

**Pregnancy-related Anorexia Nervosa and its Effect on the Maternal-Fetal Bond**

by

Nazish Jabeen

A capstone submitted in partial fulfillment

of the requirements for the Degree of

Master of Counselling  
in the  
Division of Arts and Sciences

City University  
of Seattle  
2023

This paper is accepted as conforming to the required standard.

December 5, 2023

Dr. Amanda de Guerre

City University of Seattle

### **Acknowledgements**

I want to acknowledge and sincerely appreciate my supervisor, Dr. Amanda de Guerre for her time and efforts throughout the year. She played a critical role in guiding this literature review and pushing me on. I always appreciated her feedback, comments, and check-ins, as they were sometimes necessary in completing this capstone. I would also like to thank my family for their continuous support and belief in me. I fully acknowledge that I am here because of your sacrifices, and I do not take this privilege lightly. Lastly, I would like to thank my husband for keeping me motivated, showing my empathy, and supporting me through this journey. I am eternally grateful for all your support, and I hope this work makes you proud.

### **Abstract**

Pregorexia describes women who reduce calorie intake and increase exercise to control weight gain during pregnancy. Due to the increasing consumption of social media and the desire for the ideal body type, it becomes necessary to monitor how pregorexia influences expecting mothers. The research question of this literature review is: is the maternal-fetal bond impacted due to Anorexia Nervosa (AN) in pregnancy? The researcher gathered qualitative and quantitative studies using inclusion and exclusion criteria to complete this literature review. This literature review included ten primary research articles since the year 2016. Using the network analysis approach, three themes answer the research question. The first theme examines the maternal-fetal bond and its association with adult insecure attachment style. The second theme looks at the association between depression and the maternal-fetal bond. The last theme discusses the symptoms of AN during pregnancy and its impacts on the fetus. Based on the literature analysis, an inference can be made that maternal-fetal bonding is significantly influenced by AN, even in non-eating disorder populations. Until recently, AN was a Westernized culture-bound syndrome. However, recent research has shown AN across geographic borders with variations in symptomology. Based on the inferences and themes identified in this literature review, it is essential to raise awareness about the impact of social media during pregnancy. In turn, this awareness will help mothers diagnosed with AN during pregnancy to build stronger maternal-fetal bonds.

*Keywords:* pregorexia, anorexia nervosa, pregnancy, antenatal attachment, maternal depression, and maternal-fetal bonding.

**Table of Contents**

Acknowledgement.....2

Abstract.....3

Chapter One: Introduction.....6

    Background.....6

    Problem Statement.....10

    Research Rationale.....10

    Significance.....11

    Theoretical Framework.....12

    Key Terms.....16

    Researcher Positionality.....16

Chapter Two: Methodology.....21

    Literature Search Process.....21

    Inclusion and Exclusion Criteria.....22

    Selection of Articles.....23

    Data Analysis Procedures.....24

    Methodological Critiquing.....26

        Quantitative Studies.....26

        Qualitative Study.....32

        Methodological Strengths & Limitations.....33

Chapter Three: Review of Literature and Findings.....38

    Literature Review.....38

    Review of the Literature and Discussion of Themes.....38

Ethical Considerations.....	45
Chapter Four: Application to Clinical Practice.....	49
Clinical/Therapeutic Applications.....	49
Scientific Knowledge.....	51
Cultural/Diversity Implications.....	52
Chapter Five: Recommendations and Conclusion.....	56
Conclusions.....	56
From Literature Analysis.....	56
From Methodological Analysis.....	58
Recommendations.....	60
Clinical /Therapeutic Level.....	60
Future Research.....	61
References.....	64
Appendix A.....	78
Appendix B.....	83

## **Pregnancy-related Anorexia Nervosa and its Effect on the Maternal-Fetal Bond**

### **Chapter One: Introduction**

#### **Background**

Anorexia Nervosa (AN) is an eating disorder associated with the fear of gaining too much weight, resulting in severe weight loss (American Psychiatric Association [APA], 2022, p. 339). According to a systematic review completed by Pan et al. (2022), it impacts 1 in 100 women in the reproductive age group. This disorder is often chronic, affecting various areas of life, and results in a preoccupation with calorie intake and weight (Gregertsen et al., 2017). Characteristics of AN include distortion of body image, stringent beliefs about being overweight, and behavioural changes such as excessive exercising (Bora & Köse, 2016). In 2008, the media coined "pregorexia" (pregnancy + anorexia) to describe women who reduce calorie intake and increase exercise to control weight gain during pregnancy (Mandera et al., 2019). Prior to their pregnancies, these women did not have any symptoms of AN. This literature review will use the term pregorexia to describe AN during pregnancy.

