

THE EFFECTS OF NON-PHARMACOLOGICAL INTERVENTIONS ON MATERNAL BEHAVIORAL HEALTH AND NEONATAL OUTCOMES: A SYSTEMATIC REVIEW

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May, 2026

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ABSTRACT

Maternal behavioral health (BH) problems during pregnancy are associated with increased risk for a wide range of negative infant and child outcomes. An increasing number of pregnant individuals express concerns surrounding the impact of psychotropics on the growth and development of their pregnancy. However, which non-pharmacological forms of treatment mitigate the adverse impacts of prenatal BH problems on children remains unclear. This systematic review aims to examine the efficacy and effectiveness of non-pharmacological interventions (NPIs) in supporting pregnant individuals with BH concerns, using the biopsychosocial (BPS) framework to evaluate the impact on both pregnant individual and neonatal outcomes.

A search of MEDLINE (PubMed), CINAHL, and PsychINFO, was conducted in July 2025. The search returned 6,864 total records. Screening identified 19 studies that met full inclusion criteria. A detailed codebook was used to extract data from eligible studies. Data are presented to characterize this body of literature in terms of features of the interventions,

comparison conditions, child and parent populations, and their respective outcomes. Collectively, findings indicate an array of published studies have reported positive effects of prenatal non-pharmacological BH interventions on both birthing parent and child outcomes. Findings from this systematic review indicate that moderate length, skills-based interventions, such as psychoeducation, massage, exercise, and some CBT, demonstrated the most consistent impact on maternal anxiety, depression, stress, and wellbeing. While body-based interventions appear promising for infant improvement, less is known about what is most effective for reducing the negative impact of maternal behavioral health on infant outcomes.

Keywords: pregnancy, postpartum, treatments, mental health diagnosis, neonatal outcomes

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Presented To the Faculty of the Department of Human Development and Family Science.

East Carolina University

In Partial Fulfillment of the Requirement for the Degree

Master of Science in Marriage and Family Therapy

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May, 2026

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ACKNOWLEDGEMENTS

I would like to thank Dr. Kayla Fitzke for her mentorship and encouragement. It brought me to the finish line. I would also like to thank those who served on my thesis committee both near and far. Dr. Jake Jensen and Dr. Kristin Hawley, thank you for helping make this project possible.

Next, I would like to thank Jack Andrews for providing a window into the world of academia and supporting my journey to it. I would also like to thank the health science librarian, Corey Harmon, MA, MSLS, AHIP-D, for his support and guidance in the iterative construction of this systematic review.

I would also like to thank the coders who worked tirelessly to keep this project on time. Last, but certainly not least, I want to thank my partner, family, and friends. Your love, support, and unwavering belief sustained me.

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CHAPTER 1: INTRODUCTION

Pregnancy is a period of significant emotional and physical change, and while it follows a predictable sequence of developmental stages, the experience varies widely among individuals. For pregnant people, this transition is influenced by a range of personal and psychological factors that shape the experience in deeply personal ways (Bjelica et al., 2018). For some, these changes may include the emergence or worsening of behavioral health (BH) conditions such as depression or anxiety, which can occur at any stage of pregnancy or the postpartum period. The need for effective BH interventions is critical, as BH concerns are the leading complication of childbirth, affecting 1 in 5 women, and the leading underlying cause of pregnancy related deaths in the U.S. (CDC, 2022; Gavin et al., 2005). Postpartum depression diagnoses, in particular, have seen a 102% increase, jumping from 9.4% in 2010 to 19.6% in 2021 (Khadka et al., 2024). Maternal depression can occur at any time during the pregnancy and postnatal period, with 33.4% reporting onset during pregnancy and 40.1% in the postpartum period (Wisner et al., 2013). The rising rates of BH concerns during pregnancy highlight the need for more treatment options and tailored treatment guidelines for pregnant individuals.

Pregnancy related worries may be especially challenging for pregnant individuals who also have BH concerns, as research shows that stress plays a significant role in the development of BH diagnoses, such as depression (Leonard, 2002). Pregnancy is often associated with increased emotional states that are ever-changing due to the rapid changes in hormones. Emotional fluctuation can lead to elevated levels of stress-related hormones, such as cortisol and norepinephrine, which have been implicated as a predisposing factor in psychological disorders (Leonard, 2002). During pregnancy, heightened emotional states, especially among nulliparous

women, can disrupt fetal development through prolonged exposure to stress hormones like cortisol and norepinephrine. The cyclical relationship between distress and BH may increase risks to both pregnant people and fetal well-being (Bjelica et al., 2018; Naaz & Muneshwar, 2023). Given the uniquely stressful context of pregnancy and its implications for both BH and fetal development, it is critical to examine the range and effectiveness of available treatments for managing BH concerns during this period.

Understanding the intersection of BH and pregnancy is essential, but of greater clinical relevance is the manner in which these concerns are addressed through effective treatment strategies. Despite the availability of efficient primary and secondary options for treating BH concerns, one of the most harmful choices, particularly in cases of severe BH conditions, is to receive no form of treatment during pregnancy (Creely & Denton, 2019; Gruszczyńska-Sińczak et al., 2023; Jarde et al., 2016; Naaz & Muneshwar, 2023). According to Creeley and Denton (2019), for the majority of BH concerns, the risk of not receiving treatment is equivalent to and may even outweigh the risk associated with psychotropic medications.

When left untreated, BH concerns can further exacerbate the pregnant individual's condition and complicate the pregnancy. An increase in symptom severity may impact the pregnant person's ability to care for themselves (Nicholson et al., 2006). Consequently, progressing through pregnancy with an untreated BH concern poses significant risks not only to the pregnant person but also to fetal development. For example, in a recent meta-analysis examining the risks associated with depression during pregnancy, untreated depression was found to significantly increase risk for negative birth outcomes, such as low birthweight and preterm birth (Jarde, 2016). The risk for negative birth outcomes increased with greater severity of maternal depression, as higher levels of in utero exposure to depression-related hormones were associated

with increased vulnerability in the neonate. The fetus is especially vulnerable to the effects of unmanaged BH concerns during critical periods of development, as it is exposed to the same chemicals the pregnant individual inhales, consumes, and produces (Naaz & Muneshwar, 2023; Rosenzweig & Schultz, 1982). As a result, poor mental health in the pregnant person is likely to mirror similar health outcomes in their offspring (Naaz & Muneshwar, 2023). As such, exposure to stress-related hormones from an untreated BH concern not only affects immediate development but may also increase the child's long-term risk for BH disorders (Bjelica et al., 2018). To understand the full consequences of untreated BH conditions, it is important to be aware of the biological mechanisms linking maternal mental health to fetal outcomes.

From a biopsychosocial (BPS; Engel, 1977) perspective, it is essential to consider how the interconnected nature of biological, psychological, and social factors shape health, and to examine not only the outcomes of pregnant individuals but also those of their children. As noted above, the health of the expectant mother, both biological and psychological, directly influences fetal development (Naaz & Muneshwar, 2023). Research has demonstrated, first in animal studies and now increasingly in human studies, that elevated stress hormone levels, particularly cortisol, during pregnancy can disrupt the development of the hypothalamic pituitary adrenal (HPA) axis in the fetus. This system plays a critical role in regulating stress responses, emotional regulation, and cognitive functioning (Sheng et al., 2021). A vast array of research has demonstrated the harm of excess exposure to stress hormones in utero, as it is associated with both physical alterations and an increased risk of BH disorders in offspring (Dziurkowska & Wesolowski, 2021; Leonard, 2002). "High amounts of stress hormones, such as cortisol, can penetrate the placenta and impact the developing fetus, perhaps impairing brain development, causing emotional dysregulation, and altering stress responses in the kid" (Naaz & Muneshwar,

2023, p. 6). Hormonal dysregulation during pregnancy, particularly involving cortisol and adrenaline, has been shown to negatively impact maternal functioning and in utero development (Sheng et al., 2021; Sze & Brunton, 2024). Moreover, BH conditions such as anxiety and depression are closely linked to elevated levels of these hormones (Dziurkowska & Wesolowski, 2021). Therefore, providing comprehensive BH support to pregnant individuals not only benefits maternal well-being and reduces strain on the healthcare system, but also fosters healthier developmental outcomes for their children.

Research Question and Aim

The purpose of this thesis is to synthesize and streamline the existing research on non-pharmacological interventions (NPIs). Specifically, this systematic review seeks to address the research question of which NPIs are linked with positive maternal and neonatal outcomes among pregnant individuals experiencing BH concerns? Therefore, the aim of this study is to examine the efficacy and effectiveness of NPIs in supporting pregnant individuals with BH concerns, using the biopsychosocial (BPS) framework to evaluate the impact of these interventions on both pregnant individual and neonatal outcomes. As the purpose is to synthesize the literature to identify NPIs with greater promise, the study is exploratory in nature, with no specific hypothesis. The goal of this thesis is to inform clinical decision-making and support providers and pregnant individuals in choosing effective, evidence-based treatment options.

The following chapters of this thesis will provide an overview of the current state of treatment options for BH concerns in pregnant individuals, the benefits and risks associated with each option and their combination, as well as the complexity of deciding what treatment approach is of best fit. Following the literature review, a method for conducting the systematic review is proposed. Subsequent chapters regarding existing research on the use of NPIs will be

explored and synthesized to better understand the state of interventions in managing BH concerns during pregnancy.

CHAPTER TWO: LITERATURE REVIEW

The central theoretical model that informs this study is the biopsychosocial (BPS) framework (Engel, 1977). Through the lens of the BPS framework, individual health is understood to be multifaceted. The framework is used to examine how physical, psychological, and relational factors shape not only the individual's health but also those within their system, such as the neonate (Engel, 1977; Kerr, 1981). Examining this study through the lens of BPS provides a foundation for the notion that the holistic health of expectant parents and neonates are interconnected. Larger systems such as the medical system and family can impact aspects of the pregnant individual's overall health, which can impact the health of the neonate in a trickle-down effect (Broderick, 1993; Kerr, 1981). Therefore, supporting pregnant individuals with behavioral health (BH) concerns not only addresses their individual health, but can also positively impact connected individuals from their broader systems. This dynamic has yet to be well established in research relating to the pregnant population managing a BH concern. This systematic review aims to examine the efficacy and effectiveness of non-pharmacological interventions (NPIs) through the BPS lens to inform clinical decision-making and support pregnant individuals and providers in choosing effective, evidence-based treatment options of pregnant people suffering from a BH concern.

Concerns Regarding the Use of Psychotropic Medications During Pregnancy

While this review aims to explore the promise of NPIs for pregnant individuals, first, it is critical to discuss why there is a need for various types of BH care during pregnancy. There are concerns related to the safety and potential impact of commonly used interventions, particularly psychotropic medications, on fetal and neonatal development. The challenges of psychotropic adherence during pregnancy can be observed in each stage of fetal development. In the first

trimester, the fetus is most vulnerable to teratogenic risk (i.e., substances such as tobacco, alcohol, certain medications and infectious agents that can cause birth defects during developmental periods), while in the second and third trimesters, it is vulnerable to cognitive developmental impacts and the overall labor and delivery process (Gruszczyńska-Sińczak et al., 2023). Some pregnant people may be hesitant to continue the same treatment plan during pregnancy, especially psychotropics (Cujipers et al., 2021). A primary concern with psychotropics is the medication's ability to permeate physiological barriers such as the blood-brain barrier and the placental barrier (Adam et al., 2011; Costa & Vale, 2024). The blood-brain barrier protects the brain from harmful exogenous and endogenous material. Despite this defense, psychotropic medications must be able to pass through these barriers to be effective (Creely & Denton, 2019; Costa & Vale, 2024).

Due to permeability, psychotropics can also cross the placental barrier. The placental barrier serves as a filter between the pregnant parent and offspring, allowing nutrients to pass through while filtering out waste products. The placental barrier is much more permeable than the blood-brain barrier and thus puts the neonate at a higher risk of exposure due to the medication's ability to permeate both (Adam et al., 2011; Sze & Brunton, 2024). This is a concern because, despite the increased understanding of medication during pregnancy, there is evidence to suggest that psychotropics during pregnancy may interact negatively with neonatal outcomes and the development of the fetus (Creeley & Denton, 2019; Delorme & Solmi, 2025; Gruszczyńska-Sińczak et al., 2023; Fabiano et al., 2024; Naaz & Muneshwar, 2023). As researchers and providers continue to learn more, some psychotropics have been indicated for safer use during pregnancy, in combination with treatment plans to reduce postnatal impact (Costa & Vale, 2024; Gruszczyńska-Sińczak et al., 2023).

