Study-wide, most participants self-identified as White.

Table 3

Participant Demographic Characteristics

	Control	eMB	χ^2
<i>N</i>	30	30	
Age <i>M (range, SD)</i>	30.6 (20-59, 7.1)	30.8 (18-51 8.5)	17.9
Race %			4.5
White	80	73	
Black/African American	20	13	
More than one race	-	13	
Ethnicity %			3.2
Latino/a	-	10	
Education %			7.6
Some high school	-	10	
High school or GED	10	13	
Some college/technical	30	37	
Undergraduate degree	40	13	
Graduate degree	20	27	
Employment Status %			.0
Employed	80	80	
Homemaker	7	7	
Self-employed	3	3	
Student	7	7	
Unable to work	3	3	
Household Income %			5.5
Less than 25,000	23	13	
26- 35,000	20	13	
36-50,000	0	13	
51-75,000	20	17	
75,000 or more	37	43	
Relationship description (%)			1.1
Married	80	80	
Never married	20	17	
Separated	-	3	

No participants identified as Latino/a in the control group, whereas 10% did in the intervention group. The majority of participants had some college or technical experience beyond high school.

Participant reports of employment status were the same for both groups: 80% employed, 17% as homemaker, self-employed, or student, and 3% unable to work. Most participants reported an annual household income of USD 75,000 or more; 23% of the control group and 13% of the intervention group reported USD 25,000 or less. In both groups, 80% reported being married. A Chi-square test between groups for all demographic factors was computed; none of the tests indicated any significant differences.

Mental Health Experience and Treatments

Participants self-reported the experience of mood or anxiety disorders and associated treatments for the time three months shortly before or during the current pregnancy (see Table 4). All participants were asked if a provider had discussed baby blues or post-partum depression with them during the current pregnancy. A Chi-square test was computed for between groups and between role differences. Thirty-eight percent of the control group and 42% of the intervention group indicated having discussed with a provider ($p = .96$). There was a significant difference between roles ($p < .001$): 17% of partners ($n = 24$) 61% of women ($n = 28$).

Experiences with anxiety or depression. Anxiety or depression was reported more often compared to other mental disorders. Except for intervention group partners, there was an overall increase in anxiety or depression symptoms from three months before pregnancy to the current pregnancy. Except for intervention group partners, there was an overall increase of anxiety or depression symptoms between three months before pregnancy to any point in the current pregnancy. In both groups, partners reported less anxiety or depression compared to women.

Partners had mixed reports of experiences of anxiety or depression symptoms from pre-pregnancy to the current pregnancy.

Table 4

Participant PMAD Experience and Treatment Before and During the Current Pregnancy

	Control		eMB	
	partner	woman	partner	woman
Anxiety %				
3 months prior	40	60	47	80
Experience during	60	87	40	87
Medication during	7	40	27	40
Counseling during	13	33	27	40
Depression %				
3 months prior	47	60	40	60
Experience during	33	73	33	67
Medication during	7	27	20	20
Counseling during	13	33	20	40
PTSD %				
3 months prior	0	13	20	47
Experience during	0	13	7	47
Medication during	0	7	0	0
Counseling during	0	7	7	20
Bipolar %				
3 months prior	0	27	13	20
Experience during	0	27	13	20
Medication during	0	7	7	0
Counseling during	0	20	13	13
OCD %				
3 months prior	0	13	7	13
Experience during	0	7	7	13
Medication during	0	0	0	0
Counseling during	0	0	7	0
Provider discussed postpartum mood %	7	20	20	53

Women in both groups reported using medication or counseling at some point in the current pregnancy. In the control group, 40% of women said they took medication for anxiety, and a third indicated they engaged in counseling. Similarly, 40% of women in the intervention group said they were taking depression medication, and 40% said they received counseling during this current pregnancy. In contrast, 7% of control group partners reported taking anxiety or depression medication at some time in the current pregnancy, and 13% said they received

counseling. In the intervention group, partners reported taking medication and receiving counseling for anxiety during the current pregnancy; 20% took medication and received counseling for depression.

Experiences with PTSD, bipolar disorder, or OCD. Control group women's report of experiencing PTSD or bipolar was the same before and anytime since the current pregnancy, 13% and 27% for the respective disorder. For control group women, there was a decrease from 13% to 7% for experiencing OCD. For bipolar and OCD, intervention group women reported similar experiences to those in the control group but indicated more experience of PTSD, 47% before and anytime since the current pregnancy. Only control group women reported using medication use for PTSD (7%) or bipolar (7%). Women reported the use of counseling in both groups for PTSD or bipolar. No women reported the use of medication or counseling for OCD.

None reported experiencing or receiving treatment for PTSD, bipolar disorder, or OCD in the partner control group. For partners in the intervention group, 20% reported experiencing PTSD before, 7% at some time during the current pregnancy, and 7% reported receiving counseling for the disorder at some point during the current pregnancy. Of the intervention group partners, 7% reported experience of OCD before or at some point in the current pregnancy, and 7% reported getting counseling for OCD at some time in the current pregnancy. Partners in the intervention group reported experiencing bipolar before the current pregnancy or at some time during the current pregnancy (13% both times), 7% took medication, and 13% received counseling for the disorder at some point during the current pregnancy.

Pregnancy Attitudes and Behaviors

Participants were asked about their attitudes and behaviors regarding pregnancy and when they had their first prenatal visit for this current pregnancy. Chi-square tests were computed to compare group differences and are reported in Table 5. The majority of participants across groups had their first prenatal visit between one and eight weeks, which is in the first trimester; 30% and 20% for the respective control and intervention groups had their first prenatal visit in the second trimester. Seven percent of the control and 3% of the intervention group did not seek prenatal care during their current pregnancy.

Most participants reported one or more children in the household during the current pregnancy. Across groups, about 40% reported no children. When reporting their feelings about the current pregnancy, about one-third of women in both samples reported wanting the current pregnancy. Table 5 outlines the distribution of how women across all options feel about their pregnancy. Results of Chi-square testing between groups indicate the only significant difference

Table 5

Couples' Attitudes and Behaviors about Current Pregnancy

	Control	eMB	χ^2
Weeks pregnant at enrollment <i>M (SD)</i>	21 (6.2)	19 (5.51)	10.7
Weeks pregnant, first prenatal visit %			2.1
1- 8	63	73	
9-16	30	20	
25-32	0	3	
Do not go	7	3	
Number of children in household %			10.7
0	40	43	
1	33	27	
2	7	30	
3	20	0	
Trying to get pregnant %			8.5**
yes	43	80	
Feelings about Pregnancy %			7.2
Did not want	7	3	
Wanted later	30	10	
Wanted sooner	10	33	
Wanted then	32	37	
Not sure	20	17	

** $p < .01$, two-tailed

was for pregnancy intention. Of the intervention group women, 80% indicated trying to get pregnant, whereas 43% reported the same in the control group ($p = .01$).

Major Life Events

Participants were asked to report experience of a major life events during the study period (see Table 6 for details). In the control group, 40% reported the loss of income or job and 13% said there was a friend or family member's death. In the intervention group, the most common events were the death of a friend or family member (33%) or loss of income or job (20%). Other major life events reported by participants included being diagnosed with an illness, housing instability, premature birth, problems at work, or described a person living in the household that was disruptive (i.e., difficulty with a stepchild child or teenaged person's acting out).

Table 6

Participant Characteristics: Experience of Major Life Event

	Control (%)	eMB (%)
Major life event during study period		
Death of friend or family member	13	33
Income or job loss	40	20
Diagnosed with an illness	7	7
Housing instability	7	7
Premature birth	7	7
Moved	7	7
Problems at work	0	7
Disruptive person in the household	13	7

Results: Program Efficacy and Mental Health Outcomes

The next portion of the chapter outlines the results of study hypothesis testing. Table 7 presents descriptive statistics by group, time, and outcome of interest. At Times 1, 2, and 3, the mean control group GAD-7 score indicated moderate anxiety; the EDS-3A outcome was the same except for Time 3, where the average score for the group was one point below the cut-off for moderate anxiety. The mean PHQ-9 score for those in the control group indicated moderate

depression at Time 1 and fell below the cut-off for moderate depression symptoms (i.e., 10) at Time 2 by 1 point and by 3 points by Time 3. The average score at Times 1,2, and 3, the EPDS indicated moderate depression for control group participants. For control group participants, the average stress perception score indicated moderate at Times 1, 2, and 3.

Table 7

Descriptive Statistics for Outcomes by Group and Time

Group	Time	N	Range	Min	Max	M	SD	Variance	
Control	1	GAD-7	30	21	0	21	11.27	5.04	25.44
		EDS-3A	30	8	0	8	5.00	2.35	5.52
		PHQ-9	30	18	0	18	10.13	4.58	20.95
		EPDS	30	20	2	22	11.83	5.48	30.01
		PSS-10	30	29	8	37	21.67	6.85	46.92
	2	GAD-7	28	21	0	21	10.32	6.14	37.71
		EDS-3A	28	8	1	9	4.79	1.93	3.73
		PHQ-9	28	27	0	27	9.18	5.46	29.86
		EPDS	28	19	2	21	10.93	4.66	21.70
		PSS-10	28	34	4	38	20.79	7.85	61.66
	3	GAD-7	27	13	7	20	9.74	3.62	13.12
		EDS-3A	27	8	0	8	4.19	2.15	4.62
		PHQ-9	27	17	0	17	7.11	3.93	15.41
		EPDS	27	18	1	19	9.56	5.07	25.72
		PSS-10	27	18	9	27	17.56	4.97	24.72
eMB	1	GAD-7	30	19	1	20	11.07	5.55	30.75
		EDS-3A	30	8	1	9	5.53	2.10	4.40
		PHQ-9	30	21	1	22	10.47	5.89	34.74
		EPDS	30	23	1	24	13.30	6.12	37.39
		PSS-10	30	28	7	35	22.27	7.76	60.20
	2	GAD-7	26	14	2	16	8.35	3.68	13.52
		EDS-3A	26	6	1	7	4.54	1.56	2.42
		PHQ-9	25	14	2	16	7.44	3.37	11.34
		EPDS	26	14	3	17	9.38	3.89	15.13
		PSS-10	26	24	6	30	18.04	5.17	26.76
	3	GAD-7	26	11	7	18	9.08	2.83	7.99
		EDS-3A	26	6	1	7	3.88	1.68	2.83
		PHQ-9	26	16	1	17	6.27	3.97	15.73
		EPDS	26	14	1	15	8.50	4.07	16.58
		PSS-10	26	20	4	24	16	5.06	25.63

The intervention group GAD-7 average score at Time 1 was 11 ($SD= 5.5$), indicating moderate anxiety. These scores dropped at Time 2 ($M = 8.35$, $SD = 3.7$) and rose by less than one point at Time 3 ($M = 9.08$, $SD = 2.8$). The EDS-3A average scores indicated moderate anxiety symptoms at Time 1 and Time 2 but dropped below the cut-off score of 5 at Time 3 in the intervention group. The mean intervention group PHQ-9 score was at the cut-off of 10 ($M =$

10.47, $SD = 5.9$), indicating moderate depression Time 1 dropped to 7.44 ($SD = 3.4$) at Time 2, and then to 6.27 ($SD = 3.4$) at Time 3. Similarly, the average EPDS for the intervention dropped from a 13.30 ($SD = 6.1$) indicative of moderate depression (cut-off of 10) to a mean score of 9.38 ($SD = 3.4$) for Time 2 and to 8.5 at Time 3 ($SD = 4.1$). The intervention group average stress perception score was moderate at Time 1 ($M = 22.27$, $SD = 7.8$), Time 2 ($M = 18.04$, $SD = 5.2$), and Time 3 ($M = 16.23$, $SD = 5.1$) and was greater drop than in the control group (Time 1 [$M = 21.67$, $SD = 6.7$], Time 2 [$M = 20.79$, $SD = 7.8$], and Time 3 [$M = 17.56$, $SD = 5.0$]).

Hypothesis testing was conducted with a significance level of 0.05 or less. As described in Chapter 3, the analytic strategy for testing was the same for hypotheses 1, 2, and 3: for each outcome of interest, a factorial ANOVA was used to evaluate main effects, and post hoc comparisons were computed when factor interactions were significant. In this model, group and dyad each contain two levels: 1) intervention and control and 2) pregnant woman and partner, respectively. Time includes three levels: Time 1, Time 2, and Time 3. The model contained all two-way and three-way interaction effects. When significant interactions were found, post hoc tests with pairwise comparisons were used.

Results from Hypothesis Testing

Hypothesis 1

Hypothesis 1: On average, anxiety symptoms will be significantly lower for participants who receive eMB than those in the control group. A factorial ANOVA was conducted to compare the main effects of the role, group, and time and their interaction effects on anxiety using the GAD-7 and EDS-3A measures (see Table 8). There were significant higher-order interactions for both measures. For the GAD-7, there was a significant three-way interaction of role, group, and time ($p = .02$), indicating a combined effect of the three factors. For the EDS-3A, there was a significant two-way interaction for role and time ($p = .03$); the group factor was not included in a higher-order interaction and was not significant ($p = .97$).

Table 8

Fixed Effects for Anxiety Outcomes: GAD-7 & EDS-3A

Effect	Num df	Den df	F	Sig.
GAD-7				
group	1	30	1.67	.19
time	2	28	5.76***	.00
role	1	29	8.35***	.00
group * time	2	28	1.09	.35
role * time	2	25	6.11	.00
role * group	1	29	0.03	.93
role * group * time	2	25	4.23*	.02
EDS-3A				
group	1	49	0.00	.97
time	2	39	8.06***	.00
role	1	48	13.07***	.00
group * time	2	39	1.20	.31
role * time	2	40	3.97*	.03
role * group	1	48	2.85	.10
role * group * time	2	40	0.61	.54

* $p < .05$. ** $p < .01$. *** $p < .001$

Post hoc pairwise comparisons were conducted to examine high-order interaction effects for the role, by group, and time (Table 9). For the control group, partners had significantly fewer symptoms of anxiety at Times 1 ($p = .03$) and 2 ($p = .04$) when compared to the women with the GAD-7, whereas the significant times with the EDS-3A were times one ($p < .001$) and three ($p <$

.001). The mean difference scores at both times with the GAD-7 indicate nearly four points lower symptom severity for the partners when compared to the woman for those in the control group. The control group partners had about two points less on average on the EDS-3A than the women.

Table 9

Pairwise Comparisons for Role^a by Group and Time: GAD-7 and EDS-3A

Group	Time	(I) Role ^d	(J) Role ^d	Mean Difference (I-J)	Std. Error	df	Sig. ^c	95% Confidence Interval for Difference ^c	
								Lower Bound	Upper Bound
GAD-7									
Control	1	p	w	-3.60*	1.62	73	.03	-6.86	-0.34
	2	p	w	-3.62*	1.67	79	.04	-6.99	-0.24
	3	p	w	-0.62	1.72	77	.72	-4.06	2.81
eMB	1	p	w	-7.47*	1.64	71	.00	-10.73	-4.20
	2	p	w	0.53	1.75	78	.76	-2.95	4.02
	3	p	w	-.023	1.76	79	.99	-3.53	3.49
EDS-3A									
Control	1	p	w	-2.13*	0.66	71	.00	-3.45	-0.82
	2	p	w	-1.36	0.68	77	.05	-2.71	1.15
	3	p	w	-2.21*	0.69	75	.00	-3.59	-0.83
eMB	1	p	w	-1.60*	0.66	69	.02	-2.91	-0.28
	2	p	w	0.34	0.70	76	.63	-1.06	1.74
	3	p	w	-0.81	0.71	76	.26	-2.23	0.60

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Dependent Variable: GAD-7, EDS-3A.

c. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

d. p signifies partner, and w signifies the pregnant woman.