Pregnancy could be a risk factor for initiating the development of AN. Factors that lead to AN development include a desire to be thin, dissatisfaction with the body, fasting, and excessive exercise (Stice et al., 2017). For some women, there is a fear of becoming unattractive or unfeminine after giving birth (Mandera et al., 2019). Paired with this fear, the desire to be perfect, low self-esteem, and an unsupportive family environment can increase the chances for the evolution of AN (Pan et al., 2022). Therefore, pregnancy may lead to expecting mothers experiencing distress due to the fear of being unattractive. Maternal distress may then impact food consumption, which in turn may impact the pregnancy and delivery of the baby. Appropriate consumption of nutrients such as proteins, lysine, omega-3 fatty acids, iron, and

folate plays a role in pregnancy outcomes, which may be lacking in a woman with AN due to malnutrition (Pan et al., 2022). Malnutrition due to AN during pregnancy could impact the physical health of the baby and the mother.

Mothers experiencing AN during pregnancy may pass on the trait to their children. Previous studies completed on AN have shown that this disorder can be inherited. Using twin studies, Paolacci et al. (2020) estimated that the heritability of AN is fifty to sixty percent. Moreover, AN traits can be transgenerational because close relatives are more likely to develop AN than others. Therefore, a suggestion could be that mothers who develop AN during pregnancy will not only experience maternal distress but also may pass on this trait to their offspring.

In addition to the heredity of AN, this disorder has neurobiological implications that can lead to its development, specifically in the make-up of neurochemicals. Serotonin receptors regulate the need for survival, and changes to this pathway are associated with stress; stress is also considered a predisposing factor to AN (Paolacci et al., 2020). Mothers may be experiencing stress during pregnancy, which creates a possibility for the development of AN. Furthermore, women diagnosed with AN have lower dopamine levels (Bailer et al., 2017). Consuming food, exercising, and dieting impact dopamine levels and the mesolimbic reward system. While these behaviours increase dopamine, they may also be causing more anxiety for pregnant women because the location of dopamine release, the dorsal caudate, is also associated with harm avoidance. Additionally, other hormones such as ghrelin and leptin impact the mesolimbic reward system in the brain, which results in imbalanced food intake in women diagnosed with AN (Paolacci et al., 2020). Due to this, traits associated with pregnancy, such as stress, diet restrictions, and weight gain, may lead to AN.

## **AN Traits Found in Affective Disorders**

Research has shown that AN traits are observed in affective disorders. For example, individuals experiencing high-stress events, such as pregnancy, who have an anxiety disorder or obsessive-like traits are at an increased risk of developing AN (APA, 2022, p. 342). People diagnosed with AN show more perfectionist traits, similar to OCD, giving them a sense of structure, stability, and control (Dahlenburg et al., 2019). The constant worry of gaining weight and the desire to control the automatic negative thoughts may trigger AN traits (Mandera et al., 2019). Losing weight makes people feel more attractive and increases self-confidence, which acts as positive reinforcement leading to the development of AN traits. Unfortunately, some women during pregnancy focus more on losing weight, specifically to avoid low mood and appear more attractive (Mandera et al., 2019). Research has shown an overlap in depressive symptoms with core symptoms of AN. Feeling fat, wanting to lose weight, discomfort looking at own body, and a fear of weight gain are key components to AN psychopathology and display a strong correlation to depression (Elliott et al., 2019). Worthlessness could be the connection between the negative cognitive distortions observed in AN and other symptoms of depression. As a result, these behaviours may increase the risk of developing AN like behaviours in pregnancy.