In addition to the risks psychotropics pose to the developing fetus, outcomes often depend on factors like medication type, dosage, timing, polypharmacy, and individual differences in the mother and infant (Betcher & Wisner, 2020; Costa & Vale, 2024). The type of medication pregnant people are prescribed for a BH diagnosis may also determine the level of risk to the fetus (Fabiano et al., 2025). Psychotropic medications, such as antidepressants, antipsychotics, stimulants, and benzodiazepines, can impact newborns when taken during pregnancy (Adam et al., 2011). For example, a recent review of over 66 meta-analyses found suggestive evidence linking antidepressant use and preterm birth, paroxetine (an SSRI) to major congenital or cardiac malformations, and lithium to both congenital anomalies and preterm birth (Fabiano et al., 2024). When considering medication during pregnancy, it is also important to examine risk factors that can compound challenges to neonatal development. Common neonatal effects, in addition to the ones previously mentioned, include birth complications such as lower APGAR scores, lower birth weight, and preterm weight. In addition to birth complications, the use of psychotropics during pregnancy has also been linked to poor neonatal adaptation (PNA), which can impact the ability of the mother and child to bond, especially in the first week after birth. Floppy infant syndrome and neonatal abstinence syndrome (NAS) have also been linked to the use of psychotropics over the course of the pregnancy (Costa & Vale, 2024). Combining or taking multiple psychotropics increases the likelihood of these adverse child outcomes (Kan et al., 2022; Hanley & Mintzes; 2014). Together, these risks underscore the complexity of safely prescribing psychotropics during pregnancy.

Combined Treatment Modality

Although medication often helps to alleviate symptoms, it may not, on its own, be sufficient to resolve the underlying issue for all individuals. Based on current evidence,

combined medication and NPIs may create the most optimal outcomes for individuals suffering from a BH concern (Bertolín-Guillén, 2020; Rajkumar, 2024). Medication can help reduce distress so individuals can better participate in therapy, while the benefits of therapy may take longer to emerge when compared to the initial impact of medication at their therapeutic dosage (Leichsenring et al., 2022; Rajkumar, 2024). Therapies may rely on higher amounts of effort from the pregnant person, as they require multiple sessions and a willingness to participate. Therefore, therapy is indicated as a complementary treatment, creating a combined treatment approach. Relational therapy can be especially effective in creating systemic change, which may contribute to reducing the pregnant individual's symptomatology through increased support and reduced stress (Broderick, 1993; Kerr, 1981). While the combined approach holds promise, especially in improving engagement and reducing distress, the extent of its effectiveness remains debated in the literature.

The debate within the literature reflects a broader lack of consensus about which treatment combinations are most effective, especially during pregnancy. A recent synthesis of the literature, including narrative reviews, theoretical studies, and umbrella meta-analyses, indicated that combining medication and psychotherapy is generally the most effective approach to treating BH concerns *in the general population* (Bertolín-Guillén, 2021; Betcher & Wisner, 2020; Gruszczyńska-Sińczak et al., 2023; Rajkumar, 2024; Leichsenring et al., 2022). Additionally, such combined therapies have been shown to produce significantly better short and medium-term results in several BH conditions (March et al., 2004; Mao et al., 2022). Yet, a recent umbrella of meta-analyses by Leichsenring et al. (2022) found that in the general population the efficacy of combined treatment (medication and psychotherapy), may be overestimated, often helping little more than no treatment or receiving treatment as usual.

Specifically, the meta-analysis of meta-analyses, across a myriad BH concerns, found that treatment effects were small. Most people in the studies only displayed improvements about half the time, and the improvements were typically small across a variety of BH disorders in non-pregnant individuals.

The effectiveness of combined treatments in the pregnant population is even less clear due ethical considerations and methodological challenges associated with researching psychotropic use during pregnancy, including concerns about fetal safety, limited participant recruitment, and restrictions on experimental design. This lack of clear consensus makes it difficult to determine best practices broadly, and even more so when applied to pregnant individuals, for whom the available evidence is more limited and ethically harder to obtain. In a study by Arch (2014) exploring preferences and perception of NPI's and pharmacology for pregnant women, the NPI was preferred by non-pregnant individuals, but especially by pregnant women, over combined treatment or pharmacology alone. Pregnant women in this study reported preferring NPIs because they viewed them as more credible, had fewer concerns about the treatment itself, and felt more willing to participate in them (Arch, 2014). An active and ongoing area of research is exploring which treatment methods and combinations of therapies are most effective for addressing BH issues among pregnant individuals, though no definitive answers have been reached yet.

One of the reasons for this disconnect in literature may be the use of the medical model as a foundation. The biomedical model era has seen limited clinical innovation and poor mental health outcomes, despite promoting evidence-based treatments through drug trial-style research (Deacon, 2013). However, this approach has overlooked how therapy works in practice, slowed new developments, and created a divide between researchers and clinicians (Deacon, 2013). A

new era of research and treatment built on the foundations of the BPS framework may produce more desirable outcomes for these populations.

An Alternative Treatment Option: NPIs

A shift toward more integrative models of care has opened the door for increased attention to NPIs as meaningful components of BH treatment, particularly during pregnancy. Alternative treatments to psychotropic medications include a range of NPIs, most commonly psychotherapy. NPIs may be a helpful option, as they can support pregnant people in addressing symptomatology and psychosocial stressors, while also reducing potential fetal exposure to psychotropic medications (Belay et al., 2023; Castellano-Tejedor, 2022; Creeley & Denton, 2019; Costa & Vale, 2024). Another benefit of NPIs is the array of interventions available that allow pregnant people to find the best fit. Some common interventions currently under examination include light therapy, psychoeducation groups, prenatal yoga, exercise, vitamins, and talk therapy.

These treatment options, which require further research, may also increase accessibility and affordability, especially among patient-centered services (Fuhr et al., 2019; Nakimuli-Mpungu et al., 2020; Patel et al., 2017; Weobong et al., 2017). While generic medications have led to increased affordability of psychotropics, NPIs may increase accessibility to treatment options to more than just medication for individuals with a BH concern. Both accessibility and adherence should be taken into consideration with this population. For example, among pregnant individuals, those with depression are approximately two and a half times less likely to adhere to their medications compared to those without depression (Lupattelli et al., 2015). An individuals' beliefs about medication are a powerful determinant of low adherence (Lupattelli et al., 2015).

NPIs may not only help manage the symptoms of BH diagnoses, but may also foster a sense of agency and connection for pregnant individuals. Similar to psychotropics, NPIs are not a one-size-fits-all (Gruszczyńska-Sińczak et al., 2023). Depending on the modality, these interventions can create shared spaces for communication, allowing participants to build community with other pregnant individuals navigating similar life stages. In addition to offering therapeutic benefit, such treatments often equip individuals with coping strategies, psychoeducation, and practical techniques that support self-efficacy and greater autonomy in their care (Castellano-Tejedor, 2022; Belay et al., 2023). Expanding access to these options may enhance empowerment, reduce reliance on medication, improve health outcomes, and strengthen long-term self-management (Castellano-Tejedor, 2022; Belay et al., 2023). The support provided by NPIs may extend beyond the clinical setting, helping pregnant people to develop greater support systems that serve as protective factors. The benefits of NPIs are promising but still need to be compared to the current standard of treatment to expand options for future expectant individuals.

Furthering research in alternative interventions for pregnant people with a BH concern remains important, especially given that prescription drug use during pregnancy has steadily increased over the past few decades, with most pregnant individuals reporting the use of at least one medication (Creely & Denton, 2019). NPIs can decrease reliance on pharmacological treatments and reduce the need for more intensive healthcare services (Castellano-Tejedor, 2022). Providing more options in the first line of care for pregnant people would not only improve outcomes for the parent-neonate dyad and reduce healthcare costs, but may reduce demands on family systems as well. Chronic illnesses, such as BH conditions, affect not just individuals but also their families, often increasing reliance on informal caregiving. According to

Castellano-Tejedor (2022), unpaid caregiving in North America is estimated at \$450 billion annually. By implementing effective NPIs, the demand on informal caregivers could be lessened, further reducing the overall burden on family infrastructure. This is particularly relevant given that, according to Roehrig (2018), “Mental illness is a major public health concern in the United States, with 2013 health care costs estimated at \$201 billion, placing it among the most costly conditions” (p. 142).

Complexity of Treatment Decisions

While reducing broader systemic strain is critical, treatment planning must also account for the personal and often unpredictable nature of pregnancy and BH needs. Transitioning treatment modalities for a BH concern can be challenging, especially if the need for change is sudden. The process of conception looks different for many couples and individuals. Some have unexpected pregnancies, some get pregnant quickly, and for others it may take longer, allowing them to plan ahead for the pregnancy. Due to this variation, the transition from psychotropics to alternative interventions may not always be a smooth process. People who are hoping to become pregnant and want to transition to a NPI may choose to slowly discontinue their medication, under the supervision of their provider, to reduce the magnitude of possible side effects. For example, Costa and Vale (2024) found that breastfeeding, tapering medication just before birth, and medication choice can all help reduce the severity of withdrawal as a neonatal outcome. Preparation in anticipation of the pregnancy can allow time for individuals to find the best alternative intervention for managing their BH.

Individuals who have a more abrupt pregnancy may decrease their medications at a quicker pace or move to a lower dose of their medication during their pregnancy, depending on their individual needs. Lower medication doses may not be as effective as their therapeutic dose

amount and thus individuals may benefit from combined therapies (Bogers et al., 2023; Cohen et al., 2004; Taylor et al., 2018). Therefore, it is understandable why the decision between medication and therapies can be challenging and why the right decision is different for everyone. In recent years, psychopharmacological care has evolved, and physicians are now better equipped to make informed, individualized decisions rather than avoiding medication altogether. This shift includes flexible prescribing strategies such as dose adjustments, therapeutic drug monitoring, and preconception or perinatal counseling (Costa & Vale, 2024). Clinicians are guided by many different laws and agencies such as the Centers for Disease Control and Prevention (CDC), U.S. Food and Drug Administration (FDA), National Alliance on Mental Illness (NAMI), and U.S. Preventive Services Task Force (USPSTF), as well as various medical associations such as the American Medical Association (AMA), to help pregnant individuals navigate the complexity of their individual needs and diagnosis (Coasta &Vale, 2024). Providing integrated care allows for collaborative decision-making through the involvement of multiple care team members. This form of care better enables pregnant individuals to make the best, most efficacious decision (Coasta &Vale, 2024). Expanding access to validated, evidence-based options, such as NPI's, can provide directionality to reduce the challenges many pregnant people face in treatment planning.

While expanding access to a range of interventions is essential, the ability to engage in these options is often shaped by broader systemic and socioeconomic factors. In addition to navigating clinical risks and personal preferences, pregnant individuals must also weigh the financial and structural barriers (e.g., accessibility, availability, and acceptability) that often shape access to treatment, factors that disproportionately affect those of lower socioeconomic status (SES; Steele et al., 2007; Kirckbride et al., 2024). It is especially important for NPIs to be

affordable and accessible, due to the connection between mental health and SES. According to Hau & Farah (2020), individuals with low SES, who are more likely to have less education and fewer financial resources, are at a higher risk for developing BH concerns, such as mood and anxiety disorders.

The Critical Need for Synthesis

In the United States in particular, steep medical costs and limited outpatient options often intensify barriers to treatment. Providing interventions that can be managed outside of the hospital through outpatient clinics, psychoeducation, and intervention programs may significantly reduce the burden of care on the medical system (Castellano-Tejedor, 2022; Chen et al., 2018; Wager et al., 2024). Identifying and implementing alternative, empirically based interventions would alleviate adverse pregnant individual and child outcomes, reduce financial stress on the family system, and decrease the level of demand on the medical system. In the United States, these changes are readily needed as a major proportion of the economy is spent on health care, above and beyond that of other high-income countries (Wager et al., 2024). Therefore, by improving empirically based NPIs, a greater number of expectant parents may access affordable care to manage their BH concerns during pregnancy.

While psychotropic treatment is a common component of BH care, it is not always the first or only option considered. Re-examining standard treatment modalities and expanding available options would better allow pregnant individuals to choose an intervention that best fits their needs and circumstances. Individuals who seek BH support from a primary care physician are likely to be prescribed medication or referred to another provider, such as a therapist. According to the National Institute of Mental Health (2016), “the primary care provider can treat mental disorders, particularly through medication, but that may not be enough” (para. 1).

Alternatives to medication during pregnancy are not as well researched due to the preference for medication as the primary form of treatment, especially in high-income countries (Creely & Denton, 2019). As Mechanic (2016) notes, it has historically been difficult for primary care providers alone to offer effective, high-quality BH care.

A systemic perspective on maternal health remains an underexplored dimension in the current literature. Many studies have focused narrowly on maternal outcomes without adequately examining the broader family system or child development (Dossett, 2024; Lowthian et al., 2023). By incorporating child outcomes into research designs, scholars and providers can gain a more comprehensive understanding of the longevity, efficacy, and effectiveness of NPIs during pregnancy for the family system. Pregnant individuals, their families, and their providers must weigh the pros and cons of discontinuing medication, especially in cases involving more severe BH diagnoses (Delorme & Solmi, 2024; Fabiano et al., 2022; Costa & Vale, 2024). Although weighing the risks and benefits of pharmacological versus alternative interventions during pregnancy remains complex, the least desirable outcome is the absence of any form of treatment.