In the intervention group, only Time 1 had significant differences between scores for partners and women on the GAD-7 ($p < .001$) and EDS-3A ($p = .02$). Mean difference scores at Time 1 for partners were about seven points lower than women with the GAD-7 and approached two points lower for partners on the EDS-3A.

Table 10 contains results for comparisons for time, by group, and role. In the control group, Time 1 to three was significant for women ($p = .02$), and in the intervention group, there were significant differences between Time 1 and Time 2 ($p < .001$) and one to three ($p < .001$);

there were no significant differences between time points for partners of either group. For women in both groups, the change over time indicated a decrease in symptoms. Women in the intervention had a more significant mean symptom score reduction when compared to women in the control group (approximately 6 vs. 3 points, respectively) for Time 1 to 3. Women in the intervention group averaged a drop of nearly seven points from Time 1 to 2.

Table 10

Pairwise Comparisons for Time^a by Group and Role: GAD-7

Group	Role ^d	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	df	Sig. ^c	95% Confidence Interval for Difference ^c	
								Lower Bound	Upper Bound
Control	p	1	2	1.15	1.48	41	.44	-1.84	4.14
			3	0.09	1.70	59	.96	-3.32	3.49
		2	1	-1.15	1.48	41	.44	-4.14	1.84
			3	-1.07	1.53	41	.49	-4.16	2.03
		3	1	-0.09	1.70	59	.96	-3.49	3.32
			2	1.07	1.53	41	.49	-2.03	4.16
	w	1	2	1.13	1.09	64	.30	-1.03	3.30
			3	3.06*	1.28	79	.02	0.52	5.61
		2	1	-1.13	1.09	64	.30	-3.30	1.03
			3	1.93	1.11	65	.09	-0.29	4.15
		3	1	-3.06*	1.28	79	.02	-5.61	-0.05
			2	-1.93	1.11	65	.09	-4.15	0.29
eMB	p	1	2	-1.10	1.52	41	.47	-4.18	1.97
			3	-1.55	1.74	59	.38	-5.03	1.93
		2	1	1.10	1.52	41	.47	-1.97	4.18
			3	-0.45	1.59	41	.78	-3.67	2.77
		3	1	1.55	1.74	59	.38	-1.94	5.03
			2	0.45	1.59	41	.78	-2.77	3.67
	w	1	2	6.90*	1.11	63	.00	4.69	9.11
			3	5.90*	1.28	79	.00	3.35	8.44
		2	1	-6.90*	1.11	63	.00	-9.11	-4.69
			3	-1.00	1.13	65	.38	-3.27	1.26
		3	1	-5.89*	1.28	79	.00	-8.44	-3.35
			2	1.00	1.13	65	.38	-1.26	3.27

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Dependent Variable: GAD-7.

c. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

d. p signifies partner, and w signifies the pregnant woman.

The cut-off for moderate anxiety using the GAD-7 measure is a 10. On average, control group partners began the study with a mean score of about 9 ($SD = 6.0$), whereas women in the same group had a mean score of 13 ($SD = 3.1$). At baseline, intervention group partners had an average GAD-7 score of 7 ($SD = 4.7$); women had an average score of 15 ($SD = 3.4$), the cut-off for severe anxiety.

The final pairwise comparison was for the group, by time, and role for the GAD-7 (see Table 11). There was a significant difference between groups for women at Time 2 ($p < .001$), and women in the intervention group had a score below the cut-off for moderate symptoms of anxiety ($M = 7.8$, $SD = 3.1$). Additionally, the intervention group's average reduction in GAD-7 score was four points lower than women in the control group ($M = 11.9$, $SD = 5.2$).

Table 11

Pairwise Comparisons for Group^a by Time and Role: GAD-7

Time	Role	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	df	Sig. ^c	95% Confidence Interval for Difference ^c	
								Lower Bound	Upper Bound
1	p	control	eMB	2.13	1.74	68	.23	-1.34	5.6
	w	control	eMB	-1.73	1.34	70	.20	-4.40	0.9
2	p	control	eMB	-0.12	1.88	69	.95	-3.88	3.6
	w	control	eMB	4.03*	1.35	71	.00	1.33	6.7
3	p	control	eMB	0.50	1.90	70	.79	-3.29	4.3
	w	control	eMB	1.10	1.38	71	.43	-1.65	3.8

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Dependent Variable: GAD-7.

c. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

d. p signifies partner, and w signifies the pregnant woman.

In sum, there was no significant evidence to support the hypothesis that eMB reduces anxiety symptoms for those in the intervention group compared to those in the control group. There were significant differences by role during the study period regardless of group assignment as measured by the GAD-7 or EDS-3A. Finally, women in the intervention group

experienced a significant drop in anxiety scores at Time 2 compared to those in the control group.

Hypothesis 2

Hypothesis 2: On average, depression symptoms will be significantly lower for participants who receive eMB than those in the control group. Testing for depression was conducted using a factorial ANOVA comparing the main effects of the role, group, time, and interaction effects. The PHQ-9 and the EPDS measured symptoms for depression. Similar to the anxiety findings, there were significant higher-order interactions for both measures (see Table 12).

Table 12

Fixed Effects for Anxiety Outcomes: PHQ-9 & EPDS

Effect	Num df	Den df	F	Sig.
PHQ-9				
group	1	52	0.79	.38
Time	2	45	11.56***	.00
Role	1	48	6.31	.02
group * time	2	45	1.75	.19
role * time	2	41	7.70***	.00
role * group	1	48	0.23	.64
role * group * time	2	41	3.43	.04
EPDS				
group	1	59	0.15	.70
Time	2	29	10.42***	.00
Role	1	37	17.07***	.00
group * time	2	29	2.44	.10
role * time	2	38	6.07***	.00
role * group	1	37	0.00	.97
role * group * time	2	38	0.76	.47

* $p < .05$. ** $p < .01$. *** $p < .001$

There was a significant three-way interaction for the role, group, and time for the PHQ-9 ($p = .04$). For both the PHQ-9 and the EPDS, there was a significant two-way interaction of role and time ($p < .001$ and $p = .01$). For the EPDS, there was a significant two-way interaction for the factors role and time ($p < .001$). There was no higher-order interaction involving the group

with the EPDS. Therefore, the factor was interpreted using fixed effects and was not significantly different between groups ($p = .70$).

The cut-off for moderate symptoms of depression using the PHQ-9 is 10, and the cut-off using the EPDS is 13. At no time in the study did either group of partners' depression score exceed this threshold. Post hoc comparisons were conducted to investigate all higher-order interactions further. The first pairwise comparison was for the role by group and time, conducted for both the PHQ-9 and the EPDS (see Table 13). At Time 1, there was a significant difference

Table 13

Pairwise Comparisons for Role^a by Group and Time: PHQ-9 and EPDS

Group	Time	(I) Role ^d	(J) Role ^d	Mean Difference (I-J)	Std. Error	df	Sig. ^c	95% Confidence Interval for Difference ^c	
								Lower Bound	Upper Bound
PHQ-9									
Control	1	p	w	-2.53	1.48	59	.09	-5.49	0.42
	2	p	w	-0.98	1.53	64	.53	-4.03	2.08
	3	p	w	-1.69	1.55	63	.28	-4.79	1.41
eMB	1	p	w	-7.07*	1.48	55	.00	-10.03	-4.11
	2	p	w	-0.43	1.58	58	.79	-3.59	2.73
	3	p	w	-0.13	1.60	60	.93	-3.33	3.06
EPDS									
Control	1	p	w	-4.33*	1.47	57	.01	-7.28	-1.39
	2	p	w	-1.9	1.52	63	.23	-4.90	1.19
	3	p	w	-4.02*	1.55	61	.01	-7.11	-0.93
eMB	1	p	w	-6.20*	1.47	56	.00	-9.15	-3.25
	2	p	w	-1.2	1.57	63	.44	-4.35	1.91
	3	p	w	-3.0	1.59	62	.07	-6.16	0.19

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Dependent Variable: PHQ-9, EPDS.

c. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

d. p signifies partner, and w signifies the pregnant woman.

between the intervention group's roles for the PHQ-9 ($p < .001$). At Time 1, women approached the cut-off of 15, representing moderately severe symptoms of depression on the PHQ-9, where partners were below the cut-off indicative of moderate.

With the EPDS, the differences were significant at Times 1 and 3 for the control ($p = .01$) and intervention groups ($p < .001$). The EPDS marginal mean differences between roles at Time 1 was 4 less for control partners ($SE = 1.5$) and 6 ($SE = 1.5$) less for intervention partners when compared to the women in respective groups (see Table 14). At Time 3 with the EPDS, partners

Table 14

Pairwise Comparisons for Time^a by Group and Role: PHQ-9

Group	Role ^d	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	df	Sig. ^c	95% Confidence Interval for Difference ^c	
								Lower Bound	Upper Bound
Control	p	1	2	0.11	1.31	41	.93	-2.54	2.76
			3	2.61	1.61	56	.11	-0.62	5.83
		2	1	-0.11	1.31	41	.93	-2.76	2.54
			3	2.50	1.36	42	.07	-0.24	5.24
		3	1	-2.61	1.61	56	.11	-5.83	0.62
			2	-2.50	1.36	42	.07	-5.24	0.24
	w	1	2	1.67	0.95	44	.09	-0.24	3.57
			3	3.45*	1.19	60	.01	1.07	5.83
		2	1	-1.67	0.95	44	.09	-3.57	0.24
			3	1.78	0.97	45	.07	-0.18	3.74
		3	1	-3.45*	1.19	60	.01	-5.83	-1.07
			2	-1.78	0.97	45	.07	-3.74	0.18
eMB	p	1	2	-0.11	1.35	41	.94	-2.84	2.62
			3	0.91	1.65	55	.58	-2.40	4.22
		2	1	0.11	1.35	41	.94	-2.62	2.84
			3	1.02	1.41	41	.47	-1.82	3.87
		3	1	-0.91	1.65	55	.58	-4.22	2.40
			2	-1.02	1.41	41	.47	-3.87	1.82
	w	1	2	6.53*	0.99	43	.00	4.54	8.52
			3	7.846*	1.19	60	.00	5.46	10.23
		2	1	-6.53*	0.99	43	.00	-8.52	-4.54
			3	1.32	1.02	44	.20	-0.73	3.37
		3	1	-7.85*	1.19	60	.00	-10.23	-5.46
			2	-1.32	1.02	44	.20	-3.37	0.73

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Dependent Variable: PHQ-9.

c. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

d. p signifies partner, and w signifies pregnant woman.

in the control group score 4 ($SE = 1.5$) less than women and, in the intervention group, the difference between roles was 3 ($SE = 1.6$) points.

The final pairwise comparison for the PHQ-9 was for the group by time and role (see Table 15). There were no significant between-group differences by role or time; however, the finding between women's groups suggests a trend in favor of the intervention group ($p = .06$).

Table 15

Pairwise Comparisons for Group by Time and Role: PHQ-9

Time	Role	(I) Group	(J) Group	Mean Differenc e (I-J)	Std. Error	df	Sig. ^c	95% Confidence Interval for Difference ^c	
								Lower Bound	Upper Bound
1	p	control	eMB	1.93	1.82	60	.29	-1.71	5.58
	w	control	eMB	-2.60	1.38	68	.06	-5.36	0.16
2	p	control	eMB	1.71	1.94	62	.38	-2.16	5.58
	w	control	eMB	2.26	1.41	68	.11	-0.55	5.08
3	p	control	eMB	0.24	1.97	64	.90	-3.69	4.17
	w	control	eMB	1.80	1.42	68	.21	-1.03	4.62

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Dependent Variable: PHQ-9.

c. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

d. p signifies partner, and w signifies the pregnant woman.

In summary, the findings do not suggest significant evidence to support the hypothesis that eMB significantly reduces symptoms of depressions for those who receive the intervention compared to those who do not. There were significant differences between roles during the study period regardless of the group with the PHQ-9 and the EPDS. Finally, women in both groups experienced a significant reduction in depression at various times in the study.

Hypothesis 3

Hypothesis 3: On average, perception of stress will be significantly lower for participants who receive eMB than those in the control group. A factorial ANOVA was used to test the hypothesis. Fixed effect outcomes are presented in Table 16.

There was a significant higher-order interaction for role and time ($p = .04$). There was no interaction for the group factor, and fixed effect results indicate no significant between-group differences ($p = .29$).

Table 16

Fixed Effects for Perceived Stress Outcomes: PSS-10

Effect	Num df	Den df	F	Sig.
PSS-10				
group	1	60	1.15	.29
Time	2	46	11.97***	.00
Role	1	49	12.07***	.00
group * time	2	46	2.25	.12
role * time	2	46	3.39*	.04
role * group	1	49	0.09	.76
role * group * time	2	46	1.81	.17

* $p < .05$. ** $p < .01$. *** $p < .001$

A post hoc pairwise comparison tested the relationship for role by group and time (see Table 17). In the control and intervention group, there were significant differences by role at the Time 1 only ($p = .03$ and $p < .001$, respectively). In sum, there is no significant evidence to support the hypothesis that eMB reduces perceived stress for those in the intervention compared to the control group.

Table 17*Pairwise Comparisons for Role^a by Group and Time: PSS-10*

Group	Time	(I) Role ^d	(J) Role ^d	Mean Difference (I- J)	Std. Error	df	Sig. ^c	95% Confidence Interval for Difference ^c	
								Lower Bound	Upper Bound
PSS-10									
Control	1	p	w	-4.53*	1.98	64	.03	-8.49	-.57
	2	p	w	-3.66	2.06	69	.08	-7.78	.45
	3	p	w	-2.33	2.09	67	.27	-6.51	1.84
eMB	1	p	w	-8.27*	1.98	62	.00	-12.23	-4.30
	2	p	w	-1.59	2.13	68	.46	-5.83	2.65
	3	p	w	-2.67	2.16	67	.22	-6.98	1.63

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Dependent Variable: PSS-10.

c. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

d. p signifies partner, and w signifies a pregnant woman.

Summary

Participants in this study were primarily White, educated, married, and employed at the study time. The majority of participants already had children in the household, but 40% reported none. Women and partners alike most often reported medication use or counseling for anxiety or depression. A smaller portion of participants reported having experienced PTSD, bipolar disorder, or OCD. Most participants reported accessing prenatal care within the first trimester. There was a significant group difference for pregnancy intention; more women in the control group reported an unintended pregnancy than those in the intervention group.

Hypothesis testing was conducted to assess the efficacy of eMB with couples and examined three outcomes of interest: anxiety, depression, and perceived stress. Overall, there were no significant group differences for any outcome of interest. There were significant role differences for anxiety and depression at various study times. Similarly, there were differences between women in the intervention and control group for anxiety and depression during the study. Chapter 5 contains results from study research questions concerning participant

satisfaction with eMB and how participants described feelings of partner support while using the course. The descriptive findings add context to the results from hypothesis testing.

CHAPTER FIVE

Results: Exploring Satisfaction and Perceptions of Partner Support with eMB

This chapter explores intervention group participant experiences and perspectives using the eMB program. Findings include descriptive data derived from the Time 3 survey and Time 4 interview responses. All intervention group participants who took the Time 3 survey ($n = 26$) were invited to a post-study, semi-structured interview; 19 expressed interest, and 11 pregnant women and four partners took part (see Table 18). Participants were asked about their satisfaction with the eMB course and whether they felt the course promoted partner support.