## **Attachment During Pregnancy**

Maternal bonding with the fetus is related to forming a relationship with the baby and can range from affectionate to hostile and rejective. A woman's perception of their body and the changes it is going through can impact their identity formation and the maternal-fetal bond (Talmon et al., 2021). For example, a negative experience resulting in loss of control may cause unhappiness with their physical appearance, which can influence how they view their child. In

this sense, the behaviors associated with AN may impact the maternal-fetal bond due to how women perceive their bodies during pregnancy. There is a possibility that a low maternal-fetal bond could lead to poor obstetric outcomes for the fetus. Saleem et al. (2022) explained the common symptoms found in women diagnosed with AN during pregnancy were typical symptoms of AN. As well, women who are hospitalized during pregnancy due to AN is linked with adverse outcomes in the infant, such as poor fetal growth (Ante et al.,2020).

Research indicates an association with mothers with an insecure attachment style and increase risk of maternal-fetal bond failure. Ertman et al. (2021) found that secure adult attachment is associated with the development of the maternal-fetal bond and it was noted that pregnant mothers spend more time thinking about, talking to, and feeling for the fetus. Røhder et al. (2020) found that pregnant women with an insecure adult attachment style had difficulty in forming close relationships with the fetus. Not having positive expectations about the relationship with the fetus, postnatal stress, and depression were factors in predicting bonding outcomes (Rusanen et al., 2021). Nordahl, et al. (2019) found a relationship between schemas associated with disconnection and maternal bonding, with symptoms of depression acting as a mediator in this connection.

The maternal-fetal bond during pregnancy is damaged when the pregnant mother experience prenatal depression. Smorti et al. (2019) found that prenatal depression led to poor attachment, impacting how the mother and child interacted after birth. Soltsman et al. (2021) found that prenatal mothers experiencing stress scored negatively on the depression scales. A mother's self-criticism pre-birth was positively associated with antenatal depression, impacting the maternal-fetal bonding during delivery (Brassel et al., 2020). These findings are similar to Ohara et al. (2017), who found that when a mother presented with depressive mood and bonding

failure during early pregnancy, the same results appeared in late pregnancy and five days after delivery.

### **Problem Statement**

This literature review examines the impact of pregorexia, a phenomenon not well understood on maternal fetal bonding, especially in women who develop AN during pregnancy without a prior history of such disorder. Many studies have explored the attachment formation between pregnant women and fetuses, and cases where AN was present prior to and during pregnancy there is a lot of information pertaining to the clinical eating disorders population. However, there is limited research that focuses on maternal fetal bonding and the development of AN during pregnancy, specifically in women without a previous eating disorder. It is important to monitor the risk of pregorexia and how it may influence their connection to their developing fetus, because as expectant mothers desire the ideal body image, it can affect the bond formation and possibly result in poor child's growth and future outcomes (Mandera et al. 2019). Future research on pregorexia will shed light on the triggers, beliefs systems of pregnant women who develop AN behavior during pregnancy. As well as understand the effects of these behaviors on the maternal-fetal bond in women where AN has not been previously diagnosed. For this reason, the research question for this literature review is: is the maternal-fetal bond impacted due to AN in pregnancy?

### **Research Rationale**

The available research on pregorexia, indicates that AN during pregnancy leads to harmful consequences. This disorder can lead to anemia, dehydration, gestational diabetes, impaired bone mineralization, and postpartum depression during pregnancy (Mandera et al., 2019). Mantel et al. (2020) found in their cohort study an increase in physiological symptoms

such as hyperemesis, anemia, antepartum hemorrhage, preterm birth, and increased risk of microcephaly for the baby. These symptoms can lead to a negative pregnancy, impacting the maternal-fetal bond and postnatal outcomes. The outcome of both the aforementioned studies indicate that AN during pregnancy has serious health consequences and impact both mother and fetus.

A longitudinal study completed by Blackmore et al. (2016) found that childhood trauma exposure by the mother increased the chances of low birthweight for the child due to maternal anxiety and depression. As a result of this, the attachment with the baby is impacted, as the mother does not have a stable sense of self to form a secure attachment with her child (Talmon et al., 2021). Due to the high correlation between affective disorders and AN, trauma exposure may lead to attachment injury, impacting the mother and child.