Given the nuanced nature of this decision-making process, it is essential to continue developing and enhancing NPIs for individuals who choose not to use medication during pregnancy. Synthesizing and streamlining existing research on NPIs and their associated outcomes during pregnancy can equip providers with clearer, evidence-informed guidance to better support pregnant individuals in making treatment decisions (Leichsenring et al., 2022; Rajkumar, 2024). Advancing this area of care may help reduce the burden on the medical system, expand options and education for providers, increase access to safer alternatives for parents, mitigate risks to fetal development, and ultimately improve BH outcomes. Therefore, this systematic review aims to synthesize the research on the efficacy and effectiveness of NPIs

through the BPS lens to evaluate the impact on pregnant individual and neonatal outcomes, with the goal of informing evidence-based care and treatment planning.

CHAPTER 3: METHODOLOGY

A systematic review will be conducted to delineate the current landscape of non-pharmacological interventions (NPIs) being implemented for pregnant individuals experiencing behavioral health (BH) concerns. This systematic review seeks to address the research question of what current NPI interventions are linked with positive maternal and neonatal outcomes among pregnant individuals experiencing BH concerns? As such, the aim of this study is to identify and evaluate the current evidence on the efficacy and effectiveness of NPI's in supporting pregnant individuals with BH concerns through the biopsychosocial lens. Conducting the proposed review is important as much of the existing research compares NPIs to medication (versus other NPIs) or examines NPIs as part of a combined treatment. While those studies are useful, the field still lacks a comprehensive understanding of how NPIs function as independent interventions. Without greater clarity in this area, the potential for NPIs to be recognized as stand-alone options in clinical practice is limited. The few studies that do focus on NPIs independently tend to be small in scale, with limited interventions, often comparing just one NPI to treatment-as-usual (TAU) or care-as-usual (CAU). While these studies offer preliminary insight, a more comprehensive perspective is needed to aid in informing evidence-based implementation in a clinical setting. A critical step is the systematic synthesis of available NPIs as independent interventions. This review seeks to address that gap by focusing specifically on NPIs as independent treatments for pregnant people, giving providers a better sense of their potential role in supporting pregnant individuals addressing BH concerns.

A systematic review (SR) was chosen over a scoping review or meta-analysis to allow for both breadth and depth in assessing intervention quality, outcomes, and population-specific relevance of NPIs for pregnant individuals with BH concerns. While a scoping review could

offer a broad overview of existing research, it would not allow for a detailed assessment of the efficacy and/or effectiveness of each intervention (Munn et al., 2018). A meta-analysis, in contrast, requires consistent outcome measures and intervention types, which are difficult to find in this small but diverse area of research (Askie & Offringa, 2015; Fagard, 1996). A systematic review offers the most appropriate approach to explore and synthesize findings across studies while allowing a closer look at which interventions are showing promise and for whom. The following protocol was developed following PRISMA guidelines.

Search Strategy

A search was conducted in July 2025 across three electronic databases: MEDLINE (PubMed) using the advanced search, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and PsycINFO. The search terms were formulated in consultation with a health sciences librarian. Search terms referencing concepts such as “pregnancy”, “postpartum”, “treatments”, “mental health diagnosis”, and “neonatal outcomes” were adapted for each database to maintain alignment with indexing and syntax standards. These combinations were used to capture studies referencing the pregnancy and postpartum experience, BH conditions (e.g., depression, anxiety), therapeutic interventions, and measures relating to infant health. A search hedge modified by the health sciences librarian was included to improve the identification of randomized and controlled clinical trials (Canada's Drug Agency, 2025). The complete search hedge can be found in Appendix A. Initial database searches yielded 6,864 results. After removing 1,233 duplicates, there were 5,626 articles remaining.

Inclusion Criteria

Studies were eligible for inclusion if they meet the following criteria.

- The article was a randomized control trial (RCT) published in a peer-reviewed journal and written in English.
- The study population included pregnant humans.
- The study included the prenatal, perinatal, and/or postnatal periods with treatment occurring at some point during the pregnancy. Studies that collected outcomes outside of the postnatal period were included if they also recorded outcomes from the neonatal period.
- Pregnant individuals included in the studies reviewed were required to have a confirmed BH concern at the start of the intervention, identified either through self-report, screening, or a formal diagnosis.
- The study evaluated at least one non-pharmacological intervention within the same demographic group, which could include TAU or CAU.
- The intervention group must be at least partially designed to target or treat the identified behavioral health concern (depression/anxiety).
- The study reported at least one maternal and one neonatal outcome measure; each outcome must be specific to the pregnant parent or neonate, not including shared measures (e.g., perceived bonding scale).
- No publication date or setting restrictions were applied. Studies were included regardless of their year of publication or country of origin, provided they met all other inclusion criteria.

Study Screening

After the search was conducted, all records were uploaded into Covidence, a web-based collaboration software platform that streamlines the production of systematic and other literature

reviews (Covidence systematic review software, Veritas Health Innovation, Melbourne, Australia.). The screening process proceeded in three stages: title and abstract screening, full-text review, and data extraction. The first round of the screening process, title and abstract screening, was completed based on relevance to the previously mentioned inclusion criteria. A full-text screening was completed for articles to confirm their final eligibility. A PRISMA flow diagram was then created using Covidence, with reasons for exclusion recorded during the full-text review phase. All stages of article screening were conducted by two trained research assistants.

Thorough screening instructions were developed and piloted using cycles of independently screening samples of articles, meeting to resolve discrepancies as needed. Screening procedures were influenced by the approach described in Andrews (2025), with the present study adapting these methods to define inclusion and exclusion criteria relevant to this field of study. Screening instructions were iteratively refined throughout the training and initial screening process to ensure clarity and consistency across reviewers. Coders included in the title and abstract phase were five masters students, of which the author was one, and one doctoral student. Coders included in full text were the same as title and abstract with one master's student dropping from the review. In the data extraction phase, two masters students were added, resulting in six masters and one doctoral student. Throughout all phases of screening, each article was coded separately by two reviewers. Discrepancies between screeners were resolved through discussion and consensus, with an external reviewer (thesis chair) serving as a third reviewer if needed. Meetings were held weekly to resolve and review sources of disagreement, provide feedback, and answer questions. Screening training and the overall process were supervised attentively by the faculty mentor and graduate student.

Data Extraction

A standardized data extraction form was developed and used by two screeners to collect information from each study meeting full inclusion criteria (i.e., all articles were double coded between any combination of the trained coders). Coders were trained before the beginning of each phase of coding through virtual meetings or online recordings, with example studies included for practice. Data collected included the year, pregnant individual sample size, neonatal sample size, participant characteristics, BH diagnosis or symptoms, type of NPI, length of NPI, which trimester(s), pre- and/or post-natal periods were captured, type of comparator, outcome measures for pregnant individuals, outcome measures for neonates, key findings, and effect size. Once data extraction was completed, findings were organized and summarized using a narrative synthesis to highlight key findings, patterns, and differences across studies, which then formed the basis of the written results.

Data Analysis

After data extraction, the information was organized and grouped by type of non-pharmacological intervention, BH condition addressed, and measured outcomes (maternal and neonatal). Common themes, patterns, and differences were identified across studies, such as which NPIs appear most effective for particular diagnoses or which outcomes are most consistently reported. This process allowed for summarization of the overall findings, highlighting gaps in the current body of research, and offering suggestions for clinical application and future studies. Key findings were synthesized narratively, with tables used to visually depict comparisons across interventions.

CHAPTER 4: RESULTS

Initial database searches yielded 6,864 results. A summary of the search and screening process is detailed in Figure 1. The articles were uploaded into Covidence, at which point 1,233 duplicates were removed, leaving 5,626 articles remaining. Of the 5,626 articles included in title and abstract screening, 5,516 articles were excluded, allowing 110 articles to move on to the full text stage of screening. During full text screening, 91 articles were excluded. Of the articles excluded in full text screening, 39 were excluded due to missing data on maternal and/or infant outcomes, 17 articles were excluded for not recruiting mothers for depressive and/or anxiety symptomology, 18 articles were excluded because they did not include both an intervention and control group of affected mothers in which the control group received no behavioral health intervention, 7 articles were excluded because they were not a true randomized controlled trial, 8 articles were excluded because they failed to capture the prenatal period, 1 article was excluded because it was not available in English, and 1 article was excluded because the intervention was not designed to at least partially target or treat the identified depression and or anxiety symptoms. The remaining 19 articles met inclusion criteria and moved onto data extraction. All articles were double-coded and consensus was reached on all discrepancies in which the two coders did not already agree on, such that post-consensus agreement was ultimately 100%. During transition from title and abstract to full text, one graduate reviewer dropped out and during the transition from full text to data extraction, w graduate coders were added and trained. Discrepancies were addressed through weekly team meetings in which the group discussed initial disagreements, answered coder questions, and reached consensus collectively (i.e., the percentage agreement and kappa do not account for resolved discrepancies).

Study Characteristics

Table 1 details relevant study characteristics of the 19 included studies, specifically year of publication, sample size, number of post-intervention measurement time points, and information regarding the type of control provided. Included studies were published between 2004 and 2022. The total number of pregnant participants recruited across included studies was 3,005. The countries in which studies recruited their samples included Australia, Canada, China, France, Iran, Netherlands, Spain, South Africa, and the United States of America. The control groups for these studies were broken down as follows: 47.4% of studies compared the intervention to usual care, 26.3% of studies compared the intervention to a control group that received usual care supplemented with feedback and/or resource referrals following study assessments, 10.5% of studies compared the intervention to enhanced usual care, 5.3% of studies compared the intervention to a placebo, 0% compared the non-pharmacological behavioral health intervention to a waitlist or no-intervention group.

Participants

Table 2 contains relevant information on the included maternal sample demographics. Participants were recruited from a combination of hospitals ($n = 10$), clinic/health centers ($n = 6$), and midwife practices ($n = 3$). The age of parent participants across studies ranged from 23.3-36.1, with an average of 28.8 years old. Among studies that reported sample race/ethnicity data ($n = 5$), 52.2% of participants belonged to a minority racial/ethnic group. Studies that included this data predominantly described the groups as Asian, Black, Hispanic, and ethnic minority. Fourteen studies did not collect racial/ethnic data, of which one was located in the United States. Commonly seen in studies conducted outside of the United States, this decision was largely due to homogenous populations.

Inclusion criteria of four studies required pregnant participants to be living with or married to a partner; two of those studies included the partner in the intervention. Despite the remaining 15 studies not requiring this inclusion detail, 8 studies collected some form of data relating to the participants' marriage/relational status. The average age of the fetuses at the time parents started the intervention and/or were recruited ranged from 10 weeks of gestation to 35 weeks of gestation. Additional sample characteristics are presented in Table 2.

Intervention Characteristics

Table 4 details intervention characteristics relevant to format, modality and components. Studies included were intended to target or treat distinct mental health conditions including depression and/or anxiety. Recruitment criteria varied substantially, with study samples distributed across the spectrum of symptom severity. In total, 68.4% of studies recruited participants for depression, 26.3% of studies recruited participants for anxiety, and 5.3% of studies recruited participants for both depression and anxiety. Studies reported utilizing varied inclusion criteria regarding clinical thresholds, which were predominantly based on measures used to assess symptoms or provide a formal diagnosis, symptom severity and presentation, history of symptoms, or a diagnosis. Therefore, the following categories are based on clinical thresholds of reported symptom severity. The severity of depression and anxiety symptoms at recruitment is as follows: low/non-clinical (10.5%), mild/at risk (31.6%), moderate (26.3%), severe/DSM diagnosis (31.6%). The largest proportion recruited mild/at-risk samples (37%), reflecting a prevention-focused approach. Two studies recruited below clinical thresholds, potentially representing universal prevention approaches targeting less symptomatic pregnant populations. A wide array of providers were captured across studies included, midwives ($n = 6$), psychologists ($n = 4$), massage therapists ($n = 2$), trained research assistants ($n = 2$), nurses ($n =$

2), community health workers ($n = 1$), therapists ($n = 1$), pregnant women's partners ($n = 1$), self-administration ($n = 1$), yoga instructors ($n = 1$), and lactation consultants ($n = 1$)

The delivery format captured across all included studies were synchronous formats with either individual ($n = 12$) or group formats ($n = 6$). Included in the individual format delivery studies, 5 applied a relational approach by including the pregnant person's partner at some point during the intervention. All studies provided treatment in-person apart from aspects of the intervention that allowed participants to reach the providers via phone to answer questions, complete check-ins and assessments, and/or receive reminders to reduce attrition rates. Almost all studies ($n = 17$) collected data on the loss of participants across the intervention and data collection timeframe. Of the ($n = 6$) studies that implemented an attrition protocol in their intervention, 2 of those studies lost no participants to follow up. The average percentage of participants lost to follow up in attrition protocol studies was 17.6% in comparison to studies that did not include contact to reduce drop out (26.4%).