Table 18

Interview Participant Characteristics

	Women	Partners
<i>N</i>	11	4
Age <i>M (range)</i>	28 (18-43)	39 (30-51)
Race % (<i>n</i>)		
White	82 (9)	75 (3)
Black/African American	16 (1)	25 (1)
More than one race	16 (1)	-
Ethnicity % (<i>n</i>)		
Latino/a	18 (2)	-
Education % (<i>n</i>)		
Some high school	18 (2)	-
High school or GED	-	-
Some college/technical	18 (2)	25 (1)
Undergraduate degree	27 (3)	25 (1)
Graduate degree	36 (4)	(2)
Employment Status % (<i>n</i>)		
Employed	82 (9)	100 (4)
Self-employed	16 (1)	-
Student	16 (1)	-
Household Income % (<i>n</i>)		
Less than 25,000	16 (1)	-
26-35,000	18 (2)	-
36-50,000	16 (1)	25 (1)
51-75,000	18 (2)	-
75,000 or more	82 (9)	75 (3)

Most participants were White, had an undergraduate degree or more, were employed, and a household income of USD 75,000 or greater. The average woman's age was 28.36 ($SD = 7.57$) and ranged from 18 to 43. Partner participants were generally older, with an average age of 39.50 ($SD = 9.75$) ranging from 30 to 51. The majority of participants reported being married and indicated they were trying to get pregnant. Most partners (75%) reported one or more children in the household, whereas 56% of women participants reported no children in the household. Most participants reported doing the course alone (50%), 9% indicated doing the course together, and 27% said they did a combination of alone or together. Three partners reported not using the course at all (see Table 19).

Table 19

Use of eMB within the Couple

	Women	Partners
<i>n</i>	12	10
Engagement with eMB % (<i>n</i>)		
Did not use	-	30 (3)
Alone	58 (7)	40 (4)
Together	8 (1)	10 (1)
Both alone and together	33 (4)	20 (2)

Satisfaction with the eMB Course

Research question 4: How do participants describe their satisfaction with the eMB course for meeting participant informational needs about perinatal mental health?

Research question four was answered using quantitative survey data and data from interviews.

Participants were asked about their satisfaction with the eMB course using the CSQ-8 satisfaction scale (see Table 20). The overall satisfaction score for women and partners was excellent (42% and 57%, respectively) or good (50% and 43%). When asked whether the course was easy to navigate, 50% of women and 43% of partners said strongly agree or agree (42% and 57%, respectively).

Table 20*Participant Satisfaction with eMB*

	Woman	Partner
Overall satisfaction score (CSQ-8) % (N)		
Excellent	42 (5)	57 (4)
Good	50 (6)	43 (3)
Fair	8 (1)	-
<i>CSQ-8 Items</i>		
The lessons are of high-quality % (N)		
Strongly agree	33 (4)	29 (2)
Agree	58 (7)	71 (5)
Disagree	8 (1)	-
I received the kind of topics/information I wanted % (N)		
Strongly agree	25 (3)	14 (1)
Agree	67 (8)	86 (6)
Disagree	8 (1)	-
The course has met my needs % (N)		
Strongly agree	12 (2)	29 (2)
Agree	75 (9)	71 (5)
Disagree	8 (1)	-
I would recommend the course to a friend % (N)		
Strongly agree	50 (6)	57 (4)
Agree	42 (5)	43 (3)
Disagree	8 (1)	-
I am satisfied with the amount of help I received through eMB % (N)		
Strongly agree	25 (3)	29 (2)
Agree	75 (9)	71 (5)
The course helped me deal with my problems more effectively % (N)		
Strongly agree	12 (2)	14 (1)
Agree	75 (9)	86 (6)
Disagree	8 (1)	-
I would come back to eMB if I were to seek help again % (N)		
Strongly agree	33 (4)	43 (3)
Agree	58 (7)	57 (4)
Disagree	8 (1)	-
In an overall, general sense, I am satisfied with the course % (N)		
Strongly agree	12 (2)	43 (3)
Agree	75 (9)	57 (4)
Disagree	8 (1)	-

Overview of qualitative findings. Findings from interviews with participants generally support the findings from the satisfaction survey. Using an inductive thematic analysis described in chapter 3, primary and secondary themes were identified. Primary themes include engaging with the content and course critiques. The following paragraphs define and discuss each theme in

detail, provide visual thematic maps and illustrative quotes. Figure 6 illustrates participant satisfaction with eMB with primary themes in rectangles and secondary themes as ovals.

Engaging with the content. Engaging with the content is defined as how participants



Figure 6. Primary and secondary themes of participant satisfaction with eMB.

described the learning experience using course materials and how they felt about the engagement experience. Flexibility is a secondary theme and is participants' impressions about ease of use (i.e., using on one's own time, allows for learning with no distractions and time for reflection). Promotes learning and practice. Another secondary theme includes ideas about ways eMB facilitated learning or promoted using coping tools.

Promotes learning and practice. Participants discussed how the course content helped them reflect upon the supports they had in their community networks and the importance of engaging with them to promote wellbeing. Participants highlighted ways examples of this secondary theme in discussing the various learning opportunities and content delivery modes.

For example, the vignettes contained contrasting scenarios that portrayed positive adaptation vs. negative adaptation for mothers feeling anxious or depressed, and participants found this helpful.

“...It was like a conversation between her and a friend, and it was actually quite realistic. L Like, I think I’ve had been in a situation like that...Because I do when I’m upset and I’m going through things I do want to be alone, and I feel like that’s the best way to handle it. But, this offered a different alternative, and I thought that was great.”
Woman ID 70

Much like the vignettes, participants discussed how content challenged them to identify and imagine practicing identifying and reframing thoughts (such as destructive vs. constructive) and how thoughts related to choices about subsequent activities. In general, the course presented learning activities like reading and video materials followed by quiz-like formats or worksheets.

“... I don’t have great coping mechanisms. I’ve got depression and anxiety. Like, I’m struggling with that. So, to see them offer solutions to things that I had been doing technically wrong in the past, I thought that was really helpful because now, instead of saying ‘Just leave me alone, I need space.’ I’m going to work through it myself. I’m second-guessing that and say, ‘Okay, well, maybe I should talk to someone about it, maybe I should talk to a friend and let them help me through it, too.’ Yeah.” Woman ID 70

The videos helped by presenting basic ideas. Many participants described them as helpful in parallel to other content delivery. One partner said, *“The, the videos are great, and the more interactive things online I found great as well.”* Partner ID 76. This woman shared a similar impression, and she noted appreciation for the engaging, fill-in-the-blank course activities:

“I really like the exercises, because I don’t know if it’s just my personality, but I think you learn better when you’re, you know, doing an exercise or an activity rather than just having someone talk at you for half an hour or whatever. So, I like that. And, the videos are helpful with the little examples of, you know, ‘this mom does this, and this mom did this.’” Woman ID 21

Participants referred to ways in which the course prompted an examination of their thought processes and either taught or reminded them of the value in reframing thoughts that may be negative or maladaptive to thinking in a more positive way. Participants noted specific exercises that helped them develop concrete ways to work on thoughts, actions, or behaviors that could lead to more positive coping.

"The, the course is the target about in really going through what are the thoughts that I've been experiencing and how to respond to those thoughts in a helpful way...How to address them, or I guess refocus myself on to something more positive...building confidence and know that you know, 'We had a bad experience with our first pregnancy, but there's hope for this one.' " Woman ID 19

"I like the fact that there is a variety and I liked, where would say, 'You know, give three examples of things that you know you want to work on.' or like having to write it out. I felt like really helps you, like, really think about how you're actually going to do this, you know, what are you actually going to do or what do you really want to work on." Woman ID 21

Flexibility. All participants had access to the course using unique login information.

Results from the time 3 survey, described previously and in Table 19, indicate that about half said they did the course alone, and nearly a third said they used the course alone and together.

Qualitative findings reveal ways this flexibility was helpful to participants.

Participants discussed the value of logging in and doing the course independent of their partners. Doing the course alone was convenient in scheduling because it allowed people to reflect on content at their own pace.

"For me personally, I prefer doing it separately because it did give me the time to just focus on where I was, you know, when with that particular topic and gave me time to really process through it before coming nothing, you know, talking to him about, you know, maybe what I was feeling kind of collect my thoughts. You know, I guess before really having a conversation about it. So, I feel like it let us really focus individually without really feeling like we had to cater to [the other], you know, because we weren't always on the same page, you know, we didn't always have the same response. So, it really helped us know where we were individually and be able to talk it out." Woman ID 19

"It gives you these things to think about and then like you're thinking about like seven or eight things, and then you're like sitting there like watching TV, and you think of one, or she said something like triggers kind of one part of something like, 'Oh, hey, yeah, what about...' then you just go off on a, like a 20-minute conversation... We just kind of wanted to look at it alone and come back and see what each person kind of gleans from it." Partner ID 4

Some participants discussed ways they would view the course together. At times it was expressed as intentional. Participants also described a bystander effect in which one person in the couple would be viewing eMB lessons, and the other would look over the shoulder or become interested and intentionally join the person who engaged with the program first.

"And just like the course, I can bring home resources and be like, 'Hey, you should read this.' But usually, he's not going to. Like it literally has to be like, I read something to him...It's annoying...He watched a couple videos with me, and it would be like he'd be home on the weekend, and I opened my computer and start watching them, and so he'd lay there and watch them with me." Woman ID 62

"I'm speaking for my husband right now, but from what I could tell, because we did everything together, okay, from what I could tell, I feel like it made him think a little more empathetically, you know, think about my perspective. So that was kind of nice. You know, maybe some things that he wasn't as familiar with and would spark some conversation." Woman ID 74

Course critiques. The second primary theme related to course satisfaction is ‘course critiques’ and includes participants' impressions of applicability (i.e., timely and relevant to one’s needs) and relatability (i.e., outdated, silly, and extreme). The satisfaction survey indicated that people mostly thought the course was satisfactory. However, the interview highlighted features that could use improvement.

Relatability. Relatability is defined as ways the participants felt about delivery of eMB content (i.e., dated material and content perceived as silly or extreme) and whether the content allowed them to anticipate or recall a similar situation in their lives. Most critiques were minor, and participants indicated the ability to look past aspects they disliked, but others were distracted

and may not have engaged in content fully. For example, this woman noted stylistic qualities of the video and described them as outdated:

“I’m watching, and I’m trying to just be positive about it, and I’m like, ‘Oh, I could really use that,’ but then it’s an old course. Like you can tell that it’s definitely dated. So when it comes to someone my age. I’m like, I don’t know like it’s kind of boring because it’s so old. Like I wouldn’t sit there and watch a Western movie.” Woman ID 62

The vignettes included images and corresponding speech balloons comparing and contrasting different situations portraying adaptive vs. maladaptive responses from the women portrayed in the images. The content and execution of the vignettes were referred to as “cartoons.” This participant described a vignette as silly, which may have made the lesson less relatable:

“I think those [vignettes] were just a little silly, and they shouldn’t have been silly because they’re basic, and obviously I need this basic information like I say like I said to refocus my thought process and stuff like that.” Woman ID 81

Relatability includes whether a person can imagine a scenario similar to that portrayed in the vignette or course materials occurring in their own life. PMADs are often misunderstood, minimized, or described as extreme. The eMB content did not convey the intended message in a way that overcame stereotypical perception of mood or anxiety disorders from this woman’s perspective, *“So those things were a little aggressive just for me because I never got that emotional. I’m a pretty even keel person, I feel like, most of the time anyway.” Woman ID 2.*

Applicability. Applicability is whether the content was informative and useable, thereby meeting the needs and expectations of participants. Some felt the course did not contain the expected or desired information about pregnancy or mental health needs in pregnancy. Participants suggested an expectation that the course should contain more generalized information about pregnancy (i.e., what to expect in pregnancy, at birth, and beyond). This woman described the content as not new information:

"It was just really boring to me. I have other kids. So, this is my third. So, for me, it was kind of like everything they already tell you. But I do think like if you've never had a kid before and you're getting into that course, it's helpful." Woman ID 62

This partner participant discussed ways the course would be improved by creating information that was more elementary and containing learning materials that helps to understand each step of the pregnancy experience and concepts that would be applied in the future:

"I was just kind of hoping that it would be...like those books for idiots. You know, I mean like the ones that like spells it out, and very much in detail. It's like I don't know, like pregnancy for idiot father, you're saying, you know, something like that where like basically just assumes that you don't really have any idea what's going on, or what to do, already have it [figured out], and it just kind of spells it out." Partner ID 4

Participants described feelings about no partner-oriented materials or no specific lessons about the partner role. In the Time 3 survey, 30% of partners indicated not using the course. During the Time 4 interview, women offered ideas about course content that may help explain reasons some partners did not engage.

"Just maybe, like I said, the involving the partner, having a different version for the partner or relating it more to them or even having them mom participant access or have a section on them about how they might be perceiving their partners and status and stuff, you know... but that partner if you're going to include them at least like I think it could be geared more towards them in that sense too, you know, though " Woman ID 40

In summary, participants expressed satisfaction with the eMB course. Their responses on the CSQ-8 survey indicated good to excellent satisfaction. Responses from those who participated in the post-intervention interview revealed ways the course could be improved for a better user experience, updated for better aesthetics, and revealed a gap in content applicable to the partner or the couple. Engagement with content was a primary theme inclusive of how the course inspired reflection about systems of support they had in their life, noticing and reframing thoughts from destructive to positive, thereby influencing actions (i.e., making positive choices).

Participants spoke favorably about the delivery of content in various modes, which contributed to a positive experience engaging with the content. However, for some participants, this content was not relatable or applicable to participants' needs.

Perceptions of Partner Support while Using eMB

Research question 5: How do participants describe their feelings about partner support while using eMB? Based on interview results, the primary theme associated with this research question is eMB promotes awareness. The primary theme is defined as increased knowledge, revisiting or reflecting on information, and gaining insight into the couple's perinatal relationship when using eMB. There are several subthemes: understanding the perinatal experience (i.e., individual needs and previous trauma or loss), couple connectivity (i.e., engagement, acknowledgment, supportive behaviors), and sociocultural tensions (program messaging, ingrained beliefs, and behaviors that potentially reinforce maladaptive attitudes and behaviors). The themes are defined in detail in the following paragraphs. Figure 7 illustrates primary themes in rectangles and secondary themes in ovals.

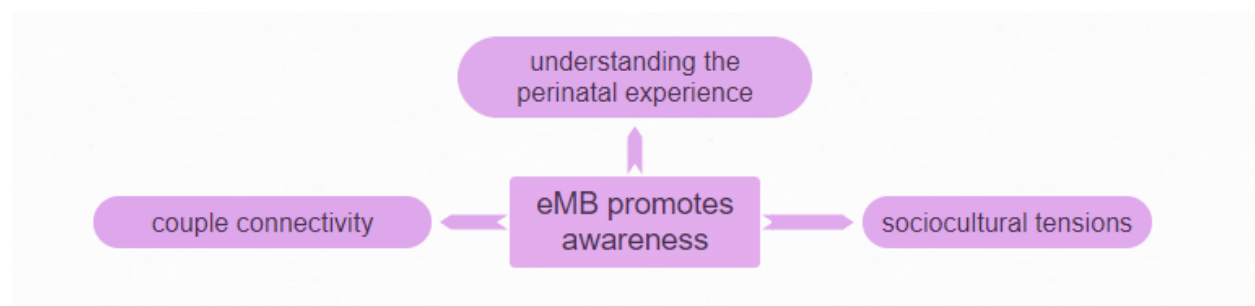


Figure 7. Primary and secondary themes of how participants felt about partner support using eMB.