### **Significance**

This literature review will assist in answering the research question: is the maternal-fetal bond impacted due to AN in pregnancy? Based on the literature to date, there is a link between AN and maternal attachment (Mandera et al. 2019). Additionally, information has shown that women with affective disorders that create disordered eating behavior during pregnancy experience a negative impact on maternal-fetal bonding (Elliott et al., 2019). However, the lack of literature about maternal fetal bonding in cases with women who experience AN traits in pregnancy when never having experienced a formal eating disorder until the state of pregnancy still need to be examined. To answer the proposed question literature about depression, pregnancy, and AN traits will be examined. Inferences will be made from the existing knowledge on women who experience depression during pregnancy, experience disorder eating behavior and have not experienced a formal AN diagnosis prior to pregnancy in order to understand the

impact it has on the maternal-fetal bond.

There is a lot of research that discusses attachment formation in pregnancy. Specific research from Mander et al. (2019) and Talmon et al. (2021) has shown the long-term consequences of poor maternal-fetal bonding during pregnancy. Factors like a pregnant woman's well-being, levels of anxiety and depression, as well as familial support are linked to better antenatal attachment to the fetus (Brandão et al., 2019). Whereas a lower level of attachment with the baby and the mother's self-efficacy during pregnancy can enhance the risk of postpartum depression (Talmon et al., 2021). Furthermore, long-term development of the baby is impacted when women with eating disorders stop breastfeeding earlier than those without eating disorders, (Mander et al., 2019). That being said, there is a gap in the literature that addresses the topic of pregorexia and its impact on antenatal attachment. This gap in literature is concerning as it may result in long-term consequences for both the pregnant woman and the unborn child.

### **Theoretical Framework**

To answer the question, is the maternal-fetal bond impacted due to AN in pregnancy? One must understand the relationship between maternal-fetal bond and pregorexia through the lens of the cognitive model and attachment theory. The cognitive model explains the triggers and belief systems associated with mothers who experience AN traits for the first-time during pregnancy. Furthermore, attachment theory outlines a deeper understanding of the maternal-fetal bond process. These theories will guide the interpretation of the research found in this literature review.

#### **Cognitive Model**

Cognitive theory, developed by A.T. Beck (1964), utilizes a cognitive model of mental illness. The cognitive model states that an individual's emotions and behaviours are influenced by how they perceive a situation. This model describes distorted patterns of thinking which influence their behavioural response (Dobson & Dobson, 2018). There are three levels of cognition: core beliefs, dysfunctional assumptions, and negative automatic thoughts (Beck, 1964). Automatic thoughts are the immediate interpretation of an event which forms an individual's emotions and behaviours. Core beliefs are how one views oneself and the world, impacting their interpretation of events. When these thoughts and beliefs become dysfunctional, they can have a negative impact, leading to cognitive distortions. Cognitive distortions are the errors in logic an individual makes that may lead to errored conclusions (Beck, 1964). Beck suggested that stressors can activate certain feelings and ways of thinking, which changes how an individual act, going back and influencing the thoughts and initiating the cognitive triangle (Beck, 1976). Therefore, treatment would include teaching strategies to adjust and restructure the negative thoughts and experience cognitive change.

Research has shown that those with AN have impaired cognitive functioning, such as decision-making abilities, which leads to rigidity (Kucharska et al., 2019). This rigidity, which is a part of their core belief, makes an individual preoccupied with their body image and caloric intake. The overvaluation of body shape and weight becomes a core psychopathology of AN (Calugi et al., 2021). Individuals with AN tend to show perfectionism, self-discipline and have difficulties with emotional regulation (Dalle et al., 2016). These characteristics together form an ideal perception of body shape and weight, leading to the dysfunctional belief that they weigh too much. These perceptions form cognitive biases as part of the negative automatic thoughts which lead to behaviour, such as starvation and excessive exercise.