The most common method used to address BH concerns was psychosocial interventions (57.8%), followed by body-based interventions (42.2%). Theoretical subcategories of psychosocial interventions were: CBT (26.2%; Abhari et al., 2021; Burger et al. 2020; Milgrom et al., 2015; Netsi et al., 2015; Urizar et al., 2011), psychoeducation (21%; Ahmadpour et al., 2022; Zhao et al., 2017; Zhao et al., 2020; Zhao, 2021), eye movement desensitization and reprocessing therapy (EMDR; 5.3%), attachment/emotion focused therapy (EFT; 5.3%; Akbarzadeh et al., 2016), narrative therapy with a journaling component (5.3%; Montazeri et al., 2020), and an "eclectic" approach including components of CBT, solution focused brief therapy (SFBT) and interpersonal therapy (IPT) provided by trained non-specialists (5.3%; Lund et al., 2020). Topics covered during psychoeducation interventions included identification and

treatment of maternal mental health, coping and emotional regulation skills, childbirth education, navigating and including family and social support, postpartum adjustment, breastfeeding education, and infant care. Body-based interventions included massage therapy (15.8%; Field et al., 2004; Field et al., 2009; Field et al., 2012), somatic therapy (10.5%; Bastani et al., 2006; Ortiz et al., 2014), yoga (5.3%), applied relaxation (5.3%), and transcranial direct current stimulation (tDCS; 5.3%; Vigod et al., 2019).

Over half of the studies provided these interventions exclusively during the perinatal period (68.4%), while fewer studies provided interventions across the perinatal and postpartum periods (31.6%). Studies recruited and administered interventions to be delivered to a majority of mothers in the third trimester ($n = 6$) closely followed by birthing parents in the second trimester ($n = 5$), with few interventions being delivered in the first trimester ($n = 1$). Additionally, some studies recruited and administered interventions to participants across two trimesters ($n = 4$) with a notable few including all three trimesters ($n = 3$). While all studies included were randomized control trials, the randomization technique was majority 1:1 individual randomization with ($n = 3$) studies opting for block randomization.

The length of intervention ranged from 14 days (2 weeks) to 112 days (16 weeks). The average duration of treatment provided was approximately 84 days (12 weeks) including postpartum booster sessions and phone call contacts. The average number of minutes birthing individuals engaged with the active intervention was 426.8, with a range of 150 minutes to 1,365 minutes. Attrition rates averaged 28.4 participants in the intervention and control groups, representing 6% of participants recruited across studies. Relevant assessments and data from included studies were collected via self-report, teacher report, researcher, and chart reviews. Assessing who reported data in response to each individual measure reported across studies,

these distinct maternal measures were only self-report ($n = 47$), whereas distinct neonatal outcomes varied widely, maternal report ($n = 10$), chart review ($n = 26$), provider ($n = 4$), researcher ($n = 7$).

Maternal and Neonatal Outcomes

Table 3 to reports on maternal and infant outcomes collected as well as direction of change. On average, studies that were included reported on 2.3 relevant maternal outcomes and 2.7 neonatal outcomes. While the studies included recorded multiple birthing individual and neonatal outcomes, the outcomes synthesized and reported on in this systematic review only include maternal outcomes directly related to psychosocial measures and neonatal physical and cognitive outcomes. Across the 19 included studies, there were 18 unique maternal outcome variables and 25 unique neonatal outcome variables collected. The most utilized maternal outcome measures across studies were the Edinburg Postnatal Depression Scale (EPDS; 22.5%), State Trait Anxiety Inventory (STAI; 15%), Center for Epidemiologic Studies Depression Scale (CES-D; 10%) and Infant Breastfeeding Assessment Scale (IBAS; 7.5%).

Across collected neonatal outcomes, there was more variety of measures reported compared to maternal outcomes. The most commonly used neonatal measures included birth weight (18%), Appearance, Pulse Grimace, Activity and Respiration (APGAR; 12%), NICU admission (6%), and developmental milestones (ASQ; 6%). Most studies assessed maternal outcomes immediately post-intervention, with follow-up durations ranging from immediate postpartum to 18 months postpartum. However, the majority of maternal follow-up assessments occurred within the first three months postpartum. Neonatal outcomes were most commonly assessed at birth, with relatively few studies extending infant follow-up beyond early infancy.

Efficacy and Effectiveness Findings

Across studies, significant findings primarily reflected more favorable maternal and infant outcomes in intervention groups relative to control conditions, rather than within-group changes alone. Of the 19 studies, maternal outcomes improved more consistently than neonatal outcomes. Sixteen studies reported at least one statistically significant outcome associated with a maternal measure, whereas neonatal outcomes appeared to be impacted less consistently, with 10 of the 19 studies reporting at least one statistically significant improvement between group, within group, or both in a neonatal outcome. The majority of neonatal measures collected were short-term, with most measures being collected at birth, whereas there was more variation in maternal measurement time frame. It is important to note that although some studies either did not detect any significant changes or only identified either a significant maternal *or* neonatal outcome – few identified both significant maternal and neonatal outcomes. Additionally, several studies included in this review captured either differences between comparison groups (i.e., NPI vs waitlist) or improvement within groups in both maternal or neonatal outcomes. The following subsections are organized by studies in which findings for maternal and neonatal outcomes were similar (i.e., the NPIs either were not significantly related to either outcomes or were related to both sets of outcomes), followed by studies in which NPIs were only significantly related to maternal outcomes, and then those in which NPIs were only significantly related to neonatal outcomes.

Both Maternal and Neonatal Outcomes

Only two studies did not find *any* outcomes collected in the study to be significantly different between intervention and comparison groups. Mothers in these interventions were recruited predominately during the late first and early second trimester, with severe/DSM

diagnosis recruitment criteria. Interventions from the aforementioned studies that did not return statistically meaningful results, included tDCS and EMDR therapy. Although both studies found no significant differences between intervention and control groups, the EMDR study identified substantial improvements in both conditions and the tDCS study demonstrated some clinically significant improvement in maternal measures. The neonatal outcomes were not repeated, not allowing for an assessment of change. These studies provided two of the shortest intervention periods of about 3-6 weeks, with 3 distinct contacts, and an average of 495 minutes of direct contact with the intervention. Providers in these studies were trained OBGYN nurses and psychologists. Recruitment in both studies took place at the hospital. Participants in these studies did not receive any retention contact such as session reminders or check-ins via phone.

Of relevant outcomes, only 3 studies reported positive outcomes for *all* maternal and infant outcomes collected in this review (Ahmadpour et al., 2022; Bastani et al., 2006; Field et al., 2012). Bastani (2006) and Ahmadpour (2022) demonstrated between-group effectiveness, with significantly greater reductions in maternal anxiety, stress, and psychological outcomes as well as improved infant outcomes (e.g., higher birth weight and fewer instrumental deliveries) compared to the control group. Field (2012) demonstrated both within-group improvement and between-group effectiveness, with intervention groups showing significant reductions in maternal symptoms (depression) over time and superior infant outcomes (gestational age) compared to the control group.

Mothers in these interventions were recruited predominantly during the late second and early third trimester of pregnancy, with one mild/at-risk and the two severe/DSM diagnosis. The interventions provided were yoga/massage, psychoeducation on applied relaxation, and psychoeducation on attachment skills training. These studies provided interventions ranging

from 4-12 weeks with an average of 7.7 weeks and distinct contact days, with an average of 1,170 minutes of direct contact with the intervention. Providers in these interventions were massage therapists, yoga instructors, trained nurses, and midwives. Recruitment for these studies took place at clinics and a hospital. No participants in these studies received any form of attrition contact such as session reminders or check-ins via phone.

Maternal Outcomes by Intervention Type

Across studies, participants who received either CBT or psychoeducation interventions generally demonstrated significant within-subject improvements over time, particularly in anxiety, depression, fear of birth, breastfeeding self-efficacy, and physiological stress markers, with some interventions also yielding greater reductions compared to control groups. However, these effects were not always consistent, as several studies reported similar improvements across both intervention and control conditions. Interestingly, interventions with non-significant differences in maternal outcomes versus the comparison group included different measures for depression and anxiety, as well as outcomes of mood, affect, and perceived infant bonding, than studies identifying significant differences in the “same” outcome. However, CBT and psychoeducation were not shown to be efficacious or effective in regard to neonatal outcomes.

Other psychosocial interventions, including eclectic, narrative, and emotion-focused therapies, were represented in fewer studies but showed targeted differences in specific outcomes. The array of theoretical interventions produced only significant maternal outcomes (depression, perceived support, anxiety). The eclectic intervention did not demonstrate any differences in short-term or long-term infant outcomes regarding physical and milestone development. Despite these outcomes, the limited number of studies prevents conclusions about consistency of these interventions.

Studies with massage-based interventions reported significant changes in maternal measures of mood, but not anxiety. A study that applied a somatic approach reported one significant maternal outcome (depression). The applied relaxation study identified positive change in one significant maternal (anxiety); but not depression, dyadic adjustment, or social support (Bastani et al., 2006). Across studies, maternal outcomes demonstrated both within-group and between-group improvements, with intervention groups showing significant reductions in depression, anxiety, and stress over time, and in several cases, these improvements were significantly greater than those observed in control groups. In sum, maternal outcomes improved in some studies but were less consistent than those observed in psychosocial interventions, especially CBT.

Infant Outcomes by Intervention Type

In interventions with a cognitive behavioral framework ($n = 5$), statistically significant between-group differences were identified regarding anxiety, depression, cortisol, and perceived stress, with the NPI being linked to better outcomes versus the comparison group. Infants from these same studies saw differences in self-regulation and communication, distress to limitations, high intensity pleasure, falling reactivity/recovery, and negative affectivity at 9 months. In contrast, there were no statistical differences between groups regarding physical and development outcomes, such as neonatal physical and intellectual development, infant temperament, sleep, stress, and teacher and parent assessment of problems.

Across intervention types, a clear pattern emerges: maternal outcomes consistently improve, whereas infant outcomes show more limited or inconsistent benefits, highlighting the differential impact of these interventions on maternal versus infant well-being. Whereas interventions grounded in narrative therapy and EFT demonstrated benefits for maternal anxiety,

the interventions were inconsistently linked to infant outcomes. The narrative-based intervention was linked to a statistical improvement in an infant outcome, specifically infant sleep at both two and four months (non-significant neonatal outcomes were physical and overall development), and the EFT intervention was linked to a significant improvement in infant mental health (Akbarzadeh et al., 2016). Improvement in between group mean score for mental health at both birth and three months were both statistically significant.

“Eclectic” therapy study captured only significant maternal outcomes including depression, presence of major psychiatric disorders, functionality, wellbeing and perceived social support. No significant between group differences were observed in neonatal outcomes across physical development measures. A trauma-based intervention study reported no improvement in the only maternal measure, fear of birth, and no improvement in the following neonatal measures assessing for preterm birth, and physical neonatal health and NICU admissions.

While psychoeducation interventions ($n = 4$) provided a plethora of benefits as demonstrated in maternal outcomes, only one study identified the benefit of these interventions on neonatal outcomes. One study captured statistically significant outcomes in immediate physical health and behavioral neonatal measures but not in others that assessed NICU admissions, preterm birth and infant physical development.

Lastly, body-based interventions ($n = 6$) appeared to produce more consistent positive neonatal outcomes. Body-based interventions, including massage, yoga, relaxation training, and somatic approaches, appeared to be more consistently linked to between-group differences, with intervention groups demonstrating significantly more favorable outcomes such as higher birth weight and lower rates of prematurity or low birth weight. Participants who received body-based interventions reported differences (in all but one study) in all infant outcomes (behavior, birth

weight, preterm birth, obstetric complications) compared to the control group (Vigod et al., 2019). The tCDS study demonstrated no significant between-group differences in maternal depression or anxiety outcomes and similarly found no significant effects on assessed infant outcomes (e.g., crying, development, or physical status at birth).

CHAPTER 5: DISCUSSION

Pregnancy is an instrumental time for growth in a multitude of ways for both the birthing parents and their neonate. This transitional period can be further complicated by the presence of a behavioral health (BH) concern, which can negatively impact both maternal and neonatal outcomes. Because of the intricately connected relationship between the pregnant person and their infant, many individuals are hesitant to use psychotropics to manage their symptoms and instead may go untreated. Due to the harm of going untreated and the still evolving knowledge of psychotropics, this study implemented the biopsychosocial (BPS) framework to examine an alternative form of treatment: non-pharmacological interventions.

This systematic review aimed to answer the research question of which non-pharmacological interventions (NPIs) are linked with positive maternal and neonatal outcomes among pregnant individuals experiencing BH concerns, specifically anxiety and depression. Findings surmised from 19 research studies conducted within approximately the last 20 years helps to provide a consensus for parents, providers and clinicians regarding NPIs that are beneficial for improving birthing parent's BH status and preventing negative impacts on the infant. This is especially important as a growing number of pregnant individuals become aware of and weigh the decision of how best to manage their BH symptoms during transitional periods, such as pregnancy.