Understanding the perinatal experience. Understanding the perinatal experience is how participants became more aware of their significant other's mental, physical, and practical aspects of the perinatal experience (i.e., antenatal, anticipated birth needs, and planning for

postpartum), thinking about risk factors, and participants attending to previous perinatal trauma or loss. Participants described increased awareness of mental health needs as part of the perinatal experience. This partner describes observing her behaviors and thinking about what she may be experiencing with a new lens because of eMB lessons:

"There were sure there were like situations where there's tension and everything, but never had it occurred to me that okay there's depression... You know, if someone's lethargic, it's not because they're just tired, it's because of something else...It was good to get all that information and just be cognizant of it, instead of just doing my stereotypical 'Oh no, she's just tired,' or 'Oh, she doesn't want to do anything,' so yeah, it opened up a whole lot of doors on being observant and just understanding the whole process."
Partner ID 41

Partners described the course as prompting reflection about mental health more generally. It increased awareness and reminded them to revisit previous knowledge. This person discussed previous work with a therapist and connected past learning with the eMB content:

"It will it help the course helped me with my mood...I'm being forced to think about mental health, including my own mental health. It makes me then reflect on both what I'm learning in that moment, and also my like past learnings through different therapists that I've had." Partner ID 76

Similarly, women discussed becoming more aware of the partner's mental health. Although the course did not have materials tailored to the partner experience of mood or anxiety disorders in the perinatal period, this woman described how the course promoted reflection:

"So, um, but yeah, like it didn't push me to think about how maybe he was feeling or him proceeding. I was curious, and we talked about that...Maybe that was the purpose of it, [eMB] was to kind of push us to communicate more about that piece of it. But it didn't. The content itself did not open my eyes to his side of feelings and thinking, and his possible wellbeing, or emotional, mental status." Woman ID 40

There were participant discussions about PMAD risks and coping with difficult histories. Participants discussed becoming more aware of what their counterpart understands about

perinatal mental health risks. This example illustrated her awareness of risk due to previous experience and dialog with her partner.

"... so like I could see that he was genuinely worried about it [mental health risks] too... he had a really sheltered okay childhood. Like, his parents were together his whole childhood. They didn't split up until he was a full adult, and so there's just a lot of difference. Like, I've seen it. Like when my mom had my younger sister, I seen her go through the postpartum [depression]." Woman ID 62

Participants acknowledged how the course helped them process or communicate about previous trauma, loss, or acute needs. The course provided ways to think about planning for triggering experiences.

"[discussing a previous pregnancy loss] I think it was more that it [eMB] just gave us the opportunity to start exploring some of those ideas and what some of those needs will be that we'd kind of been avoiding. So, I think, I think it did help initiate I guess some of those conversations ...There's, you know, taking care of the baby, but also um, what my needs will be just because there's a lot of emotion and there's gonna be a lot of triggers." Woman ID 19

This woman described her partner not logging in to the course on his own but talking about PMADS after looking at her laptop when she was using eMB next to him:

"He did question if I've had postpartum [depression] with any of my other children and he did start asking me questions about like signs of postpartum [depression] and what he can do to help and where we can go if it happens. So that was good." Woman ID 62

She went on to describe how he was somewhat disengaged, but the course helped her think through other sources of support available to her:

"It does definitely help with like not letting yourself be down during your pregnancy...I've noticed on the days where I'm like, 'Oh, I'm so sick. I can't get up'...So it definitely helps with trying to get pregnant women up and continuing to motivate, even though this is probably one of the hardest things anybody's ever done in the world. Woman ID 62

There was recognition of the toll the COVID-19 pandemic took on their lives and how it changed the more typical pregnancy activities. This person discussed how the course served as a conversation starter:

"I mean, this has been a crazy year for us, to be honest...It's, it's been good to like be able to kind of have like things I can bring up to mention to her and then like it [eMB] starts like a discussion and things like that." Partner ID 4

The course highlighted the need to connect with support networks in preparation for birth and beyond. Participants expressed regret that the pandemic disrupted support networks, reflected on difficulties in planning, and talked about adapting to the difficult situation.

"You know, like wellbeing and support system and thinking about that social piece of it. Of course, COVID puts a little damper on that side of things, but in that could be something where maybe that [eMB] content piece could say, 'Hey, you might have your support system, but if you don't see them face to face, and how often do you reach out or how close?' You know, like, 'do you have that person you can rely on?' well yeah, of course, I do." Woman ID 40

"Um, I think it was really helpful when they were talking about just the support networks of people like during the pregnancy and also after you have the baby. And the negative versus like positive ways of thinking...It's when you were actually reading about it and practicing it...and I think that it also made me reflect a lot but with the support network how that can impact people during this [COVID-19] time." Woman ID 60

Participants discussed how COVID-19 added a sense of pressure to the need for planning. This partner discussed how lack of communication is damaging in a relationship. He had increased awareness of mental health risk factors and described ways that support systems at birth were restricted:

"It kind of really hurts your relationship if a guy doesn't want to talk about those things. I think, especially right now with all the things that are going on [COVID-19 pandemic]...They [other guys] said, going through this and going to the hospital, as you said, Just, just, just wait till you actually go in and have a baby. This stuff will still be going on." Partner ID 24

Couple connectivity. With increased awareness, couples described becoming more connected (i.e., were able to share or imagine the other person's experiences, make decisions based on increased understanding, and describe how they felt) and were prompted to reflect on their respective roles and needs of their counterpart. In this example, the pregnant woman understands her partner is excited and looking forward to the future when he can feel more engaged.

"He's like here for it, but it's happening in my body. So, he's kind of like happy to, like, feel the kicks and the motions, and he wants to know what's going on with me. He's more excited for like when the baby comes because that's when he gets to be more hands-on."
Woman ID 2

Pregnant women described ways in which the course helped initiate conversations that produced empathy or conveyed a desire to understand each other better. The conversations included discussions of the physical and practical aspects of pregnancy but also highlighted changing experiences. Conversely, partners used the information to start conversations when they did not understand the things she was experiencing. Each of these examples illustrates increased connectivity through communication:

"The opportunity that you know opening up that communication so that I was having those conversations and had the opportunity to learn more about his perspective as well. A lot of it has been focused on, you know, on me is the, you know, with the pregnancy...But he's experiencing changes too and just becoming more aware...to ask him, you know, include those [his changes] in the conversation as well because it can be very easy to get caught up in all the physical changes that you know that we see going on with the mom that you don't necessarily see that." Woman ID 19

"... asking her these questions which she usually didn't know the answers to, or like how to help her out what to do on those situations. So, or how to vocalize that so a just like knowing more about what was going on with her body. Because of the information I learned in the course [it] helped me." Partner ID 76

The course helped make clear the importance of partner engagement in the present moment. Partners who engaged with the material or had conversations they attributed to happening because of the course described becoming more intentional or attentive. *"I wasn't focused. I wasn't spending enough time focusing on getting ready for the baby and, and just honestly, getting our house in order."* Partner ID 76. And the women discussed seeing shifts in partner perspectives after using eMB:

"I think what it was, really put things in perspective for him like 'Okay yeah this is not affecting me right now. But very soon, this is going to be my reality, too. And I'm going to be having some of the same stresses and thoughts, as you know, some of the things we talked about in the program.' ... Yeah, I think it's good to keep things realistic. Woman ID 70

Participating in the eMB course provided partners with ways to articulate need for information on topics they knew were important but did not know where to start. Partners talked about feelings of disconnection due to her pregnancy needs. This partner perceived her as making assumptions about his experience.

"It's like she takes for granted that I might already know. Some of the things that she's going through, I have, I have no idea. I have no clue. You know, I, I'm not a medical doctor, I don't have any education in this kind of stuff. So I don't know what I don't know, what she's going through, and I think sometimes she just assumed that I know. You know, how her body is changing, how that affects your mindset. Not a clue, you know, I have no idea about that stuff, and so that's something I definitely wish that she knew that I would find out that I don't know. Partner ID 24

In some cases, partners became aware of the necessity of being in tune as a couple. The idea that couples should be attentive and knowledgeable of each other's mental health status and more basic needs was conveyed. In this case, the partner discussed the utility of checking-in rather than making assumptions.

"I mean because that was like one of the big takeaways for me from the course is, 'Hey, just make sure to be familiar with your partner's emotions.' Or how she, how they are

going through everything...and just not read into everything because sometimes when she was tired, 'Yeah, she is just tired' and it allowed me just to, just us to talk about it this."
Partner ID 24

Not all participant experiences indicated increased connectivity or communication about perinatal mental health after using eMB. However, the course helped pregnant women think through what to do when the partner was not supporting her needs. In this example, the course helped her think about the support systems that exist outside of the couple:

"I mean, it definitely helped me learn to reach out more. Like, even though I can't really talk to him [partner] like I do call my mom a lot and I call my family a lot...I have a lot more support like when you go through your day-to-day life. You don't sit and think about all the people that are really supporting you." Woman ID 62

Sociocultural tensions. There were tensions described regarding when and how to address individual mental and physical needs, be present for the pregnant woman, and be present in the antenatal experience. Sociocultural norms promote the idea that intentional coupling implies or produces shared experiences. Perinatally, a tension exists for couples due to social and cultural norms perpetuating and prioritizes the notion that pregnancy is solely a physical experience producing a birth. Some participants deemphasized emotional and informational connectivity by minimizing their own needs as a supportive act.

"I mean, it's, is it really does all revolve around the pregnant party...there's only so much you can make it about the partner...it's cool to have that focus, but to me, like it's not even really like about me. It's about me assisting or it [eMB] helping me communicate."
Partner ID 4

Not only does the above example distance her (i.e., the pregnant woman) from the couple's shared experience with the verbiage "pregnant party," his description is illustrative of sociocultural norms suggesting the partner is not a priority in the perinatal experience.

In other examples, there was an acknowledgment that the course prioritized her experiences, but there may be room to discuss his needs. There may have been an unintended consequence of using eMB that reified a cultural norm that his mental health isn't relevant, particularly perinatally.

"I just, you know, kind of applied it [course material] to myself, obviously, you know, as a male going through that stuff. Yeah, you, you obviously know the program is geared toward a woman and pregnancy. But I think you know that's the thing that you know you men go through a lot of that too. It's just, it's just kind of the, we don't want to talk about that, you know, kind of a thing." Partner ID 24

Participants described thinking about ways to be mentally present and purposefully engaged as a couple. Some talked about looking beyond the lack of partner content and find ways to empathize with her experience.

"The content, for me, was geared towards pregnancy... it did give me thoughts of, 'Is this what my wife is going through?' you know, or 'Does she have these kinds of feelings as well?' And maybe I should, you know, see if she's going through any of these issues that are that were coming up within the lesson. So, in that respect, that was the way for me to pull [information] out of it [eMB] and get it from her perspective so that I wasn't just purely focused on myself... 'Okay this is not geared towards me, and let me see what it is like on that other side.' Partner ID 41

Another tension was about one's role. While the intention is supportive, there may be a tendency to ignore aspects of his mental health, relational, or informational needs. One partner said, *"She's doing all the work. And I am this, her support person. And so, I'm here for her."* Partner ID 4. Another partner described getting to the "end goal" implying the need for his focus on the birth or providing support for her.

"Conversations just trying to keep it all in like one cohesive, positive view to get to the end goal...A happy, healthy delivery and like, and then want to have another after." Partner ID 4

The tension reflects a larger sociocultural tendency to push aside, ignore, or minimize mental health needs. One partner described not communicating about mental health as part of ingrained messaging.

"You know, I kind of grew up in a household of 'Just suck it up and, and move, just drive on.' And so, for me to relate to communicate my feelings. It's just not natural to me to do that...That when I do talk about how I'm feeling with my wife, it does help relieve my stress and anxiety. I start bottling that stuff up, and I don't release it, then it's, yeah, I just kind of builds up...and then it just kind of comes out in a negative way." Partner ID 24

There were descriptions of how sociocultural norms have reinforced moving past mental health needs, particularly in deference to her needs. In this case, the partner's description sounded as if he felt no other choice and was trying to justify the inattention to his emotional or mental state:

"I've really got to be the like emotional rock right now because she can't be honestly...Uh, so, um, which has felt like too much at some points feels like too much pressure. But It's worth it. So, been able to cope and get through it and help her do the same." Partner ID 76

The course seemed to raise awareness about planning for birth and postpartum, but it is unclear whether it illuminated the tendency to engage in end goal thinking at the cost of experiencing the present. A final tension of the health of the child at birth and the pregnant woman's antenatal experiences. This tension exemplified by a woman's description of feeling objectified until a doctor asked about her wellbeing rather than just focusing on the physical health of the fetus:

"You just want [the partner] to be like, 'Hey, how are you, though, like, how are you feeling?', and same with our doctor's appointments too. They're like, 'How are you as a person, though?', like 'baby's fine... how are you feeling?' And so it's just more of that where I'm like, I'm so concentrated on what's going on in here [womb] that it was like, 'Oh, yeah, yeah, like my doctors [not] here to see me as just the baby.' ...like, I'm also a huge part of this. I'm not just, like, a vessel." Woman ID 2

In sum, this section described themes about how participants felt about partner support while using eMB. The primary theme was how eMB raised awareness within the couple. Participants described how the course increased knowledge through lessons about the perinatal experience, mental health topics, and ways it prompted supportive behaviors. The course generally supported connectivity within the couple. Finally, sociocultural tensions included end goal thinking and potentially missing the present antenatal experiences, setting aside one's own needs in attempts to be supportive, and pushing aside mental health needs more generally. The course did seem to foster supportive behaviors; however, there are opportunities to improve the content to be more specific to the couple's efforts in learning how to do so.

Summary

This chapter has provided descriptive and qualitative findings in response to two study questions. One question explored whether participants found the study satisfactory and included participant responses to survey and interview questions. The second question explored how participants felt about partner support with eMB using interview data. In general, participants found the eMB satisfactory and made straightforward suggestions for improvement, primarily through thoughtful inclusion of partner-related materials.

Regarding feelings about partner supportiveness, the lack of partner materials was again a critique point, but participants could find ways to view the material in helpful ways by shifting how they perceived the materials. Otherwise, most identified the program as supportive to them personally, the couple's needs, and indeed for the pregnant woman. The next chapter provides discussion and conclusions based on study findings presented in Chapters 4 and 5.

CHAPTER SIX

Discussion

The purpose of this pilot study was to explore the use of an online psychoeducation program intended to lessen the symptoms of anxiety, depression, or perceived stress for women when engaging the pregnant couple. As discussed in previous chapters, online interventions addressing mood and anxiety disorders are widely used and effective, but little research has examined the effectiveness of online antenatal mental health interventions with couples. The study examined the intervention's effect on participant antenatal mental health (i.e., anxiety or depression) and stress perception, describes participant satisfaction and views about content applicability and explores participants' perceptions about partner support during the study period. The study used a mixed-method design to test study hypotheses and to explore qualitative research questions.

Contextual Overview of Historic Events Occurring between 2020-2021

This chapter begins with a discussion of the global events during the study period and is followed by ways in which the sample represents people who have previously experienced perinatal mood and anxiety disorders. This study took place during unprecedented times, as described in the preface to Chapter 4. People were stressed, and it is unclear how many participants in this study would have exhibited symptoms of anxiety or depression had the COVID-19 pandemic, the historic social movements, and political division and events leading up to the 2021 Capitol insurrection not occurred (AJMC, 2021; Buchanan et al., 2020; Leatherby et al., 2021; Williams & Parson, 2020). Indeed, globally PMADs increased substantially during the study period, and known protective factors, including perceived social support and support effectiveness, were associated with lower symptoms (Lebel et al., 2020).

Some participants in this study described income or job loss, and there were deaths of family members and friends. Further, planning for birth, postpartum care, and performing daily living activities was in flux. This study did not record whether participants experienced income or job loss or the death of a loved one, friend, or family member due to the COVID-19 pandemic. However, data indicates 4,922 Missourians died during the study data collection period, June 26, 2020-January 8, 2021 (USA FACTS, 2021). By April 2020, Missouri reported an unemployment rate of 12.5%, up from 3.9% at the end of March 2020. Between February 2020-February 2021, payroll employment decreased by 130,500 jobs. (Missouri Economic Research and Information Center, 2021). Research on the COVID-19 pandemic has shown that increases in anxiety rates among pregnant people have been profound and have lasting implications for postpartum mental and physical health, child development, and relationships (Moyer et al., 2020). The context in which this study took place likely affected outcomes. As a result, study findings provide unique contributions of insights and lessons learned during this time.