During pregnancy, women experience changes to their bodies. In that sense, women may experience dysfunctional assumptions and cognitive distortions due to the stress and fear of childbirth (Dafei et al., 2021). These automatic thoughts may lead to anxiety and depression for the mother, resulting in further harm. For example, women who are pregnant may hold the core belief that they will be inadequate mothers. Therapies that utilize cognitive theories to treat AN tend to focus on factors that lead to the maintenance of the disorder and the extreme restrictions that people with AN place on themselves (Dalle et al., 2016). Treatment for AN emphasizes modifying thinking and using strategies for behaviour changes, such as self-monitoring. Therefore, using a cognitive model can provide a better understanding of the relationship between the mother's emotions, cognitions, and behaviours as they experience pregnancy and symptoms of AN.

### **Attachment Theory**

Attachment theory helps one to understand a mother-child relationship and its interactional patterns (Bowlby, 1982). Bowlby defines attachment in children as wanting to be close and maintain contact with an important figure during times of fear or stress. If a child feels secure in the presence of their caretaker, they will be motivated to explore their surroundings. However, if the child becomes frightened, their motivation will shift toward seeking proximity and stop the exploration (Zeanah et al., 2011). A secure attachment leads children to feel confident to explore their environment. Attachment behaviours evolve throughout the different stages of life. According to Ainsworth (1978), each type of attachment pattern links to parent behaviours and child response to them. Insecure attachments tend to form when a caregiver is unavailable or only occasionally responsive to child stresses and cues. Those with insecure attachment may present as being anxious or ambivalent and behave in unpredictable ways

(Ainsworth, 1978). This behaviour pattern may impact how individuals establish meaningful relationships.

Research has demonstrated that those diagnosed with AN tend to have an insecure attachment style. The development of insecure attachment is due to the experience of childhood trauma, abuse or loss (Tasca & Balfour, 2014). This attachment style and how one experiences the body can lead to the core symptoms of AN (Emanuele et al., 2020). Adverse life experiences often lead to body dissatisfaction and the formation of insecure attachment, linking to the onset of AN. Childhood adversity can lead to feelings of confusion due to the inconsistency of emotional responses from caregivers (Tasca & Balfour, 2014). Emotional inconsistency during childhood leads to individuals with AN overly controlling their emotions as adults, developing an insecure attachment. Often, individuals with AN display over-regulation of their affect, appearing dismissive and focusing more on dieting and body appearance (Zachrisson & Kulbotten, 2006). This over-regulation helps the individual divert attention from focusing on their feelings or stressful cues.

Given that two of the causing factors of AN are insecure attachment and body dissatisfaction, this disorder may impact bond formation during pregnancy. Pregnancy is a period when most women experience drastic body changes. Part of adjusting to the transitional period of becoming a mother is establishing a relationship with the baby in and out of utero and establishing a new maternal identity (Talmon et al., 2021). A maternal identity includes a shift from thinking about oneself to the child and their relationship (Zdolska-Wawrzekiewicz et al., 2019). The mother's past relationship with important caregivers and attachment styles, such as insecure attachment, can impact the relationship with their baby, thus impacting their well-being

(Ghahremani et al., 2019). In this sense, AN can impact the maternal-fetal bond due to how women perceive their bodies during pregnancy.

### **Key Terms**

**Anorexia Nervosa (AN):** is a form of eating disorder that causes extreme weight loss, which is often associated with a fear of becoming overweight (APA, 2022, p. 339).

**Pregorexia:** is a type of AN that is present in women who seek to control their pregnancy, with approximately five percent of women experiencing it during and after pregnancy (Tuncer et al., 2020).

**Antenatal Attachment:** is the ability of the mother to conceptualize the fetus as a human being, building a psychological bond between the parent and the child (Brandão et al., 2019).

**Mother-fetal Bonding:** another word for antenatal attachment, is the emotional relationship between a mother and her fetus (Daglar & Nur, 2018). The crucial role of this bond is the maternal identity formation and the transition to motherhood.

**Maternal Depression:** describes a range of symptoms that may affect pregnant women (Department of Health, 2015).

**Pregnancy:** is a period, usually nine months, when a fetus forms and develops inside a womb (National Institute of Health, 2017).