An interesting but not surprising finding is that a substantial number of interventions were psychotherapy based. Descriptions of psychosocial interventions and the associated theoretical orientations varied from explicit description of the theory (i.e. CBT) and program (Beating the Blues before Birth) to increasingly vague (i.e. psychological treatment, counseling). Therefore, theoretical categorization was based on the intervention's primary or most

representative approach, despite the presence of possible secondary or multi-component elements. Theoretical orientations included majority CBT, followed by psychoeducation, EFT, narrative, and one study with a multi-theoretical approach focused on CBT and solution focused therapy (SFT). Given the context of the recruitment locations, a majority of which were hospitals, providers are more likely to implement evidence-based modalities. CBT is a first-line empirically based treatment for an array of mental disorders (Beck & Fleming, 2021; Nakao et al., 2021). More specifically, CBT was created on the foundation of treatment for depressed individuals and has been extensively studied in relation to providing treatment for anxiety (Beck & Fleming, 2021; Curtiss et al., 2021; LeBlanc et al., 2021; Ost et al., 2023;). Overwhelming support resulted in many health care and medical providers adopting this approach, especially in healthcare contexts. As previously noted, a majority of recruitment settings were hospitals, which likely skewed the decision of what type of intervention was provided to pregnant individuals. Despite being heavily researched and demonstrating beneficial outcomes in an array of disorders and populations, this does not necessarily mean CBT is the most effective intervention, but perhaps rather one of the most commonly examined interventions with positive outcomes.

Another well researched therapeutic approach that produced promising outcomes was EFT. Emotion-focused therapy is also a highly researched, evidence-based intervention (Wiebe & Johnson, 2016). It has demonstrated empirical support for the treatment of both depression and anxiety (Salgado et al., 2019; Greenman & Johnson, 2022). In a study examining treatment outcomes of EFT vs. CBT in generalized anxiety disorder, EFT produced similarly large outcome changes and a lower drop-out rate in comparison to CBT (Timulak et al., 2022). This theoretical framework may be especially beneficial during pregnancy as core components of the

theory are to improve connection and emotional identification and create secure attachments (Greenberg & Johnson, 1988). Application of this theory, which has been found to be beneficial for individuals, couples, and families, may be increasingly relevant as some interventions tended to the systemic relationships of pregnant people, including their partner and family (Johnson, (2019); Lebow & Snyder, 2022).

In comparison, relatively fewer studies examined alternative NPI's such as yoga, massage, exercise, and tDCS, to name a few. Of the evidence present, it appears that these forms of interventions work more consistently in neonatal outcomes. While these interventions may work less consistently for mothers, these interventions may create more systemic change for the infant, due to the likely impact of interventions on birthing people's nervous system (Braeken et al., 2017; Schlatterer & du Plessis, 2021). The nervous system, which plays a key role in regulating emotions and is impacted by pregnancy as it manages intense hormonal shifts, drives neurological remodeling and shapes fetal development (Dicks, 2023; Georgescu, 2023; Lee, 2007; Sandman et al., 2012). These interventions may also possess important mechanisms of change, such as skills-based interventions that can scale up or down in intensity and engage in outside of direct contact after acquisition of the skill.

This lack of research is especially relevant to note as exercise is not only physically beneficial but has a well-established positive impact on mental well-being (Munro et al., 2026; Susanti & Aljaberi, 2024). In fact, the American College of Obstetrics and Gynecology recommends an average of 150 minutes of weekly exercise during the pregnancy and postpartum period to support the physical and mental health of birthing individuals (Kołomańska-Bogucka & Mazur-Bialy, 2019).

Studies with short intervention times ranging from 3 to 6 weeks tended to report mixed or limited outcomes unless highly structured. The following interventions: tDCS, EMDR, birth plan, and one CBT study, may help with some symptom relief as seen in maternal outcomes, but rarely improved infant outcomes (Abhari et al., 2021; Ahmadpour et al., 2022; Akbarzadeh et al., 2016; Baas et al., 2021; Vigod et al., 2019). Common patterns in these studies were interventions that targeted specific symptoms for relief or brief education. It appears as though shorter interventions may be too brief to influence all outcomes.

Moderate length interventions accounted for the largest group ($n = 9$) across studies included in this review. Studies that implemented relaxation, psychoeducation, “eclectic” therapy, psychoeducation and lactation training, massage and exercise, massage and one CBT interventions over moderate lengths, from 6 to 12 weeks provided the most consistent positive maternal outcomes (Bastani et al., 2006; Burger et al., 2020; Field et al., 2009; Field et al., 2012; Lund et al., 2020; Ortiz et al., 2014; Zhao et al., 2017; Zhao et al., 2020; Zhao et al., 2021). Reliable improvements were most commonly seen in maternal depression and anxiety, stress, maternal wellbeing, and some infant outcomes.

Longer interventions that ranged from 14.5-28.5 weeks produced mixed often positive results, which usually depended on adherence. In the following interventions including therapy and journaling, somatic therapy, massage and progressive muscle relaxation, and one CBT study, it appears that increased duration alone does not guarantee better outcomes (Field et al., 2004; Montazeri et al., 2020; Netsi et al., 2015; Urizar et al., 2011). While it is unclear what specifically contributed to a better intervention over a longer duration, Montazeri (2020) implemented an attrition protocol by using a hybrid delivery format, and provided small doses of the intervention (6 sessions and 202 minutes) over 14.5 weeks, which may have reduced

participant demand and increased meaningful engagement. Interestingly, most studies provided interventions that could be engaged in outside of the distinct contact, such as journaling and self-administration of progressive muscle relaxation. Among studies, none focused solely on information delivery, many placed an emphasis on the joining process early on in the intervention, required active engagement, used structured reflection outside of sessions extending the therapeutic process, included continued facilitator contact, and implemented small groups, which may have increased a sense of community and accountability, allowed for staged progression to develop skills, and addressed underlying emotional processes rather than simply symptomatology. While longer studies did produce positive outcomes, they were inconsistently better when compared to moderate length interventions. These findings suggest that moderately structured interventions with repeated engagement across several weeks may provide an optimal balance between feasibility and therapeutic impact.

Additional factors to consider that emerged from this review were the selection and measurement of outcomes across studies. While all studies examined at least one maternal and infant outcome, many studies heavily measured and documented maternal mental health. Instruments assessing anxiety, depression, stress and fear of childbirth, including measures such as the EPDS, STAI, and DASS-21, were the most commonly utilized. This focus reflects the primary aim of many interventions, which was to reduce and address maternal behavioral health concerns. This approach may also reflect limited understanding and or acknowledgement of the connection between maternal mental health and improving infant health. In part, maternal outcomes tended to show more consistent statistical improvement and/or difference when compared with neonatal outcomes.

Compared to maternal outcomes, infant and neonatal outcomes were assessed in a more limited manner, both in length of time and in the number of unique assessments. Common infant outcomes were restricted to birth indicators such as birth weight, gestational age, or APGAR scores. While these measures provide useful information about immediate health outcomes, they do not fully capture the potential for broader or longer-term development that could be influenced by maternal mental health interventions. Relatively few studies examined long term infant outcomes such as social emotional functioning, temperament sleep regulation, or early attachment, despite links between maternal mental health and infant outcomes.

Most interventions were delivered in person, with only a small number incorporating hybrid delivery models that combined face-to-face sessions with telephone or digital follow-up. Additionally, the majority of studies implemented multi-component interventions, whereas a smaller subset evaluated single-modality approaches. Recruitment thresholds for symptom severity also varied, resulting in samples that spanned the full prevention-treatment continuum. Almost one-third of studies (31.2%) targeted mild/at-risk samples, and the other third targeted severe/DSM diagnosis. This proportion of BH severity may emphasize the importance of early intervention before symptoms reach clinical thresholds. Despite including several studies that appeared to reflect a preventative approach, study inclusion criteria were not written to specifically capture true preventative studies. Studies with a preventative approach often described recruitment criteria such as women with a family history of BH concerns but no current symptoms or personal history, or pregnant persons with low SES, high stress levels, or recruited based on the participants geographical location, such as underserved areas with high risk factors. Therefore, the preventative trend noted here likely aligns with public health priorities, as these birthing individuals present with depression and anxiety symptoms that would

otherwise not have been treated outside of presentation to receive care. The studies aimed at addressing these symptoms often provided little focus on external factors such as social location and determinants of health.

The behavioral health system is meant to provide a continuum of care, allowing treatment to increase as severity does and scale down as improvements are made (Center for Substance Abuse Prevention, 2014; Zelka et al., 2020). Despite this highly implemented model, more recent research is finding that when applied to the pregnant population, specific gaps appear such as a need for models supporting a more diverse range of perinatal mental illnesses, and limited implementation adequacy amongst less developed countries where the average dropout rate is more than 50% (Carter et al., 2025; Tsega et al., 2022). When examining the treatment protocol amongst the most common severity, mild/at-risk, in comparison to severe/DSM diagnosis, the difference between this continuum of care appeared to be limited. The average treatment time in minutes of mild/at-risk interventions was 431.7 while the average treatment time for severe/DSM diagnosis was 506.7. The average length of intervention time was 8 weeks for mild/at-risk populations and 12 weeks for severe/DSM diagnosis populations. The average number of sessions of mild/at-risk interventions was 9.7 sessions, and the average number of sessions of severe/DSM diagnosis interventions was 14.3 sessions. While these interventions may be informed by current protocols and treatments, these findings pose an interesting question: is the continuum of care less expansive than what is commonly demonstrated in the medical system? Especially, as treatment location (i.e. outpatient vs. inpatient) and intensity of treatments (i.e. talk therapy vs. psychotropics vs. treatment resistant tDCS) change amongst medical settings in relation to the severity of BH needs.

A common theme that occurred in studies was pairing the intervention with follow-up phone calls and check-ins between distinct contact with the intervention. This is interesting to note as it may have reduced the amount of attrition across studies. A systematic review of attrition during psychotropic intervention studies found that the likelihood of losing participants during the intervention period was reduced by reminders, human contact, and no gamification features (Liu et al., 2026). This finding may be further supported by this systematic review and the acceptability of NPI's. Especially, as attrition rates for psychotropic interventions range from 20-40% in the acute phase of treatment, which was the average length of treatment time captured in this study (Gonzalez et al., 2011; Ihaddadene et al., 2024; Warden et al., 2007). Future meta-analyses could examine whether intervention type, timing, and dose interact with baseline severity to determine optimal matching of interventions to symptom profiles.

In summation, the findings suggest that the type of intervention implemented during pregnancy may influence whether maternal or neonatal outcomes are most impacted. Interventions grounded in psychosocial frameworks such as CBT and psychoeducation, were most consistently associated with improvements in maternal mental health outcomes, most notably anxiety, depression, and stress. These interventions may therefore be particularly useful for clinicians whose client's main presenting problem is maternal psychological distress during pregnancy. Interventions such as narrative and EFT showed promising change in maternal anxiety and infant well-being outcomes. Despite these improvements, because of the limited number of studies implementing these interventions, replication is needed to provide more evidence regarding consistency.

Body based interventions appear to be more consistently associated with neonatal improvements, especially measures of physical development, occurrence of pre-term birth, and

behavior assessments. These forms of interventions may also impact maternal mental health in less direct ways. Many of the outcomes reported across studies, including infant outcomes, were based on maternal reports, which can best interpreted as the birthing parents' perception of their infant, rather than objective measures of infant health. This distinction remains important when interpreting findings, as perception-based measures may be more sensitive to changes in maternal mood, anxiety, or distorted cognition. The difference in intervention (psychosocial vs. body-based) may reflect differences in the underlying mechanisms through which interventions operate. Psychosocial interventions often target intrapersonal processes such as cognition, emotional regulation, and perceived stress, which may lead to improvements in how birthing parents interpret and report both their own symptoms and their infant's behavior. In contrast, body-based interventions may act more directly on physiological systems (e.g., stress response, autonomic regulation), potentially producing downstream effects on fetal development and infant outcomes. Therefore, body-based interventions may be indicated for clinicians whose clients have an increased risk of or history of complications during the pregnancy, when not contraindicated (i.e., bed rest). Studies combining components of each intervention may offer the greatest potential to positively influence both maternal and neonatal outcomes, though additional research is needed to determine the most effective combinations.

Equity and Access

Equity and access considerations are central to interpreting these findings, as treatment efficacy and effectiveness do not equate to treatment accessibility. When examining studies that identified statistically significant findings across both maternal and infant outcomes, many factors need to be taken into consideration. While massage/yoga, applied relaxation, and attachment skills training appeared to be beneficial, it is important to pose the question: Who was

this intervention beneficial for? Of the three relevant studies, only one collected data on the race of participants. The two studies that did not collect race data were likely a result of the largely homogenous countries where they conducted their studies. Despite 12% of participants in the massage study identifying as White, our ability to draw conclusions in the other two studies is limited. Although race data was collected in one study, the authors did not assess for interaction effect or acceptability of the intervention to assess racial differences.