Study Participants and Mental Health

Anxiety was the most common self-reported disorder among women and partners in the Time 3 survey. Although self-reported PTSD, bipolar disorder, and OCD was limited, when reported, it was mainly by women in this study. These findings are congruent with the current literature for pregnant women and partners (i.e., women report higher rates of mental health symptoms than their partners). Previous literature also finds that the pregnant woman's mental health symptoms tend to increase from before to anytime during the current pregnancy (Ashley et al., 2016; Leach et al., 2016; Leach et al., 2017). Regardless of role or group assignment in this study, overall participant recall of anxiety or depression in the three months before the

current pregnancy was less than what they reported experiencing at any point in the current pregnancy. Participants disclosed risk factors including unintended pregnancy, a history of mental illness, a previous perinatal loss or trauma, discontinuation of medication, and experiencing a major life event. Previous research suggests some of these factors may account for increased mood or anxiety symptoms (Abajobir et al., 2016; Andersen et al., 2012; Biaggi et al., 2016).

Up to a third of women in this study reported using medication or counseling therapies at some point in the current pregnancy. Given that this sample of women was required to have elevated symptoms of anxiety or depression, this number is low according to best-practice recommendations and could indicate women's desire to engage in programming such as eMB that may fill a barrier to care. Routine, in-person care was likely not an option for everyone due to COVID-19, which could leave many women without the same access to care as pre-pandemic. It is unclear how access to treatment for this study's participant population aligns with other Missourians' experiences of antenatal mental health interventions (Boelig et al., 2020; Dosaj et al., 2021; Werner et al., 2020). Interestingly, given the world's increased psychological needs during the pandemic, participants reported limited conversations about postpartum depression risks with care providers. This finding is similar to literature noting the limited conversations in non-pandemic times despite best-practice recommendations to screen and provide information about risk factors during the antenatal period (Accortt & Wong, 2017; Committee on Obstetric Practice, 2015; Earls & American Academy of Pediatrics, 2010; Hynan et al., 2015; Legere et al., 2017; Lind et al., 2017; Lupattelli et al., 2014; O'Connor et al., 2016; Siu et al., 2016). Recent research also shows that the additional stressors on women and partners during the pandemic have affected continuity in prenatal care, planning for perinatal mental and physical health needs,

and uncertainty about risks associated with contracting COVID-19 while pregnant (Wastnedge et al., 2021), all of which can impact mental health.

Concerning participant attitudes and behaviors during the current pregnancy, most people across treatment and control groups reported having their first prenatal visit within the first trimester (U.S. Department of Health and Human Services, 2004). This is similar to past research on married, higher educated couples who often have private insurance through a workplace (Wally et al., 2018). Participants' reports of early prenatal care are encouraging, given how the pandemic required rapid integration of existing telehealth services (Monaghesh & Hajizadeh, 2020).

There was a significant difference in intention to get pregnant between groups; fewer women in the control group indicated they were trying to get pregnant compared to the intervention group. Missouri PRAMS indicates about half of Missouri's pregnancies are unintended (Centers for Disease Control and Prevention, 2017b). Perinatal health experts suggest that the pandemic might have contributed to increased unintended pregnancies due to lack of reproductive care or increased sexual encounters without contraception. Still, it is too early to fully understand if the pandemic accounts for the between-group variation in this study (Thapa et al., 2020).

The descriptions noted above about this study's sample may not adequately represent the experiences of Missouri women. Despite best efforts, recruitment methods did not result in a representative sample of the target population (i.e., Missouri women at risk for increased symptoms of anxiety and depression antenatally). It is common in perinatal mental health research to fail to reach all populations, especially disadvantaged groups. In Missouri, BIPOC, people with no post-high school education, or those who are low-income experience

disproportionately high rates of anxiety or depression throughout the perinatal period compared to women who are White, have some post-high school education, and whose household income is mid-to-high (Department of Health and Human Services, 2019). In this study, 27% of women identified as people of color, but less than 10% of the sample had education levels lower than college and the majority were employed, with high incomes. Given the lack of in-person perinatal mental health programming due to the exceptional events occurring during the study period, an online intervention may have been more accessible and appealing to certain sub-populations (Burgess et al., 2021) or different recruitment strategies may have been needed to recruit a more representative sample.

Previous online mental health interventions in the antenatal period have included a homogeneous study sample of primarily White, married or partnered, and higher educated women reporting similar household income levels. This study's sample was similar in demographic characteristics to previous studies and similar in design and intervention type (Ashford et al., 2016; Lee et al., 2016; Lee et al., 2018). The pilot was necessary because other online studies of this nature have not included partners alongside pregnant women; therefore, there is less information about comparable samples. A recent systematic review on father-inclusive perinatal educational programs (i.e., preparing for birth or parenthood, increasing maternal supportiveness, increasing self-efficacy in child-rearing) is informative to understand sample characteristics for interventions that contain information about perinatal topics (Lee et al., 2018). Of those studies included in the Lee et al. (2018) review, the most common and more recent antenatal studies addressing mental health or promoting traits associated with partner supportiveness mainly included younger fathers who were a minority, low-income, unmarried, and had little or no education beyond high school. Studies including fathers of more advantaged

groups were up to four decades old, yet perinatal mental health issues persist within couples indicating a need for research for fathers in general (Diemer, 1997; Hart & Foster, 1997; Smith & Smith, 1978; Westney et al., 1988). This study's failure to recruit a more inclusive sample suggests that a multipronged approach in programming and recruitment strategies is needed to reflect the diversity in pregnant people's partners. Online studies have the potential to supplement systems of support and provide equitable and inclusive programming.

Efficacy of eMB with Couples and Potential Improvements for Programing

In this study, symptoms of anxiety, depression, and perceived stress were not statistically significantly different when comparing outcomes between eMB participants to the control group. These findings are similar to Barrera et al. (2015), where mental health outcomes improved when assessing symptom severity throughout the eMB program and between-group differences trended in favor of the intervention group though not statistically significant. In this study, women began the study with moderate symptoms of anxiety or depression. Many women had elevated (i.e., greater than a score of 10) symptoms for both. Women in both groups experienced lower symptoms at Time 3, but those in the intervention group experienced a more considerable drop in scores than women in the control group.

This study provides data about associations between partner and pregnant women's mental health outcomes in the antenatal time and is a valuable contribution to the literature (Biaggi et al., 2016). It is notable that across both groups, partners were, on average, below the cutoff for moderate symptoms of anxiety and depression at every measurement time in the study, and there were significant differences between partners and pregnant women within each group. Findings from this study imply maternal mood or anxiety had a more negligible effect on a partner's mood or anxiety symptoms and raises important questions as to why. The current

literature suggests a positive association for perinatal maternal mood and anxiety on the partner's perinatal mood and anxiety outcomes (Pilkington et al., 2015; Wee et al., 2011). Additionally, there may be illuminating patterns depending on how many weeks gestation the woman was at the time mood and anxiety were measured and worthy of analysis with modeling of lagged effects between partners and pregnant women in the couple by measurement time point and consideration of weeks of gestation. The current literature on maternal antenatal mood and anxiety suggests significant changes by trimester (Bennett et al., 2004).

A third of partners in the intervention group said they did not use the program at all. This may indicate that the actual effect of an engaged partner may have been less evident in the analysis. An analysis excluding partners who did not use the intervention but were assigned to the intervention group may shed light on important changes in mood, anxiety, and stress perception that was not detected in the current analysis. To complicate this matter, even if partners did not engage the content, it is possible that their partners talked to them about the content suggesting indirect content engagement. Although difficult to parse out in the current study, future research is needed to disentangle the effects of partner engagement.

Participant Satisfaction and Perceptions of Support. Participants reported satisfaction with using eMB. Those responding to questions about satisfaction in the Time 3 survey felt the course was good or excellent overall. Interviews corroborated the survey results and added informative nuance about engaging the partner, promoting awareness, and increasing empathy for program adaptations in the future. Regardless of role, participants described ways in which engaging with the course and reflecting on their learning was beneficial for practicing new skills or revisiting ones previously learned and recognizing the importance of understanding or seeking to understand whether their significant other also had tools that helped cope with anxiety,

depression, and stress. This study's findings on support perceptions are similar to other studies of perinatal education interventions involving couples (Lee et al., 2018).

Despite reports of course satisfaction, a third of partners reported not using the course in the Time 3 survey. Interestingly, the most common reason for the lack of couple enrollment in the current study was no follow-up from the partner to complete the enrollment process.

Throughout the study, partners participated less than the enrolled women in surveys administered at Times 2 and 3 and in interviews at Time 4. One possible reason for the lack of engagement with eMB found in the qualitative analysis is that partners might not have engaged with the programming because they did not find information tailored or relevant. Learning theories indicate content delivered in a manner that is engaging and relevant to the learner is most effective (Bandura, 1977). The original programming suggests the content was applicable and useful for partners, but results from this study suggest the need for more tailored materials (Barrera et al., 2015; Muñoz et al., 2007).

Participants found the course information helpful in learning or practicing reframing maladaptive thoughts and for reflecting on how actions inform behaviors. This indicates increased awareness of the principles promoted by cognitive-behavioral theories, which is central to the eMB course objectives (Ashford et al., 2017; Lee et al., 2015). The variety in lesson content and information delivery techniques were positively received overall; however, research suggests that addressing minor critiques may deliver a more effective and quality experience (Lustria et al., 2009).

Partners discussed ways in which the course helped them better understand unfamiliar or new ideas associated with the realities of pregnancy and noted how they were more present, purposeful in their thoughts and actions, and engaged in communication of how to support the

pregnant woman. This finding is congruent with previous literature when partners have participated in education about perinatal mental health using in-person formats or through more informal ways such as engaging in peer support groups (Lee et al., 2018). Similarly, pregnant women in this study noted the importance of engaging with their partners or finding outside sources for perinatal mental and physical health needs and were appreciative of how the course prompted questions and conversation from their partners and vice versa.

This study's results reveal tensions between their increased awareness and empathy as the couples moved through the antenatal period and the unintended effect of potentially mal-adaptive coping as the course may have reinforced sociocultural norms tending to detract attention from mental health needs. Partners discussed setting aside or pushing through their mental health realities or needs in deference to the pregnant woman. There is a literature gap about how a partner's mental health affects pregnant women in the antenatal period and vice versa. However, partner mental health is highly correlated in the postpartum period and can be a risk factor for her mental health, can increase marital disturbance and intimate partner violence, and has been shown to have adverse effects on attachment with the infant and throughout child development if not addressed (Bruno et al., 2020). Similarly, the current study found the course reinforced culturally normative behaviors of solely focusing on the pregnant woman's mental and physical health regardless of the couple's intentional engagement as a unit. Couples discussed end goal thinking which can signify cohesion within the couple about priorities and mental, physical, and material resources. A potentially unintended consequence of end goal thinking might be to push aside or overlook realities that could result in poor outcomes at birth or postpartum. Pregnant women indicated wanting their mental and physical realities to be validated and addressed in the

present; in one case, a woman described the lack of validation as feeling objectified, a "vessel" for the baby.

Despite critiques, couples talked about the course as positive for relational awareness and coming together to have a positive perinatal experience in challenging times. The participants found the programming to increase empathy and awareness of their counterpart's mental and physical realities. Participants indicated positive learning experiences about perinatal mental health topics and coping strategies to use in the present and future times to buffer risks of anxiety and depression. Overall, the course was described as satisfactory and prompted positive feelings about partner supportiveness, indicating promise for this programming type.

Implications

The interpretation of results highlights several implications and opportunities for future research. The following paragraphs discuss recruitment, the potential for online programming to increase awareness about perinatal mental health, the importance of tailoring content for end-users, considerations about partner support using eMB, the opportunities for research inclusive of couples during the antenatal period, and addressing tensions identified when couples used eMB.

The past year's events reveal promise for providing access to health care services via telehealth and online applications to support mental and physical health care services. In one year, the use of telehealth online services and programming for promoting mental health has advanced in ways that have not been possible in the last decade even though the technology has been available for use. The lessons learned from this pilot are informative and can be maximized given the heightened focus on mental wellbeing for pregnant women, families, and communities. Providers using telehealth could be targeted as potential users of this type of programming.

The current study does not contain a sample reflective of all Missouri women at risk for increased symptoms of anxiety and depression antenatally. The recruitment methods used produced a sample of women who were highly educated and faced few economic challenges. In future studies, a recruitment plan that ensures a more inclusive sample is necessary. Advertising through more diverse social media outlets may have helped reach a broader target. A more traditional approach such as mailing a letter to people who had a prenatal encounter may be a successful recruitment technique. Recruitment using community health workers, engaging local organizations serving traditionally underserved or marginalized people, recruiting through existing prenatal education classes, and recruitment through providers who give prenatal care to women may produce a more diverse study sample of women. Some of these recruitment approaches may require more education and buy-in from physicians, nurses, or behavioral health professionals, as the findings from this study signal limited conversations by antenatal providers about mental health. In the most general sense, purposeful public health messaging by radio, television, or billboards may reduce stigma about engaging in future antenatal mental health studies.

Courses like eMB can be coupled with other interventions to maximize exposure to perinatal mental health issues. For example, more traditional prenatal education classes include lessons about perinatal mental health and use eMB as an additional learning opportunity. Researchers can partner with health departments, federally qualified health centers, or birth centers to promote this type of programming for people with limited access to treatment due to payment barriers or for those who distrust traditional prenatal care, and for those at-risk for poor perinatal mental health outcomes. Making the content available through the patient portal of the electronic health record as part of routine prenatal education or when a woman screens positive

for a PMAD has excellent potential and may facilitate ongoing mental health treatment with a behavioral health specialist. Finally, there is a need to identify partners at risk for poor mood or anxiety during the perinatal period and engage couples who present together during prenatal wellness visits about perinatal mental health. However, content covered in eMB and similar interventions should be sure to include content that partners perceive to be relevant to their own pregnancy experience.

Given the challenges and stressors associated with the unprecedented events during the study period, it is encouraging that women in the intervention group had a substantial and significant drop in anxiety symptoms scores. Future research warrants exploration of why women had decreases in anxiety symptoms, but the partners did not. Interestingly, there were significant differences between couples at every time point for all outcomes of interest. On average, partners in this study generally had less severe symptoms of anxiety or depression at any point in the study when compared to women and the mean partner scores did not decrease as much as the women. Previous research indicates that a pregnant woman's mood or anxiety may affect her partner's mental health, but little antenatal research describes how a partner's mood affects the pregnant woman's mental health (Biaggi et al., 2016). Given the significant differences between role mental health outcomes, this study's findings suggest the need to explore further the associations of a partner's mental health on a pregnant woman's.

The primary critique of the course was the lack of content available for partners. Participants had access to course background and were informed of how viewing the course material may help partners empathize with the pregnant woman's experience but still indicated a desire for relatable partner content. In general, participants did indicate being able to move past the fact that there was no specific material for the partner, signaling that they found value in the

content. However, some participants felt that if partners are invited to participate, materials tailored to them would be welcomed. These findings indicated the need to learn more about content applicable to the couple's roles in future studies.

There were tensions in how eMB users discussed perspectives about mental health and partner supportiveness suggesting macro-level, sociocultural norms that influence how one addresses individual and relational attitudes and behaviors. Policies, practices, and programming help people challenge ingrained ideas that putting aside one's wellness in the present is healthy behavior. Public health and care delivery will benefit from a critical lens on macro, mezzo, and micro-messaging that reinforces ideas that antenatal time focuses primarily on the birth of a healthy child or that perinatal mental health involves only the pregnant women where a couple is involved.