### **Researcher's Position**

As a therapist, I practice using the theoretical underpinnings of Acceptance and Commitment Therapy (ACT). A third-wave therapy, under the umbrella of cognitive theory, focuses on the acceptance of painful experiences, while taking committed action linked to personal values (Fullen et al., 2020). ACT outlines that psychopathology results from regular

psychological processes (Hayes et al., 2003). This theory outlines that it is the avoidance of negative thoughts and feelings that cause harm (Hayes et al., 2012).

My belief in human development and psychopathology aligns with the views of ACT. A fully functioning individual lives by their values. As we grow, our communities, culture, families, and friends play a role in building our identity. Through their influence and our lived experiences, we develop our values, worldviews, and perspectives. When we can live according to these principles, we can face challenging times. We often label human emotions and behaviours as pathology, which stops us from experiencing all types of emotions. Our brain broadcasts pains from the past, problems in the present and fears about the future. This process is linked to evolution, making it normal and natural. It is essential to consider the frequency, type, effect of behaviour and workability to understand if the experience is outside the norm.

In this sense, my ontological and epistemological view is social constructivism. This view states that the construction of reality and knowledge comes from society, building an understanding of the world (Creswell & Poth, 2017). Social constructivism assumes that human beings rationalize their experience by creating a model of the world around them. Therefore, interpretations of social phenomena, such as anorexia, are dynamic and changing over time based on the understanding of society.

Growing up in a community where thinness is admired and sought after, I always thought AN had more of an environmental contribution rather than other factors. Learning throughout my master's program that contributing factors of genetics, hormones, neurodevelopment, cognitive, and comorbid disorders impact the development of this disorder has been eye-opening. As a woman who has not experienced pregnancy, I am conscious that I may not truly understand the experiences of women and the transition they go through. I am also not diagnosed with AN,

which may limit my understanding of the challenges of this disorder. My knowledge of AN and attachment formation comes from an educated background rather than through lived experience, which may form biases in my interpretation of data. For example, I may make inferences or conclusions that may not be accurate to an individual living with pregorexia. Being part of a generation that heavily utilizes social media, I am just as susceptible to its messages and impact. This impact could play a role in the conclusions I form. Acknowledging the privilege I hold of being able to conduct this literature in a secure environment and my role as a therapist, it is my responsibility to ensure I practice within the Canadian Code of Ethics (Canadian Psychological Association [CPA], 2017) and meet its standards. To prevent bias in this literature review, I consulted with my supervisors and peers to ensure objective conclusions are made based on the findings, rather than my opinions.

As a new counsellor, the findings of this literature review have piqued my interest. Initially, I was surprised by how little information exists about the effects of maternal-fetal bonds in cases of AN during pregnancy. I had expected more research, considering the extensive number of studies available on AN through the lens of attachment theory. However, it appeared that more research was available on maternal depression during pregnancy and its impact on the maternal-fetal bond than the topic I was investigating. This lack of research prompted my application of the network analysis approach, aiming to draw some inferences that could pave the way for future researchers to investigate this topic.

Based on the inferences and themes made from this literature review, it is evident that mothers at risk of developing pregorexia require closer monitoring and support. Early identification of triggers and the implementation of a plan are beneficial. For example, if the triggers include exposure to social media posts promoting unrealistic body ideals during

pregnancy, a part of the treatment plan could involve assessing and managing the time spent on social media. As a counsellor belonging to Generation Z, I recognize the impact of social media on individuals and its role in setting societal standards. Considering social media coined the term "pregorexia," it is clear platforms like Instagram and TikTok can have a substantial influence on the new mother. These platforms are influential because of the vast knowledge available on these sites, but the accuracy of this information is unknown. It is possible that mothers now may turn first to these platforms to learn pregnancy tips rather than meeting their doctors. Therefore, I must build a better understanding of how mothers coping with AN during pregnancy can find a balance and adopt healthier daily habits.

### **Paper Overview**

This literature review examines the development of pregorexia and its impact on the maternal-fetal bond. This paper outlines the available research on this topic while identifying the gaps and illuminating factors such as triggers, cognitions, and attachment styles. The literature review sheds light on the common themes in the ten articles addressing this topic. Furthermore, a discussion on the application of this research project highlights the importance of this literature review to the field of counselling psychology, along with a discussion on the future direction of this topic.