Across studies, demographic information that was collected included level of education and socioeconomic status. The level of education distributed across participants in one study was elementary completion (19.1%), a high school diploma (62.7%), or higher than a diploma (18.2%; Bastani et al., 2006). The second study reported 48.2% of participants with high education, defined as completion of a degree. The remaining makeup of education was "medium" (31.2%), defined as applied sciences, and "low" (17%), defined as completion of a high school diploma (Baas et al., 2021). Of the two studies that collected level of education, pregnant participants were of predominantly low socioeconomic status, which was described in Field (2012), as an average score of 4.5 on the Hollinshead SES Index (Bastani et al., 2006; Field et al., 2012). Other demographic information that was not repeatedly collected across more than one study included employment and marital status (Bass et al., 2021).

Another aspect to acknowledge is the array of providers responsible for delivering the NPIs; in addition to midwives, other providers included psychologists, therapists, pregnant women's partners, massage therapists, self-administration, yoga instructors, trained research assistants, nurses, and lactation consultants, massage therapists, nurses, and midwives. The variation in providers introduces benefits and challenges when deconstructing, comparing, and deciding on real world applications. Through the examination of providers in a low stake setting,

where results inform future evidence-based interventions, this allows researchers to explore more affordable and accessible providers. Another benefit to exploring the range of providers means that pregnant individuals may have access to multiple providers and can choose between providers or choose multiple providers.

Many studies, including some in this review, are starting to examine whether non-professional providers can administer behavioral health interventions based on talk therapy, in a way that still produces meaningful outcomes. This approach may serve to reduce the demand for medical systems and medical, mental health providers. While there are many benefits of examining studies with a vast array of providers, it does complicate the comparison across NPIs. This variation makes it difficult to account for the differences in who is providing the intervention and their level of education and experience.

The exploration of provider and quality of intervention in comparison to professional providers was not examined in these studies. This variable creates a meaningful dialogue in relation to the deconstruction and de-professionalization of the mental health profession. While these interventions may help to de-mystify the mental health field and provider for greater access, it does pose a question about the difference in outcomes between professionals trained through higher education versus trained community workers. This is especially interesting given that research has found that the therapeutic alliance is highly indicative of success in therapy, even influencing improved outcomes in some cases (DeAngelis, 2019; Stubbe, 2018; Opland & Torrico, 2024). This distinction may reflect the growing emphasis in mental health care on structured, manualized, and psychoeducational approaches that can be delivered by trained nurses, midwives, counselors, or other facilitators, compared to biologically based medical treatments that typically require more narrowly defined clinical credentials.

Despite the potential for increased accessibility and reduced cost from non-professionals, it is important to continue to examine clinical outcomes, patient experiences, and provider effectiveness, to reduce the possibility of harmful, ineffective and less regulated interventions. Through this process, providers can reduce the likelihood of ineffective treatment, minimal symptom relief, or potential harm to patients, which is particularly important given the significant time investment required for patients to meaningfully engage with NPIs. As a result, further research should examine whether variation in provider training, discipline, and professional background influences intervention effectiveness, implementation, feasibility, or participant outcomes.

The length of time demanded by interventions averaged about 9.1 weeks across all studies included in this review. This data is especially relevant as NPIs often pose their own barriers such as weekly sessions, transportation, childcare, a flexible schedule, or access to the internet, which can be especially demanding late in pregnancy. Other factors that may have impacted accessibility and participant retention were delivery format. Of the 19 studies, a little over a quarter of studies ($n = 5$) provided some form of hybrid contact, either over a phone call or app to provide support outside or as an extension of direct intervention sessions. This did not include studies that provided only session reminders by phone.

While not examined herein, structural determinants of maternal mental health contribute to the determination of what treatments work under certain structural conditions that are not equally available (Crear-Perry et al., 2022; Meng et al., 2025; Neerland et al., 2024). These factors include but are not limited to socioeconomic status, race and ethnicity, availability of trained professionals, and geographical access to service (Boakye et al., 2026; Neerland et al., 2024; Pardo et al., 2024; Sah et al., 2024; Tamene et al., 2025; Ulrich et al., 2024). Although a

smaller number of studies were implemented in a hybrid fashion, which may reduce maternal demand by providing long-distance care and reduced visits, these interventions require individuals to have access to the internet or a phone plan. Birthing parents from rural or low-income locations are often faced with health care deserts, reducing their ability to access hospitals, clinics or providers without long drives or a stable internet connection (Brînzac et al., 2023; Costa et al., 2026; Turja, 2025)

Other factors that were not examined in these studies were the associated cost, insurance coverage, and associated acceptability based on those factors (Boakye et al., 2026; McAllister et al., 2018). Financial barriers may influence both initial participation and sustained engagement, especially since most NPIs require multiple frequent sessions and extended time commitments. A study of over 100,000 postpartum women found that Medicaid reimbursement of maternal depression screening could increase detection and outpatient treatment (Gordon et al., 2025). Payment systems may also influence intervention availability, as many services have a pre-determined number of sessions covered over the span of a year while some insurance plans do not encompass the full biological, psychological and social care of birthing parents. Additionally, individuals who are uninsured will likely be left with out-of-pocket payment as their only option. Noonan (2010) found that the incidence of prenatal behavioral health concern was indicative of not having coverage postpartum and behavioral health concern one year postnatal was linked to being uninsured during that time.

It is worth mentioning that, especially because of these unexamined factors, interventions that showed promise in controlled research settings may not fully reflect the feasibility or accessibility in routine care. Therefore, the studies that return the best maternal and infant outcomes may be studies that provide access to more affordable providers, interventions that

were affordable without insurance coverage, require fewer resources, were flexible in delivery format and reduced the time demand on expectant parents. Evaluating these structural and practical considerations may provide a more comprehensive understanding of which interventions are feasible, equitable, and sustainable across different populations and care settings.

Clinical Implications

The findings synthesized herein offer clinical implications for providers regarding the quality and process of how interventions are applied to pregnant individuals with a BH concern. As noted throughout the study, NPIs appeared to show promise but vary in intensity and feasibility. Additionally, there are many factors that contribute to the effectiveness of an NPI. Providers should engage in shared decision-making with patients that consider factors such as length, intensity, modality, cultural adaptation, access to resources, comorbid diagnosis, financial coverage, engagement from social supports, and physical ability. Collaboration with providers is likely to increase patient self-efficacy and autonomy (Alfian et al., 2025; Montori et al., 2023; Wang et al., 2024). In fact, patient inclusion in medical decision making has been found to produce better outcomes and increase participation in treatment (Tang et al., 2025). This finding is an especially important aspect of NPIs, which cannot produce desired outcomes without the required patient buy-in, and engagement. Other studies have noted that shared decision making can improve women's mental health outcomes and reduce anxiety (Ahmed et al., 2019; Anderson & Funnell, 2011; Couva et al., 2024; Yount et al., 2014). As previously mentioned, there are many factors that influence the effectiveness of NPI's, factors which are not proportionally distributed. Alongside the support of their provider, shared decision making allows patients to take into consideration and tailor decisions according to their own needs.

Another important clinical implication and strength of this study is the fact that pregnant individuals were screened for BH concerns. In order to know which NPIs are best for treating pregnant individuals with BH concerns, these individuals must first be identified (versus universally applied interventions). Screening for BH concerns during prenatal appointments is often limited, as pregnant people are less likely to be screened than their non-pregnant counterparts (Eakley & Lyndon, 2024). In a study examining over 100 OBGYN hospitals (Torbenson et al., 2023), the implementation of formal assessments using screeners for BH concerns occurred a little over half of the time in the prenatal period, half in the postpartum period, and a quarter in emergency departments. Even more concerning – less than half of providers assessed for BH concerns during an admission, even after the BH concern was raised by the pregnant person (Torbenson et al., 2023).

This may come as a surprise as the current guidelines and recommendations of the American College of Obstetricians and Gynecologists (ACOG), American Medical Association (AMA), and U.S. Preventive Services Task Force recommend universal assessment for depression and/or anxiety using standardized and valid screening tools (Johnson, 2017; Kendig et al., 2017; Siu & US Preventive Services Task Force, 2016). Although there is variation in frequency and timing of screening, other bodies of psychological and mental care such as the American Academy of Pediatrics (AAP), Postpartum Support International (PSI), and American Psychological Association (APA) have all endorsed the importance of BH screening during the peripartum and/or postpartum periods (American Psychiatric Association, 2018; Earls et al., 2019; Screening Recommendations., n.d.). Despite the array of recommendations, a recent article referenced the impact of the current screening implementation, resulting in around 80% of perinatal Mood and Anxiety Disorders (PMADs) going undiagnosed or untreated (Wilson,

2024). In some ways, this systematic review and research in general have gotten ahead of clinical practice by assuming that routine BH assessments are occurring.

As noted above, it appears that the most beneficial outcomes were produced in interventions that took place over a moderate amount of time (ranging from 6-12 weeks). Other relevant factors of interventions that produced change were, implementation of an attrition protocol or contact outside of the intervention, increased patient autonomy over their care by providing interventions that can be engaged in outside of sessions, allowing for progression of skill, and client reflection. Beneficial interventions also included a “hands on” aspect of treatment, dedicated time for joining the patient, implementation of contact with other participants to increase buy-in, support, and accountability.

Limitations of the Body of Research

When examining outcome measures and follow up time points, a limitation to the current research is the ability to speak to long term effectiveness and sustainability of results. Infant measures were commonly collected around birth, with a limited number of studies following the progression later into child development. This limited time frame makes it difficult to speak to clinical improvement as measures cannot be repeated to better understand the directionality of infant changes. In contrast, there was significantly more variability when maternal outcome measures were collected. These spanned from postintervention while still prepartum, immediately postpartum, 1-3 months postpartum, up to 18 months postpartum. However, the lack of long-term data collected consistently in studies, months or even years, after the intervention limits the longitudinal evaluation of maternal and especially infant outcomes.

A methodological limitation of many studies was the use of multi-component or non-isolated intervention designs, limiting causal attribution, and reducing comparability across

trials. The working definition for a multi-component study in this review was any intervention that included two or more distinct therapeutic mechanisms (i.e., psychoeducation and lactation skills training) versus one therapeutic modality (i.e., CBT only, EMDR only). Of the studies included, 10 applied a multi-component NPI (Abhari et al., 2021; Ahmadpour et al., 2022; Akbarzadeh et al., 2016; Bastani et al., 2006; Lund et al., 2020; Milgrom et al., 2015; Montazeri et al., 2020; Ortiz et al., 2014; Urizar et al., 2011; Zhao et al., 2017; Zhao et al., 2020; Zhao et al., 2021). Non-isolated interventions introduce confounding and potential interaction effects, leading to an inability to attribute outcomes to a single NPI component. These forms of interventions make it difficult to draw conclusions on maternal outcomes due to the inability to speak to causality. Despite this limitation, not all studies provided non-isolated interventions. The blend of isolated and non-isolated studies, which are examined together in this systematic review, allows for examination of both internal and external validity. While many pregnant individuals may only utilize one NPI during their pregnancy, the controlled environment of the study may not translate to the real-world treatment experiences of pregnant persons. For example, some pregnant persons may receive multiple NPIs or complementary treatments. While such designs enhance ecological validity by reflecting real-world clinical practice, they complicate comparisons across studies, thereby requiring cautious interpretation of intervention effectiveness.

Several gaps in the literature emerged from this review. Many studies used multi-component or non-isolated intervention designs, limiting causal attribution, and reducing comparability across trials. Additionally, a significant limitation in the existing body of research is the lack of reported participant diversity. Of studies that reported race/ethnicity data, an average of about half of participants identified as White/non-Hispanic. Though the range

indicated that even amongst the five studies, there was notable variation, much of the literature disproportionately represents Caucasian mothers, which is concerning given that populations who may benefit most from these interventions are often excluded from study samples (Bøttern et al., 2023; Shea et al., 2022). For example, Black pregnant individuals are 40% more likely to experience a mental health concern but are twice as likely to go without receiving adequate care (Hemstad, 2024). Improving the inclusivity and cultural responsiveness of research and clinical interventions can enhance outcomes for the mother, child, and broader family system. Improving this area of care can expand provider knowledge, increase access to safer alternatives, and ultimately enhance behavioral health (BH) outcomes for all pregnant individuals.

Review Limitations

One key limitation of this thesis is that our review focused on studies reporting maternal and infancy outcome data in published peer-reviewed journal articles. As mentioned in the results section, a majority of the studies included had at least one statistically significant outcome measure. This trend may be influenced by publication bias. Despite increased awareness and intervention to attend to journalistic desire to publish statistically significant studies, this factor should still be taken into account (Dickerson, 1990; Nair, 2019). In fact, a recent assessment of quantitative systematic reviews reporting on health services and delivery research found that less than half of authors even discussed the impact of publication bias (Ayorinde et al., 2020). Although narrowing to published studies only bolsters the work by implicitly embedding the peer review process, additional relevant but unpublished studies are likely missing that may have meaningfully contributed to the data summarized herein.