There have been successful interventions addressing perinatal mental health while combining tenants of cognitive-behavioral therapy and mindfulness to promote the importance of perinatal mental and physical health in the present moment. Participants suggested being present in mind as necessary for promoting mental wellbeing and supportive behaviors within the couple. Couples eMB with lessons about mindfulness may positively affect mental health and stress perception while bolstering partner supportiveness. Additionally, there have been successful interventions during the antenatal period, including formal (e.g., therapists or trained facilitators) and informal supports (e.g., peer supports) as part of the intervention; this work can be extended to inform perinatal research to include the couple.

Finally, health systems can make an essential macro-level change by incentivizing providers to screen, refer, and treat perinatal mental health disorders. Incentives can include easy access to evidence-based programs, reimbursed time for attending to perinatal mental health

issues, and perinatal mental quality indicators with publicly available performance reports. Each of these macro intervention approaches requires efficacy research and program evaluation.

Strengths and Limitations

The study had several strengths and limitations. The study included a rigorous experimental design and utilized qualitative methods to provide meaningful context and nuance relevant to a pilot study. A mixed-method design is advantageous when developing interventions for populations not yet studied or for adapting interventions previously found to be efficacious and promising for the inclusion of a new population. The study utilized an approach guided by established and tested theory and empirical literature as part of the conceptualization. This study provided multiple time points, sound data collection and management procedures, and adherence to human subject protections. This study utilized previously validated and reliable measures appropriate for answering research questions. The analytic approach was appropriate given the study design and data collected in this study.

There are study limitations, as well, to consider when interpreting the findings from this project. The global events that occurred during this study are inextricable from the study outcomes. Qualitative interviews were conducted to understand better the impact of these events on participants' attitudes and behaviors during the study.

This study did not have a large enough sample to be generalizable. This study was limited to those living in Missouri for the pilot and resulted in a small sample size for the overall trial and the Time 4 interviews. This study was limited in the sample size, which increases the likelihood of a type II error. Larger sample sizes for future research will increase power and allow additional analytic strategies to examine complex relationships, including dyads. Future studies would benefit from including more geographies to increase the potential sample size and

better understand the impact of the programming on disadvantaged populations in areas with different resources, policies, and perinatal practices.

Another limitation of this study is the failure to recruit a sample representative of Missourians who experiences PMAD's. Due to the stay-at-home order during the study, recruitment activities that may have resulted in a more robust sample were not possible. However, future studies would benefit from the global adaptation of technologies that were pushed forward due to the adversity caused by quarantine. Further, those who identify as BIPOC, who are low-income or with less educational attainment, people with disabilities, and those identifying as sexual or gender minorities experience significantly higher rates of poor mental health across the perinatal period in comparison to the general population, compounding issues relating to disparities (Anderson et al., 2017; Kozhimannil et al., 2011; Substance Abuse and Mental Health Services Administration, 2018). Erasure and stigmatization of gender identities and sexual orientation alongside culturally narrow gender roles is problematic and exclusionary when describing perinatal experiences (Hoffkling et al., 2017; Pilkington et al., 2015; Wenzel et al., 2014). Perinatal mental health affects all people; thus, it is important to acknowledge the unnecessary burdens placed upon people who do not identify as cisgender, heterosexual, or in a relationship. This pilot study is limited to cisgender, heterosexual couples due to the small sample size, which does not yield enough power to conduct sub-analysis for people identifying as sexual or gender minority group members. Future studies should include a more diverse pool of participants as significant perinatal mental health disparities exist for sexual and gender minority groups. A more inclusive pool of participants will require pilot testing to determine if the programming is efficacious and appropriate for all users' needs. The technological progress made in circumventing barriers to communication and access to resources provides the

opportunity to think thoughtfully about recruitment approaches for populations that often experience barriers to care and health disparities or who are traditionally underserved.

Interpretation of results is limited given that some participants assigned to the intervention group indicated not using the program and were not interviewed to ask about that lack of engagement. Additionally, the small sample of interviewees may have limited illumination of factors associated with exploratory research questions and may have resulted from poor engagement with the programming. Future studies may need to increase incentives for interviews or request that all participants participate in a follow-up interview as an expected study activity rather than voluntary.

The intervention dose is unknown, and results from those who indicated not engaging with the content may have been contaminated because of their partner's exposure to programming. There were no requirements placed on participants to complete any number of lessons. There were no requirements for the number of logins, amount of time spent, or pacing of lessons. Participants' ability to view all lessons at any time, pace, or frequency during the trial may have affected mood or anxiety at various time points and may account for significant changes in anxiety and depression symptoms for women between Time 1 and Time 2. Future studies may benefit from protocols that control the pacing of lessons (e.g., releasing one lesson per week) and fidelity checks to ensure participants use programming as intended, and monitor the dose by tracking time the person engages with each lesson or how many times they click on content. The Qualtrics platform has some tools to monitor usage data, and evaluation of data from this study may provide insights about engagement with programming and necessary modifications to future study protocols.

Finally, providing resources to the control group participants was an intervention that was considered ethically necessary given the study requirement for elevated symptoms of maternal anxiety or depression and due to the need to provide information relevant to the pandemic. The use or effect of the control group participants' use of these materials was not measured and is a limitation of this study as mental health outcomes may have been different for those who utilized the provided resources. Future studies may benefit from asking the control group participants to describe the use of any information or resources provided.

Conclusion

The current study examined the efficacy of the eMB program with couples and explored participant satisfaction and feelings about partner support when using the course. There is a lack of perinatal PMAD prevention studies that include the couple, specifically those in the antenatal timeframe. This is one of the first studies to use an experimental design to test the effectiveness of an online perinatal mental health intervention for couples. The study results provide insights about eMB with couples efficacy for reducing symptoms of anxiety or depression, decreasing perception of stress, participant satisfaction, and how participants described feelings of partner support.

In future research interventions, recruitment efforts must include more robust techniques to reach the entire target population. To be successful, intervening at the provider level may be required to ensure that those providing antenatal care promote programming and timely interventions to address mental health needs. This study's findings have implications and the potential to affect policy, practice, and use of technologies that increase access to needed mental health care and promote prevention with a lifecycle perspective.

Overall, eMB participants were satisfied with the course content, yet there was a clear desire for content applicable and relatable to all end users. There is a need to modify the content for future interventions to meet the needs and be inclusive of partners and couples. There are several opportunities for future research based on the findings of this study. Indeed, a larger, randomized control trial with modified content applicable to the couple as a unit would be an appropriate adaptation given this study's findings.

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APPENDIX A

Field Manual for the Mothers and Babies Course

Full manual available online: <https://www.mothersandbabiesprogram.org/wp-content/uploads/2015/09/Instructor-Manual-English.pdf>

MB 1-on-1 Field Guide

Spring 2018

The Mothers and Babies Course

Home Visitor Field Guide



Mothers and Babies Curriculum

Developed By:

Ricardo F. Muñoz, Ph.D.
Chandra Ghosh-Ippen, Ph.D.
Huynh-Nhu Le, Ph.D.
Alicia F. Lieberman, Ph.D.
Manuela Díaz, Ph.D.
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Home Visitor Guide Created By:

Darius Tandon, Ph.D.
Hannah Snyder, B.A.
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Deborah Perry, Ph.D.
Huynh-Nhu Le, Ph.D.

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APPENDIX B

Developer Letter of Support and Permission to use eMB



May 30, 2019

Dear Dr. Canada and Dissertation Committee Members:

I write in support of Shannon Canfield's School of Social Work Dissertation proposal to the University of Missouri Graduate School. I support Ms. Canfield's proposal to utilize the content I have created for the Mothers and Babies Online Course to decrease anxiety and depression for pregnant women. This project will add to the evidence-base of using online interventions to provide access to mental health interventions.

As a faculty member at Palo Alto University (PAU) and Associate Director of the PAU Institute for International Internet Interventions for Health (i4Health) we strive to develop, evaluate, and disseminate digital health interventions to people worldwide, free of charge. I have previously adapted the in-person Mothers and Babies Course as an online intervention and evaluated the outcomes of maternal mental health in the perinatal period with promising results.

Through this letter, I acknowledge my role in support of Ms. Canfield's dissertation work to address maternal mental health among pregnant women and their partners. If her project meets the requirements for a dissertation project, we would expect our role in Ms. Canfield's project, *A Replication of the online Mothers and Babies Course to Improve Perinatal Mental Health for Pregnant Mothers and their Partners*, to include:

- providing access to the content of the Mothers and Babies Online Course to Ms. Canfield for replication on her institution's platform which would allow access to her study participants,
- allowing the course modules to be edited to include data collection elements while on her institution's platform, and
- developing an opportunity for student collaboration across institutions.

Ms. Canfield will take the responsibility to lead the research study, *A Replication of the online Mothers and Babies Course to Improve Perinatal Mental Health for Pregnant Mothers and their Partners*, to reduce perinatal mood and anxiety disorders.

I look forward to working with Ms. Canfield to promote healthy mental health outcomes for pregnant women and their partners through accessible online interventions. I believe this advances health equity for all people. Should you require additional information or have any questions, please do not hesitate to contact me by email at abarrera@palcoaltou.edu.

Cordially,

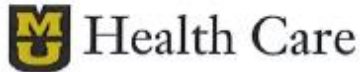
A handwritten signature in black ink, appearing to read "Alinne Barrera".

Alinne Barrera, Ph.D.
Associate Professor
Associate Director of Clinical Training

1791 Arastradero Road, Palo Alto, California 94304 Phone: (650) 433-3800 Fax: (650) 433-3888

APPENDIX C

Letter of Support from Health System



South Providence Family Medicine
551 E. Southampton Drive
Columbia, MO 65201
PHONE: 573-884-7733
FAX: 573-882-6228
WEB: muhealth.org

June 21, 2019

Dear Dr. Canada and Dissertation Committee Members:

I write on behalf of the University of Missouri Health Care in support of Shannon Canfield's School of Social Work Dissertation proposal to the University of Missouri Graduate School. I support Ms. Canfield's proposal to utilize the Mothers and Babies Online Course to decrease anxiety and depression for pregnant women and their partners.

Our organization's mission is clear: to save and improve lives and strive to be Missouri's premier academic health system. Our academic health system promotes efforts for research and innovation so that our patients benefit from leading-edge treatment. Our institution also strives to provide all our patients to accessible, evidence-based interventions.

Through this letter, I acknowledge our institute's role in support of Ms. Canfield's dissertation work. If her project meets the requirements for a dissertation project, we would expect our role in Ms. Canfield's project, *A Replication of the Online Mothers and Babies Course to Improve Perinatal Mental Health for Pregnant Mothers and their Partners*, to include:

- supporting recruitment efforts of patient participants, and
- developing an opportunity for student collaboration projects.

Ms. Canfield will take the responsibility to lead the research study, *A Replication of the online Mothers and Babies Course to Improve Perinatal Mental Health for Pregnant Mothers and their Partners*, to reduce perinatal mood and anxiety disorders.

I look forward to working with Ms. Canfield to promote healthy mental outcomes for pregnant women and their partners through an accessible online intervention. I believe this advances health equity for all people.

Sincerely,

A handwritten signature in black ink, appearing to read 'S. Swofford'.

Sarah J. Swofford, MD

Associate Clinical Professor of Family & Community Medicine

APPENDIX D

Recruitment Materials

Sample Flyer

A sample flyer for a research study. The flyer has a light gray background with a faint, stylized leaf pattern on the left side. The text is centered and uses a mix of bold and regular fonts. The main title is "Between 13-30 weeks pregnant?". Below it is the course name "Online Mothers and Babies Course" followed by a subtitle "a research study including pregnant women *and* their partners". A line of text with sun icons reads "8 Weeks 1 Short Course per Week Gift Cards for Participation". A horizontal line separates this from the "Learn about:" section, which lists four topics with sun icons. Below that is the "Eligible couples receive:" section with two items, also with sun icons. The flyer ends with the contact information for Shannon Canfield, including a phone number and an email address, both preceded by sun icons.

Between 13-30 weeks pregnant?

Online Mothers and Babies Course
a research study including
pregnant women *and* their partners

☀ 8 Weeks ☀ 1 Short Course per Week ☀
Gift Cards for Participation

Learn about:

- ☀ transitions from pregnancy into parenthood
- ☀ shifting roles in relationships
- ☀ positive coping skills and adapting to changes
- ☀ "baby blues" & other mental health topics

Eligible couples receive:


- ☀ Mother and Babies Course for FREE
- ☀ gift cards throughout the study

Spots fill quickly- call or email

Shannon Canfield:

- ☀ 573-884-0089
- ☀ canfieldsm@health.missouri.edu

Sample Facebook Ad:



**Online Mothers & Babies Course
for Couples**
Sponsored · 🌐

...

Topics: transitions to parenthood, shifting roles,
coping, adapting to change & baby blues

Between 13-30 weeks pregnant?

FREE Online Mothers and Babies Course
a research study including
pregnant women ***and*** their partners

⚙ 8 Weeks ⚙ 1 Short Course per Week ⚙
Gift Cards for Participation


Must be an Adult, Living in Missouri


FORM ON FACEBOOK
Mental Health & Pregnancy

SIGN UP

 14

8 Comments

 Like

 Comment

APPENDIX E

Screening Protocol

Invitation Script/Guide:

[Adaptable for use by Clinicians or for direct recruitment in waiting rooms or childbirth education classes]

Thank you for your interest in the online Mothers and Babies Course (*eMB*)! Shannon Canfield, is a PhD candidate in the University of Missouri's School of Social Work program and is leading a study to test the effectiveness of the program. The program and participation in the research study, is voluntary, and completely confidential.

The program provides 8 online educational modules that review changes that occur during pregnancy and in the postpartum, shifting roles and responsibilities that commonly occur in relationships, how to adapt to change through positive coping skills into everyday life, and provides basic information about mood disorders and resources to help lessen the severity, if they occur, during the transition from pregnancy into parenthood.

The intervention is offered online and content is delivered through modules composed of evidence-based tools including audio/text lessons, multimedia, and downloadable resources. The program is free, and participants will receive a gift cards throughout the study. Does this sound like something you and your partner might be interested in doing? If you are unsure about your partner's interest, that's okay, contact Shannon to check to see if you are eligible, and she will give you more information, answer your questions and tell you how to move forward with signing up:

Shannon Canfield

[phone number]

canfieldsm@health.missouri.edu

[healthcare team member may provide a flyer to participant]

[Once the participant has contacted the PI, Ms. Canfield]

Thank you for your interest in the program. To begin I'd like to ask you a few questions to ensure that you are eligible to participate. Also, I will retain this information for tracking and descriptive purposes however any identifiable information you have provided is kept confidential. Do you have any questions about that? [Continue once all questions are answered]

First, this study requires participation from both the pregnant woman and her partner. If you are both eligible to participate you will be enrolled in a randomly assigned group, either a treatment group who will have immediate access to online materials, and required mood assessments taken at enrollment, 4 and 8 weeks; the assessments should take you no longer than 10 minutes to complete each time. People in that group can expect to spend 20 minutes per week on the course materials. Those assigned to our treatment as usual group will also take assessments at enrolment, 4 weeks and 8 weeks; an emailed survey link will be sent at each of those time intervals. At the end of the 8 week period those in our treatment as usual will receive access to the online course free of charge. All participants will receive a gift card each time an assessment is completed; \$10 at enrollment, \$15 at week 4, and \$25 at week eight. Some people may be invited back for a one-time phone interview after the course is complete; those who agree to participate will receive an additional gift card.

Do you have questions about anything so far?

Do you wish to continue to find out if you are eligible to participate in the research study?

[If no, provide them with resource information; if yes continue]

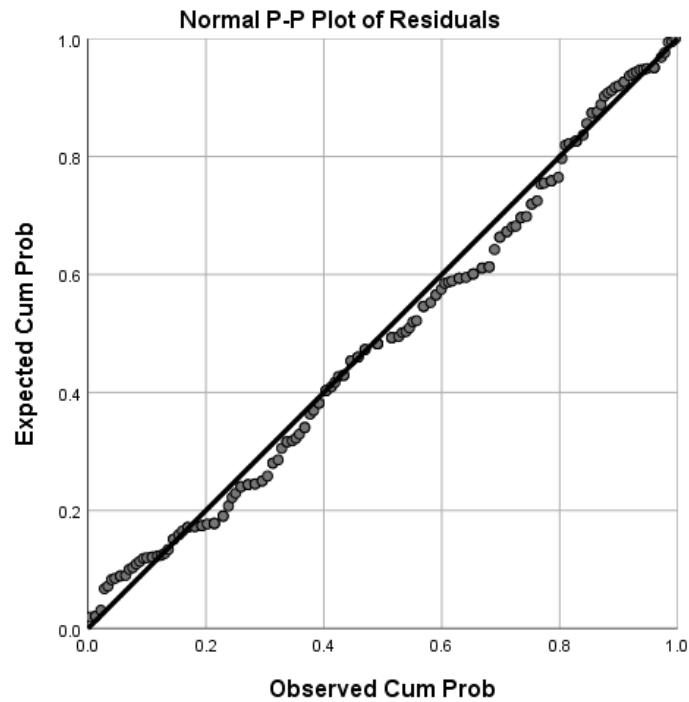
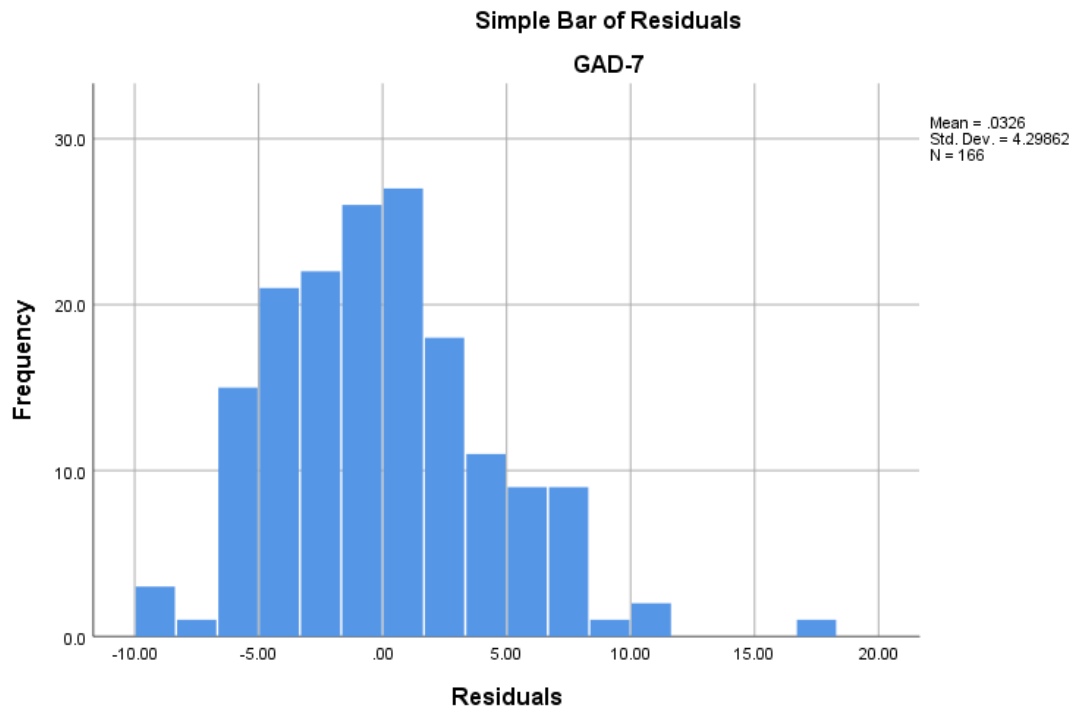
[Stop at any point the interested individual says “no”, let them know they are not eligible, thank them, and give them the resource information]

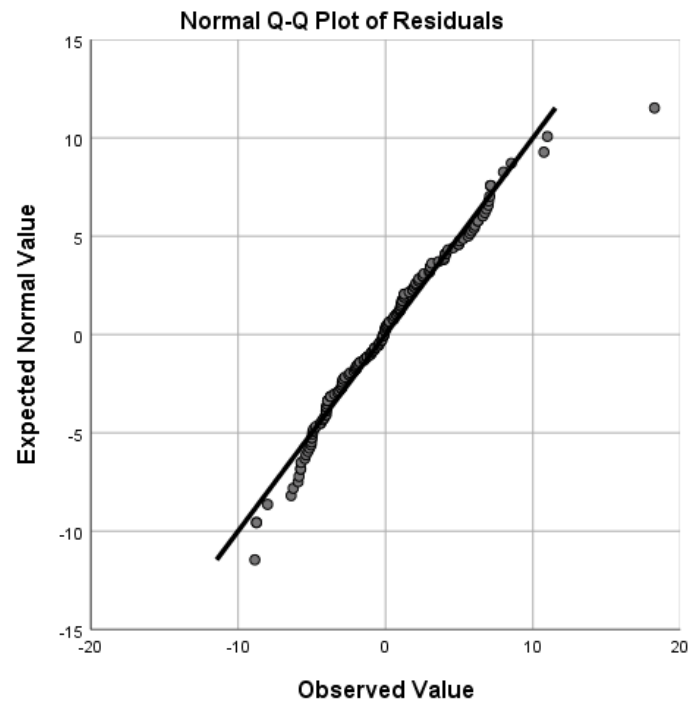
1. Are you at least 18 years of age?
2. Can you read, write, and speak English?
3. Do you reside in Missouri?
4. Do you have access to the internet?
5. Can you provide me with contact information so that I can invite your partner to the study OR will you ask your partner to contact me if they are interested in participating?
[Collect the partner’s name & contact if the potential participant offers]
6. [For pregnant women only]
 - a. Next, I will ask you some questions about your mood and levels of anxiety.
 - b. [administer and score the PHQ-9 and the GAD-7; if score on either is 10 or greater they are eligible; if below that score they are not- let them know they are not eligible, give them resources and thank them for their interest.]
 - c. [If the PHQ-9 item #9 is a 2 or 3, administer the Columbia-Suicide Severity Rating Scale (Screen Version). If the woman screens positive for suicidal intent immediately refer her to the Emergency Room (ER); the participant will retain the right to treatment if they so wish. Give her the national suicide hotline number and tell her to contact her provider after seeking care at the ER.]
7. [If all eligibility requirements are met up until this point the participant is pre-enrolled pending enrollment of the partner. The partner will go through the same steps (1-5).]
8. [Obtain email and contact information.]
9. [Review the consent information and check for understanding.]
10. Notify the potential participant of the following:
 - a. If both parties are eligible you will receive separate email invitations to the program. The email will notify you which group you are in- treatment (get the online course now) or treatment as usual (get the course in 8 weeks).
 - b. Each person will follow the instructions in the email to complete the enrollment process which includes formally consenting to the study by clicking the “I agree to participate” button.
 - c. Next some each person will answer some basic questions about themselves and will take surveys asking about their current mood.
 - d. Interested parties and participants may contact the PI at anytime with questions about the study or consent before fully enrolling. Participants can stop participating at any time. If a person chooses to quit the study, the PI will follow-up by phone and ask the person why they chose to withdraw.

APPENDIX F

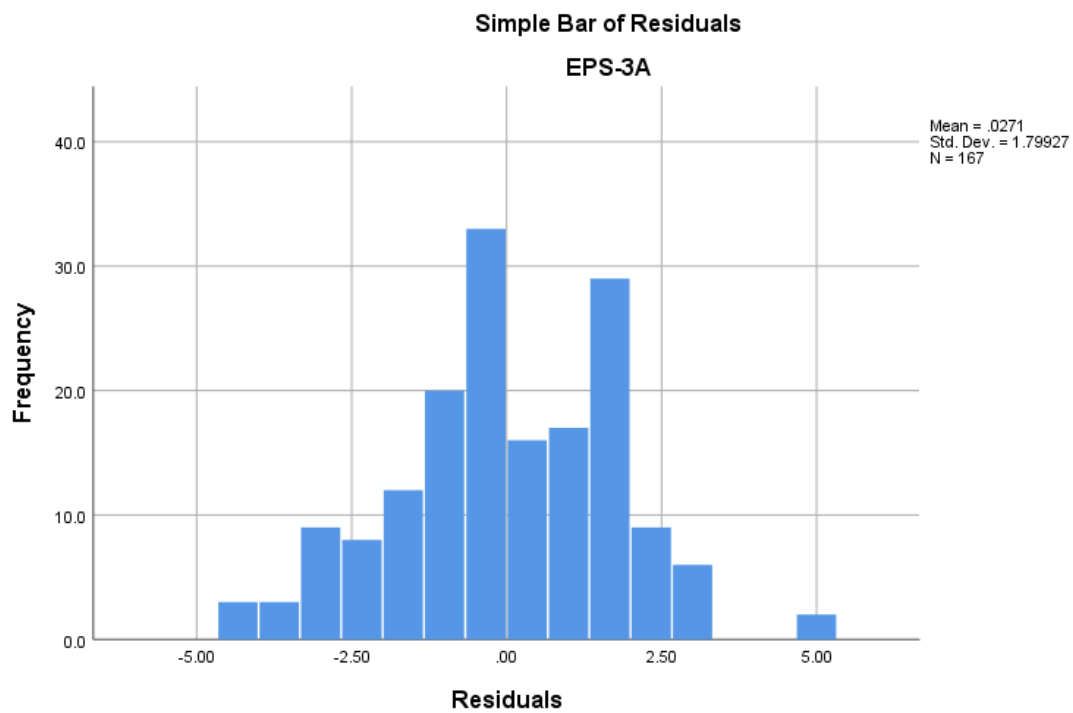
Visualizations for Evaluation of Normality Assumption

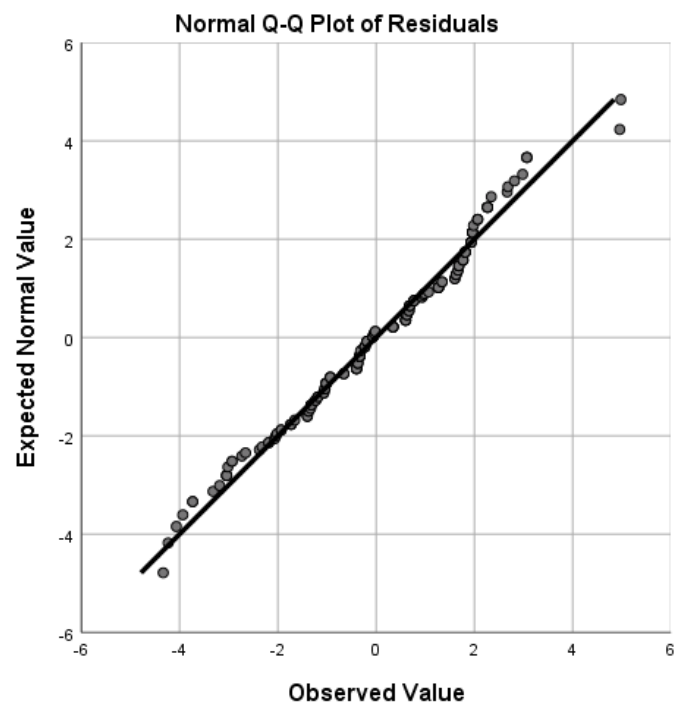
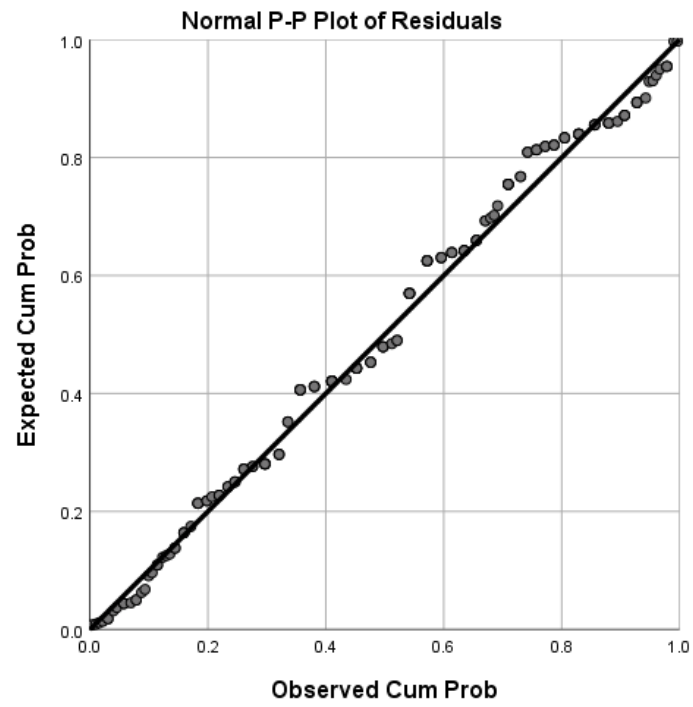
GAD-7: Measure of Anxiety



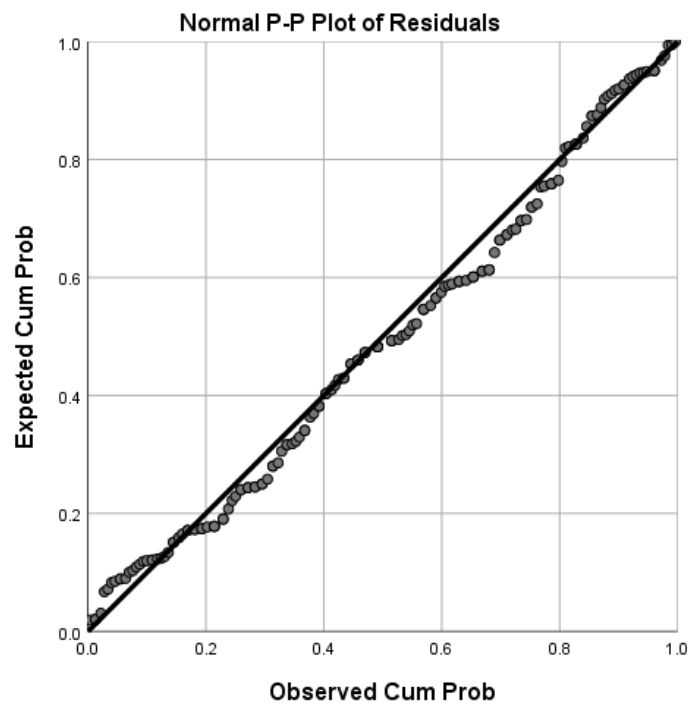
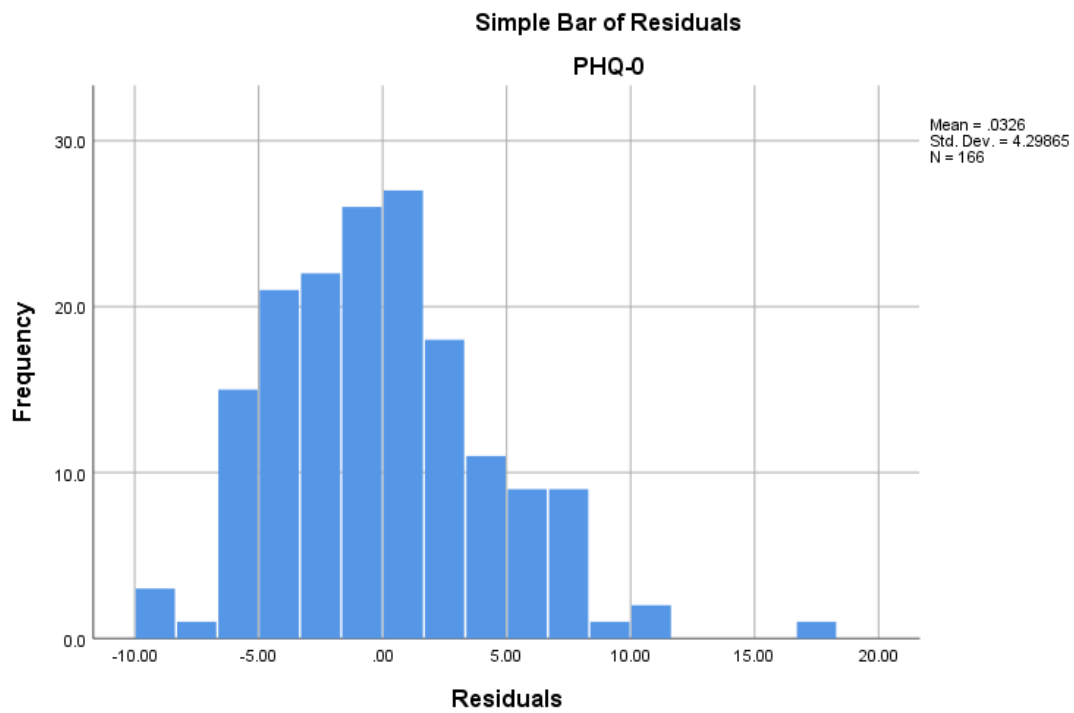