Similarly, another limitation of the overall structure of this systematic review is the inclusion of articles accessible only in English. As a result of this inclusion criteria, NPIs that

were published in other languages were not included, thus potentially limiting the examination of beneficial forms of treatment. This is especially important to draw attention to, as this criterion may have excluded interventions that are less commonly accepted and practiced in more developed parts of the world (Hoenders et al., 2024). As a result of a lack of documentation and evidence-based examination, these homeopathic, traditional forms of treatment may become lost and no longer accessible to birthing parents. As previously mentioned, the majority of interventions captured in this study were therapy-based interventions. The contrast is important to acknowledge as this form of treatment, and CBT more specifically, is built on a foundation of individualistic Western ideals, such as assertiveness, that do not align with all cultures (Sokol & Fox, 2019). As research progresses, it is important to identify, examine, and disseminate an array of interventions that are beneficial for a range of diverse populations.

Although modern allopathic medicine dominates healthcare delivery in many English-speaking countries, this emphasis may overlook evidence-based NPIs and traditional medicine approaches. Findings from cross-cultural research suggest that patient preferences increasingly favor pluralistic care models that align clinical treatment with culturally grounded beliefs about health and healing (Burke et al., 2011). Access to NPIs is important, as 80% of the world's population accesses forms of traditional, complementary, and integrative care (Hoenders et al., 2024). Allowing patients to have options in their care is not only socioculturally important but also acknowledges that a single treatment approach may not be appropriate for all individuals. These changes will likely reduce patient barriers, such as not responding to available treatments in biomedicine alone and affordability. Expanding treatment options may also reduce physician and health care burnout (Hoenders et al., 2024). In general, future research would benefit from clearer intervention delineation, longer follow-up periods, complete data collection on race and

ethnicity, further examination of culturally adapted NPIs, as well as greater attention to mechanisms of change.

This thesis provides valuable insights into the complexity associated with BH during pregnancy, more specifically what NPIs demonstrate both efficacy and effectiveness in supporting pregnant persons. The evaluation of both maternal and infant outcomes provides a deeper understanding of how these interventions impact more than just the pregnant person. The application of a BPS framework further contributed to understanding the interconnectedness and systemic factors that play a role in the experience of pregnancy with a BH concern. The research presented here highlights the complexity of time, length, modality, accessibility, and equity amongst NPIs.

Despite the limitations of both the included studies and the current systematic review, this research provides clinical implications for providers and directions for future research. It is worth noting that, as seen in this study, providers may encompass any trained or licensed professionals who intervene during the pregnancy or postpartum period. These implications include the implementation of consistent BH screening, collaborative decision making, and a focus on tailoring interventions instead of a one size fits all approach. Further exploration of quality research examining NPIs, will help to deepen and enrich our current understanding of inclusive, effective, and efficacious forms of treatment for BH concerns during pregnancy.

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Figure 1

PRISMA Flow Diagram

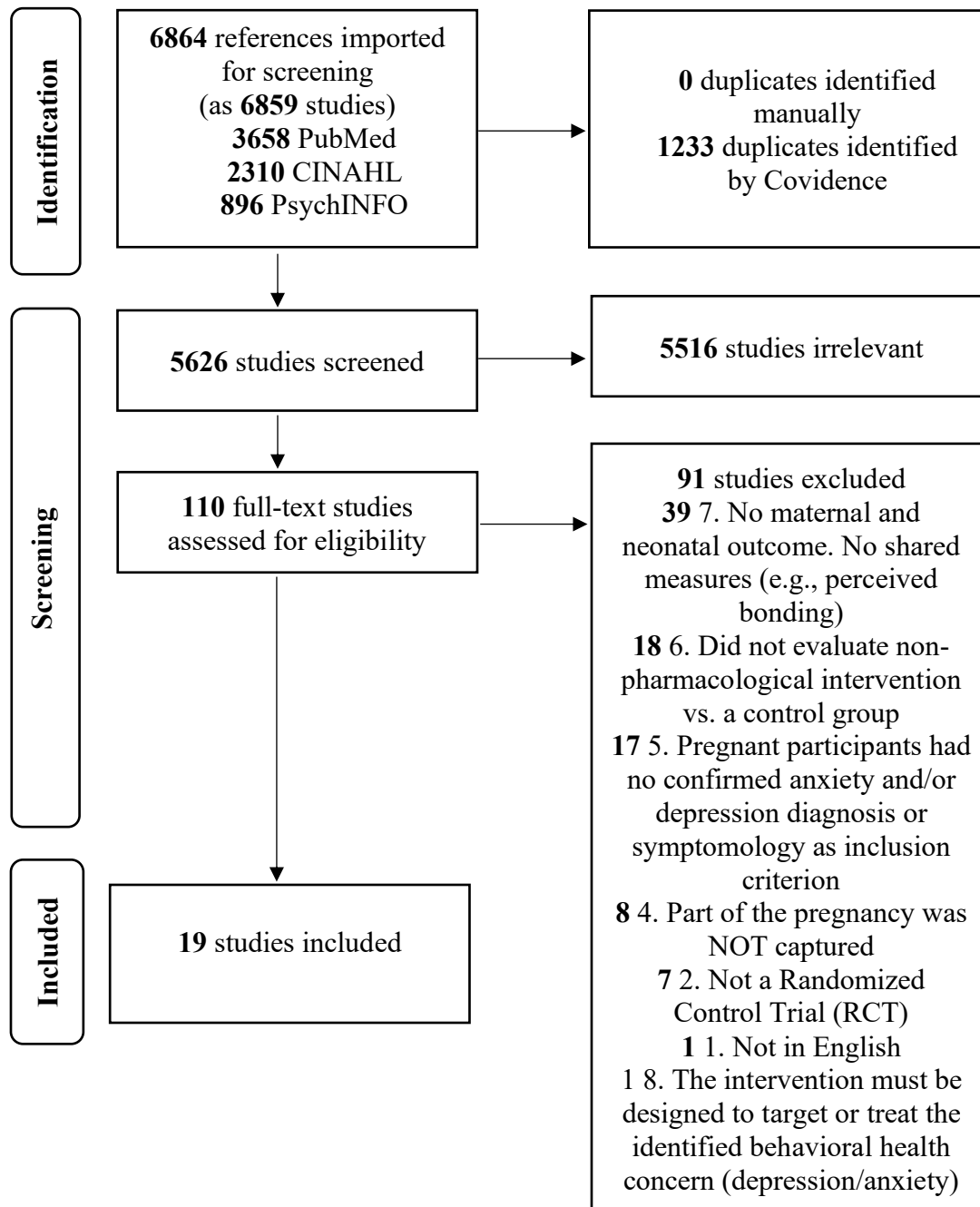


Table 1*Summary of Study Characteristics*

	<u>K # studies</u>	<u>% of studies</u>	<u>Mean</u>	<u>SD</u>	<u>Range</u>
Year of publication	19	100%			2004-2022
RCT design type	19	100%			
1:1 Randomization	16	84.2%			
Block randomization	3	15.8%			
Sample size	19	100%	133.3	92.3	20-425
Age	16	84.2%	28.8	3.6	23.3-36.1
Race	5	31.6%			
BH/MH Concern	19	100%			
Depression	13	68.4%			
Anxiety	5	26.3%			
Both	1	5.3%			
Symptom Severity	19	1000%			
Low/non-clinical	2	10.5%			
Mild/at-risk	6	31.6%			
Moderate	5	26.3%			
Severe/DSM	6	31.6%			
Pregnancy week of enrollment	19	100%	22.1	7.6	10-35
Recruitment Trimester	19	100%			
1 st Trimester	1	5.3%			
2 nd Trimester	5	26.3%			
3 rd Trimester	6	31.6%			
Multiple trimesters	7	36.8%			
Recruitment location	19	100%			
Hospital	10	52.6%			
Clinic/health center	6	31.6%			
Midwife practice	3	15.8%			
Type of Intervention Group					
Psychosocial	13	57.8%			
CBT	5	26.2%			
Psychoeducation	4	21%			
EMDR	1	5.3%			
EFT	1	5.3%			
Narrative	1	5.3%			
“Eclectic”	1	5.3%			
Body-focused	6	42.2%			
Massage therapy*	3	15.8%			
Somatic therapy	1	5.3%			
Applied relaxation	1	5.3%			

tDCS	1	5.3%			
Partner Involvement data	19	100%			
Yes	5	26.3%			
No	14	73.7%			
Intervention format	19	100%			
Group	6	31.6%			
Individual	13	68.4%			
Intervention modality	19	100%			
Hybrid	6	31.6%			
In Person	13	68.4%			
Intervention Provider	19	100%			
Midwife	6	31.6%			
Psychologist	6	31.6%			
Massage therapist	2	10.5%			
Trained research assistant	2	10.5%			
Nurse	2	10.5%			
Community health worker	1	5.3%			
Therapist	1	5.3%			
Type of Control Group	17				
Waitlist	0	0.0%			
Usual care	2	10.5%			
Placebo	1	5.3%			
Usual Care	9	47.4%			
Feedback/referral	5	26.3%			
Length of intervention (days)	19	100%	84	28.72	14 -112
Length of intervention mild/at-risk (days)	6	31.6%	56	29.2	28-112
Length of intervention severe/DSM (days)	6	31.6%	84	55.3	21-182
Mild/at-risk direct contact	6	31.6%	9.7	11	4-32
Severe/DSM direct contact	6	31.6%	14.3	4.82	3-16
Length of intervention (minutes)	19	100%	426.8	301	150-1365
Length of intervention mild/at-risk (minutes)	6	31.6%	431.7	183.8	240-630
Length of intervention severe/DSM (minutes)	6	31.6%	506.7	201.3	240-780
Assessment time points	19	100%	3.4	1.8	2-8
Attrition	17	89.5%	28.4 participants		

Note. * Two massage therapy studies included secondary intervention groups including yoga and progressive muscle relaxation. Randomized Control Trial (RCT), Diagnostic and Statistical Manual (DSM), Cognitive Behavioral Therapy (CBT), Emotion Focused Therapy (EFT), Eye Movement Desensitization and Reprocessing (EMDR), Transcranial Direct-current Stimulation (tDCS)

Table 2*Intervention Characteristics*

Study			Intervention					Maternal Outcomes		Infant Outcomes	
Author	Year	Type	Recruitment Weeks	# sessions	Timing	BH	Improvement	Significant	Improvement	Significant	
						severity					
Abhari	2021	Counseling/ Therapy	35	5.5*	4	170*	Low	Y-DASS-21	Y-DASS-21	NA-APGAR Na-BW	N-APGAR N-BW
Ahmadpour	2022	Psychoeduca tion	14-32	4*	6	150*	Low	Y-W-DEQ A Y-EPDS	Y-W-DEQA Y-EPDS	Y-APGAR 1min Y-APGAR 5 min Na-NICU	Y-APGAR 1 min N-APGAR 5 min N-NICU
Akbarzadeh	2016	Counseling/ Therapy	28-34	4	4	300*	Mild/at- risk	Y-STAI	Y-STAI	Y-IMH	Y-IMH
Baas	2021	Counseling/ Therapy	8-20	4.5*	3	270	Severe/ DSM	Y-WDEQ A	N-WDEQ-A	Na-Preterm Na-BW Na-Composite Y-APGAR	N-Preterm N-BW N-Composite N-APGAR
Bastani	2006	Relaxation	14-28	7	7	630	Mild/at- risk	Y-STAI	Y-STAI	Y-BW	Y-BW
Burger	2020	Counseling/ Therapy	10-12	12*	12	720*	Moderate	Na-PBQ Y-STAI Y-EPDS	N-PBQ Y-STAI Y-EPDS	N-CBCL Na-BW Y-APGAR Na-BSID-III Na- C-TRF	N-CBCL N-BW N-APGAR N-BSID-III N-C-TRF
Zhao	2021	Psychoeduca tion	28-34	6*	5	240	Mild/at- risk	Y-BSES-SF Y-IBAS Y-EPDS-10	Y-BSES-SF Y-IBAS Y-EDPS-10	N-GEST. N-NICU	N-GEST. N-NICU