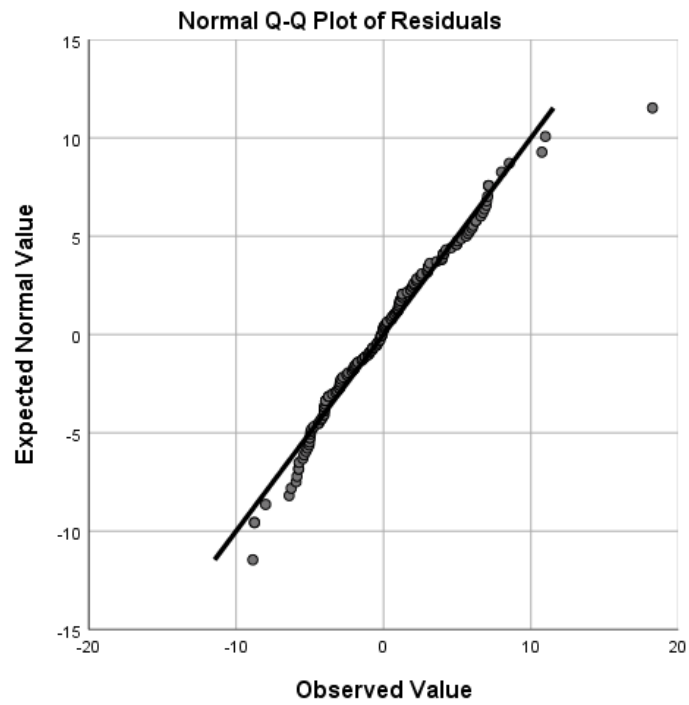
EDS-3A: Measure of Anxiety



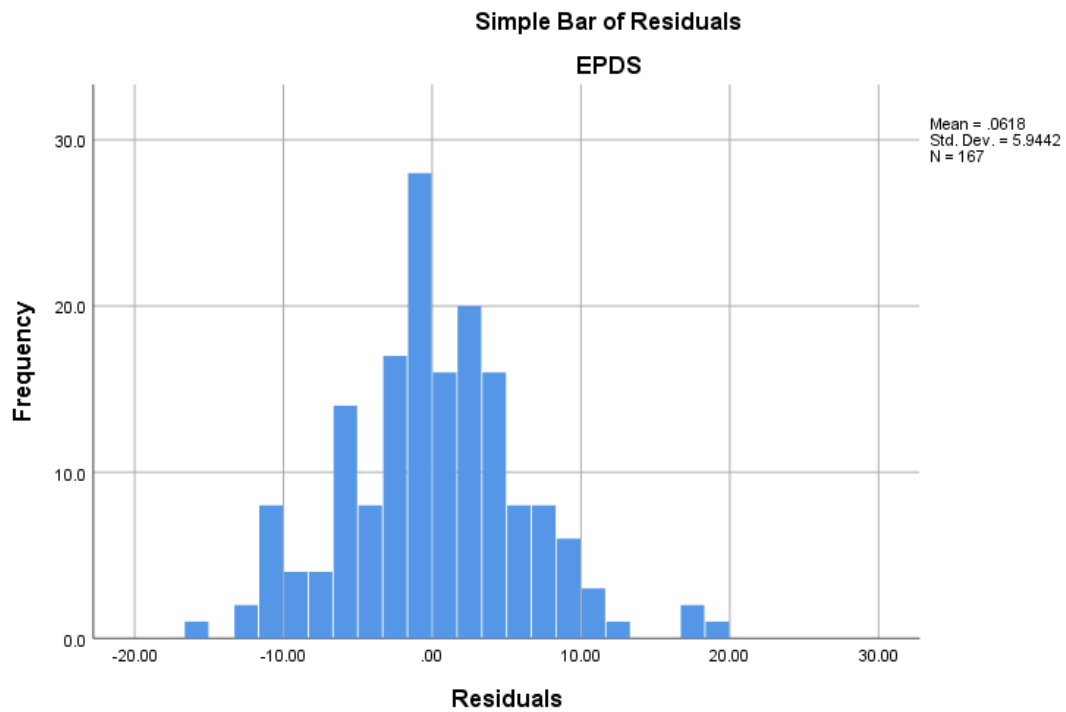


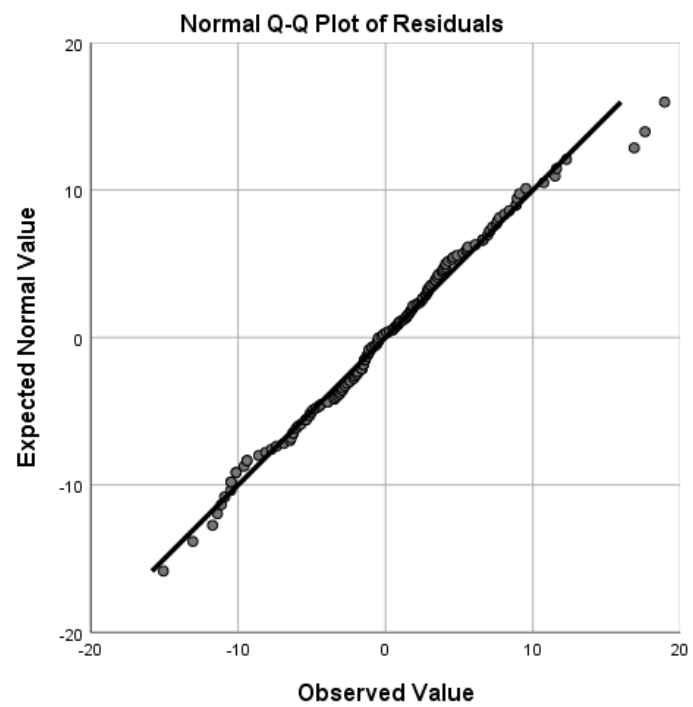
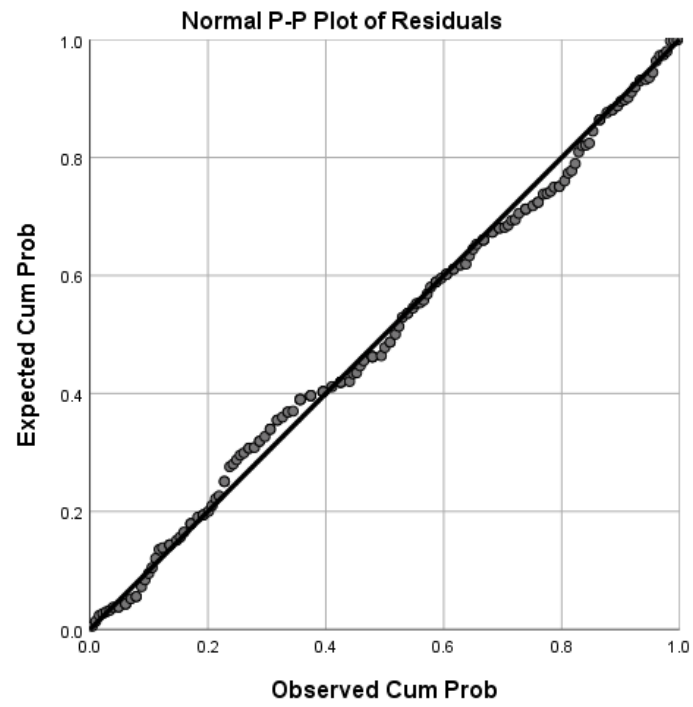
PHQ-9: Measure of Depression



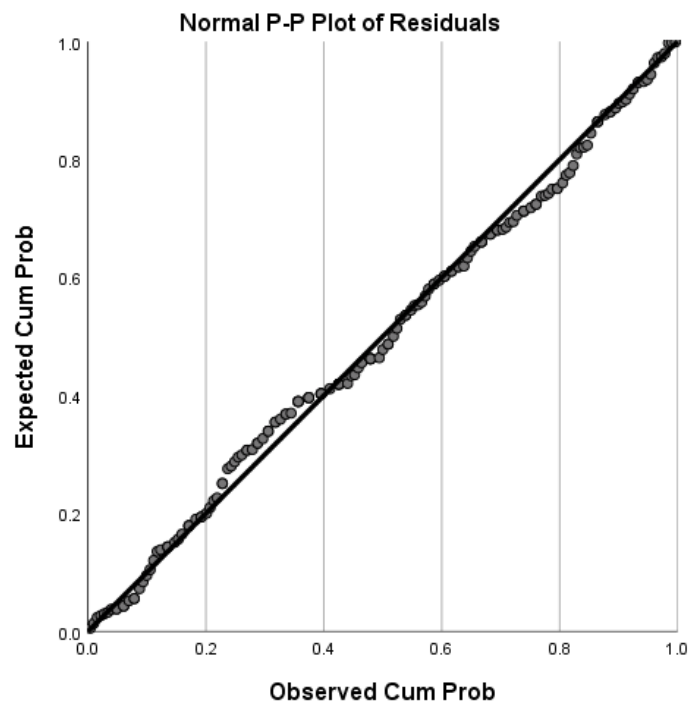
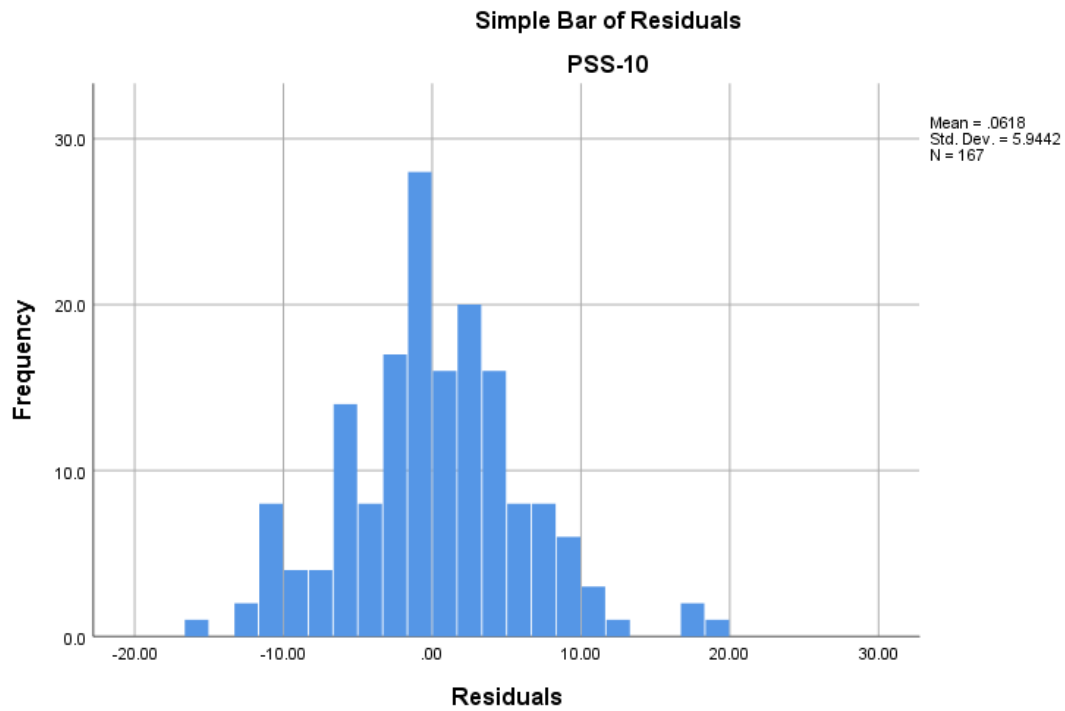


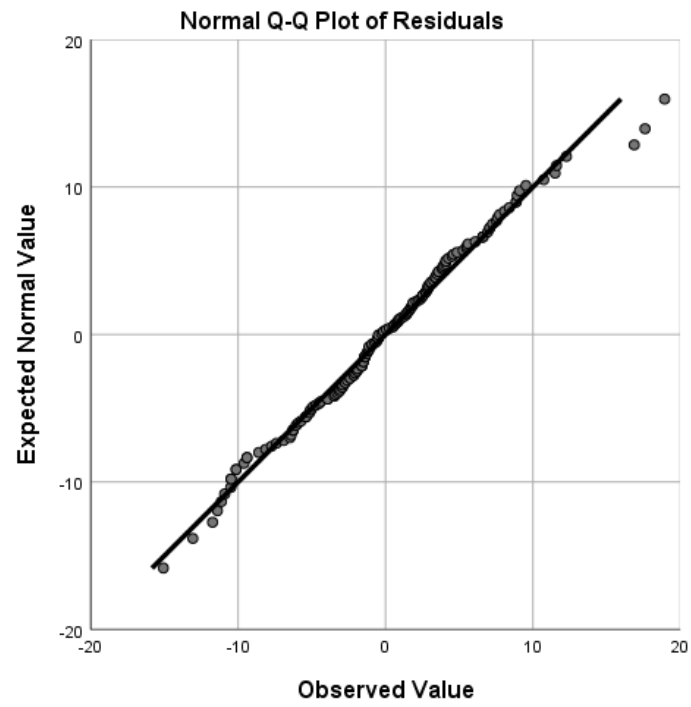
EPDS: Measure of Depression





PSS-10: Measure of Perceived Stress





VITA

Shannon Canfield was born and raised in Missouri and now lives in Columbia, Missouri, with her family. Shannon enjoys spending time with her community, recreation in the outdoors, listening to music, and traveling whenever possible.

Ms. Canfield's research agenda includes health promotion and equity, emphasizing women's health, particularly mental health in the reproductive period. Her research program includes three overarching areas: 1) developing and implementing interventions to support the needs of women and families throughout the perinatal period, 2) exploring the efficacy of using technology-mediated interventions in health promotion, and 3) engaging in health equity research prioritizing community-engagement and access to care.

As an experienced health disparity and implementation science professional, Shannon's work has contributed to successful community initiatives and health care innovations. She has contributed to numerous mixed-method research projects utilizing information technology to improve chronic disease management and programmatic, policy-oriented, or educational approaches designed to promote health equity for marginalized and underserved populations. Ms. Canfield hopes to continue this work upon receiving her Ph.D. in collaboration with researchers, community leaders, and the people served.