Field	2004	Massage/PM R	18-24	16	32	640	Mild/at- risk	Y-STAI Y-POMS Y-CES-D	N-STAI Y-POMS Y-CES-D	Y-BNBAS Y-OCS Y-PNF	Y-BNBAS Y-OCS Y-PNF
Field	2009	Massage	16-20	12	32	640	Severe/ DSM	Y-CES-D Y-STAI	Y-CES-D N-STAI	Na-BW Na-BNBAS	Na-BW Y-BNBAS
Field	2012	Massage/Ex ercise	20	12	12	240	Severe/ DSM	Y-CES-D	Y-CES-D	Y-GEST.	Y-GEST
Lund	2020	Counseling/ Therapy	≤28	6	6	315*	Moderate	Y-EPDS Y-MINI Y-HDRS Y-FAI Y-MSPSS	Y-EPDS Y-EPDS Y-EPDS Y-EPDS Y-EPDS	Na-APGAR Na-BW Na-BL Na-HC Na-CW Na-CH Na-CHC	N-APGAR N-BW N-BL N-HC N-CW N-CH N-CHC
Milgrom	2015	Counseling/ Therapy	<30	12*	8	480	Severe/ DSM	Y-BDI-II Y-BAI	N-BDI-II N-BAI	Na-ASQ-3 Na-ASQ-SE Na-IBQ-R Na-BSID Y-CBCL Na-WPSSI-II	Y-ASQ-3 Y-ASQ-SE Y-IBQ-R N-BSID N-CBCL N-WPSSI-II
Montazeri	2020	Counseling/ Journaling	28-31	14.5 *	6	202. 5	Moderate	Y-BAI	Y-BAI	Y-ISQ Y-BW Y-ASQ Y-BL Y-HC	Y-ISQ N-BW N-ASQ N-BL N-HC
Netsi	2015	Counseling/ Therapy	8-18	18*	12	720	Moderate	Y-EPDS	Y-EPDS	Na- ICQ Na-BISQ	N-ICQ N-ICQ
Ortiz	2014	Counseling/ Therapy	≤20	10	11	1,36 5	Moderate	Y-EPDS Y-FSSQ Y-DAS	Y-EPDS N-FSSQ N-DAS	Na-BW Na-Premature	Y-BW Y-Premature

Urizar	2011	Counseling/ Therapy	6-28	28.5 *	16	960*	Severe/ DSM	Y-MSC N-MPS Na-MMS Y-CES-D Y-PANAS	Y-MSC Y-PMS N-MMS N-CES-D N-PANAS	Na-IPS Y-ISC	N-IPS N-ISC
Vigod	2019	tDCS	14-32	3	15	450	Severe/ DSM	Y-MADRS Y-EPDS Y-STAI	N-MADRS N-EPDS N-STAI	Na-ICQ Na-ASQ Na-APGAR	N-ICQ N-ASQ N-APGAR
Zhao	2017	Psychoeduca tion	<28	9*	6	540	Mild/at- risk	Y-EPDS Y-PDSS	Y-EPDS Y-EPDS	Na-GEST Na-BW	N-GEST N-BW
Zhao	2020	Psychoeduca tion	28-34	6*	4	240	Mild/at- risk	Na-BSES Y-EPDS Na-IBAS	Y-BSES Y-EPDS Y-IBAS	Na-NICU	N-NICU

Note. Gestational Age at Birth (GEST); Neonatal Intensive Care Unit Admission (NICU); Breastfeeding Self-Efficacy Scale–Short Form (BSES-SF); Infant Breastfeeding Assessment Tool (IBAS); Edinburgh Postnatal Depression Scale (EPDS-10); Appearance, Pulse, Grimace, Activity, and Respiration (APGAR); Birth Weight (BW); Depression Anxiety Stress Scales–21 Items (DASS-21); State-Trait Anxiety Inventory (STAI); Infant Mental Health (IMH); Postpartum Bonding Questionnaire (PBQ); Child Behavior Checklist (CBCL); Bayley Scales of Infant and Toddler Development (BSID-III); Caregiver-Teacher Report Form (C-TRF); Brazelton Neonatal Behavioral Assessment Scale (BNBAS); Obstetric Complications Scale (OCS); Postnatal Factors Scale (PNF); Profile of Mood States (POMS); Center for Epidemiologic Studies Depression Scale (CES-D); Birth Length (BL); Birth Head Circumference (BHC); Child Weight (CW); Child Height (CH); Child Head Circumference (CHC); Mini International Neuropsychiatric Interview (MINI); Hamilton Depression Rating Scale (HDRS); Functional Assessment Instrument (FAI); Multidimensional Scale of Perceived Social Support (MSPSS); Ages and Stages Questionnaire, Third Edition (ASQ-3); Ages and Stages Questionnaire: Social-Emotional (ASQ-SE); Infant Behavior Questionnaire–Revised (IBQ-R); Wechsler Preschool and Primary Scale of Intelligence (WPPSI-II); Duke-UNC Functional Social Support Questionnaire (FSSQ); Dyadic Adjustment Scale (DAS); Preterm Birth (Preterm); Infant Perceived Stress (IPS); Infant Salivary Cortisol (ISC); Maternal Salivary Cortisol (MSC); Maternal Perceived Stress (MPS); Maternal Mood Screener (MMS); Positive and Negative Affect Schedule (PANAS); Postpartum Depression Screening Scale (PDSS); Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ A/B); Montgomery–Åsberg Depression Rating Scale (MADRS); Beck Anxiety Inventory (BAI); Beck Depression Inventory–II (BDI-II).

APPENDIX A: IRB

This study did not require Institutional Review Board (IRB) approval because it did not involve direct interaction with human subjects. As a systematic review, all data were obtained from previously published studies.

APPENDIX B: SEARCH HEDGE

("Randomized Controlled Trial"[pt] OR "Controlled Clinical Trial"[pt] OR "Pragmatic Clinical Trial"[pt] OR "Equivalence Trial"[pt] OR "Clinical Trial"[pt] OR "Random Allocation"[mh] OR "Double-Blind Method"[mh] OR "Single-Blind Method"[mh] OR Placebos[Mesh:NoExp] OR "Control Groups"[mh] OR (clinical[tiab] AND (trial*[tiab] OR study[tiab] OR studies[tiab])) OR (random*[tiab] OR sham[tiab] OR placebo*[tiab]) OR ((singl*[tiab] OR doubl*[tiab]) AND (blind*[tiab] OR dumm*[tiab] OR mask*[tiab])) OR ((tripl*[tiab] OR trebl*[tiab]) AND (blind*[tiab] OR dumm*[tiab] OR mask*[tiab])) OR (control*[tiab] AND (study[tiab] OR studies[tiab] OR trial*[tiab] OR group*[tiab])) OR (Nonrandom*[tiab] OR "non random"[tiab] OR "non-random"[tiab] OR "quasi-random"[tiab] OR quasirandom*[tiab]) OR allocated[tiab] OR ("open label"[tiab] OR "open-label"[tiab]) AND (study[tiab] OR studies[tiab] OR trial*[tiab])) OR ((equivalence[tiab] OR superiority[tiab] OR "non-inferiority"[tiab] OR noninferiority[tiab]) AND (study[tiab] OR studies[tiab] OR trial*[tiab])) OR ("pragmatic study"[tiab] OR "pragmatic studies"[tiab]) OR ((pragmatic[tiab] OR practical[tiab]) AND trial*[tiab]) OR ((quasiexperimental[tiab] OR "quasi-experimental"[tiab]) AND (study[tiab] OR studies[tiab] OR trial*[tiab])) AND (((("Pregnant People"[Mesh] OR ("Pregnancy"[Mesh] AND "Humans"[Mesh]) OR "Postpartum Period"[Mesh] OR "Pregnant People*[tiab] OR "Pregnant Person"[tiab] OR "Pregnant Woman"[tiab] OR "Pregnant Women"[tiab] OR (Pregnancy[tiab] AND Humans[tiab]) OR Postpartum[tiab] OR Puerperium[tiab]) AND ("Therapeutics"[Mesh] OR "Maternal Health Services"[Mesh] OR Therapeutic*[tiab] OR Treatment*[tiab] OR Therap*[tiab] OR "Prenatal care"[tiab] OR "antenatal care"[tiab] OR "Postnatal care" [tiab] OR "Postpartum Program*[tiab] OR "Maternal Health Service*[tiab])) AND ("Behavioral Medicine"[Mesh] OR "Mental Health"[Mesh] OR "Mental Disorders"[Mesh] OR "Anxiety"[Mesh] OR

"Depression"[Mesh] OR "Behavioral Medicine"[tiab] OR "Health Psychology*"[tiab] OR "Mental Hygiene"[tiab] OR "Mental Health"[tiab] OR "Mental Disorder*"[tiab] OR "Psychiatric Disorder*"[tiab] OR "Psychiatric Disease*"[tiab] OR "Psychiatric Illness*"[tiab] OR "Mental Illness*"[tiab] OR "Behavior Disorder*"[tiab] OR "Psychiatric Diagnos*"[tiab] OR "Severe Mental Disorder*"[tiab] OR "Depressive Symptom*"[tiab] OR "Emotional Depression"[tiab] OR Angst[tiab] OR Nervousness[tiab] OR Hypervigilance[tiab] OR "Anxiet*"[tiab] OR Anxiousness[tiab])) AND ("Infant"[Mesh] OR "Birth Weight"[Mesh] OR "Child Development"[Mesh] OR "Apgar Score"[Mesh] OR "Gestational Age"[Mesh] OR "Pregnancy Complications"[Mesh] OR Infant*[tiab] OR Newborn*[tiab] OR Neonate*[tiab] OR "Birth Weight*"[tiab] OR Birthweight*[tiab] OR "Child development"[tiab] OR "Apgar score"[tiab] OR "Bayley scale*"[tiab] OR "bsid III"[tiab] OR "caregiver teacher report form"[tiab] OR "care giver teacher report form"[tiab] OR "c-trf"[tiab] OR "Wessler scale*"[tiab] OR "wppsi III"[tiab] OR "Gestational Age"[tiab] OR "Gestational Ages"[tiab] OR "Embryologic Age"[tiab] OR "Embryologic Ages"[tiab] OR "Chronologic Fetal Maturity"[tiab] OR "Fetal Age"[tiab] OR "Fetal Ages"[tiab] OR "Adverse Birth Outcome*"[tiab] OR "Pregnancy Complication*"[tiab]))

APPENDIX C: CODING MANUAL

<i>Inclusion criteria</i>	<i>Notes to reviewer</i>
English	
Randomized control trial	
Pregnant humans	
Part of the pregnancy (1st,2nd,3rd trimester) was captured during the study, even if the postnatal period is also included	
Pregnant participants must have a confirmed anxiety and/or depression diagnosis or symptomology as inclusion criterion	• Include studies where parents are selected for having any elevated symptom of depression and/or anxiety • This can include a reported personal history of past confirmed depression or anxiety symptoms or diagnosis • This does not include stress, as stress is not a formal diagnosis • This description does not include informal “at risk” criteria such as limited social support, living circumstances, limited income, etc. unless the criteria are assessed for in a standardized assessment, Ex. Predictive Index of Postnatal Depression (PIP)
Evaluates one non-pharmacological intervention vs. a control group	• 1. Waitlist / No Intervention • 2. Feedback and/or Referral Only ○ Note: if participants receive access to assistance or support not typically accessible during routine care at that site, then it is not considered Feedback and/or Referral. • 3. Placebo / Attention Control • 4. Usual Care ○ unenhanced as long as there is no BH format that is not apart of routine care already occurring at the site or apart of pre-natal care standards. • Participants receive a placebo or sham intervention that: -Matches the intervention on non-

	specific features (e.g., attention, time) -Lacks the active components intended to improve parent BH • Control group receives some form of intervention that DOES NOT target BH • Ex of control group interventions to dis-include ○ “Low-intensity treatment (LIT)” ○ “mhGAP-informed care” ** unless the site was already trained pre-study and is considered a part of that cite’s usual care and services offered.
One maternal and neonatal outcome, no shared measures (eg, perceived bonding)	• Includes: “birth” and “pregnancy” outcomes <u>IF they are child-focused</u> (e.g., birthweight and APGAR scores should be included.) ○ Exclude if the only outcome is whether the mother had a natural birth vs. cesarean section or other parent-focused birth/pregnancy outcome • May include measures of the child’s attachment relationship with their parents/caregivers or “attachment security” or measures of parent-child interactions that measure the child’s behavior in a manner that is distinct from any measurement of the parents’ behavior and meets above definition of a child outcome ○ Exclude if the only measure is a measure of parent-child interaction that primarily or exclusively reflects the parent’s behavior (e.g., maternal sensitivity) • The variable must measure something that a infant ‘has’ or ‘does’ in order to be a child outcome. Frequency of experiences is not a child measure but

	the frequency of an event (e.g. crying) is a infant outcome.
The intervention must be designed to target or treat the identified behavioral health concern (depression/anxiety)	***PLEASE code any components of the intervention that do not appear or are not overtly expressed as a part of the intervention intended to treat the BH concern (lactation training, financial literacy training, etc.) • The intervention is explicitly designed or intended to treat or reduce parents' behavioral health concerns (e.g., depression, anxiety). • The intervention is intended addresses parents' behavioral health more broadly, not only parenting skills or parenting behaviors. • Interventions that focus only on improving parenting (e.g., lactation education, responsiveness to crying) DO NOT qualify. • The intervention must be consistent across the control group or different levels of intervention within the same intervention group; these should be accounted for in the data as separate groups.