In Chapter 2, there is a discussion on the literature search process to answer the research question, such as discussing the inclusion and exclusion criteria. This chapter includes the decision-making process to refine the literature and the challenges experienced. Chapter 3 reviews the relevant literature and answers the research question. This chapter consists of a thorough analysis of the attachment style most commonly observed with this diagnosis, the relationship between depression and AN, and the long-term outcomes of pregorexia. Then,

chapter 4 incorporates the themes established in the last chapter and discusses its use in clinical practice. The final chapter offers future research questions, discusses this literature review's limitations, and concludes this study.

## **Chapter Two: Methodology**

This chapter reviews the literature search process to answer the research question: is the maternal-fetal bond impacted due to AN in pregnancy? It includes the databases and search engines accessed and the specific terminologies utilized to find the ten research articles. To find the articles, inclusion and exclusion criteria were established. This chapter reviews the decision-making process to refine the literature and discuss the challenges experienced. Lastly, this chapter completes a methodological critiquing of the ten key articles and outlines their strengths and limitations.

### **Literature Search Process**

To complete this literature review, the researcher gathered primary research to explore the development of AN during pregnancy and its impact on the maternal-fetal bond. Primary research is a study that collects data directly from the source rather than gathering data from previous research. Part of the review protocol was to screen the articles using inclusion and exclusion criteria. Data analysis creates an opportunity to assess and criticize the quality of the articles. From this analysis, the researcher identifies themes to address the research problem. This literature review included ten primary research articles since the year 2016.

Due to the lack of direct research available on the topic, the researcher utilized the network analysis approach to address the problem statement. Network analysis outlines how comorbidities arise based on symptom activation of one disorder to another (i.e. symptoms may have a higher association with a specific mental disorder but can also span to other diagnoses) (Monteleone et al., 2019). Based on this approach, a disorder includes multiple symptoms that could activate another through feedback loops (Borsboom, 2017; Monteleone et al., 2019). As these symptoms are present for some time, they become recognized as mental disorders based on

the Diagnostic Statistical Manual (DSM) (APA, 2022) or International Classification of Diseases (ICD) (World Health Organization [WHO], 2019) criteria. These causal connections between symptoms can also indicate that a change in one of the symptoms can impact the presence or severity of other symptoms (Borsboom, 2017). Using the network analysis approach aided in answering the research question by looking at existing research on depression and its impact on the maternal-fetal bond. Research has shown an overlap in depressive symptoms with core symptoms of AN, such as the drive to be thin and lack of introspective awareness (Elliott et al., 2019). By looking at the symptom overlap between depression and AN, inferences made can aid in understanding how AN can impact the maternal-fetal bond.

The researcher first established an understanding of AN, maternal-fetal bonding, the stages of pregnancy and the development of the fetus. The search process began by using combinations of the keywords on PubMed, PsycINFO, and Psychological and Behavioural Sciences collection databases using the City University of Seattle and the University of Alberta library search engines. Google Scholar helped to find secondary resources, such as textbooks and books relevant to the research question. Data collection began on February 10, 2023, and concluded on June 18, 2023. Published qualitative and quantitative studies helped to build an in-depth understanding of the research problem.

### **Inclusion and Exclusion Criteria**

This review included primary articles published in peer-reviewed journals from the past seven years. Mothers showing symptoms of AN traits for the first time during pregnancy as per the DSM-5-TR (APA, 2022) or the ICD (WHO, 2019) criteria are part of this review. Articles covering maternal, fetal, or neonatal outcomes due to AN met the inclusion criteria because this explains the long-term effect of the disorder. Topics such as antenatal attachment and pregnancy,

pregnancy and attachment, attachment formation in-utero, AN and antenatal attachment met the inclusion criteria because they discussed the maternal-fetal bond. Applying the network analysis approach, articles discussing the impact of maternal depression during pregnancy and the effect of depression on the maternal-fetal bond during pregnancy met the inclusion criteria because there is an overlap of symptoms between AN and depression.

Exclusion criteria helps to eliminate studies that are not applicable or relevant to the research question. This literature review excludes any articles that used samples of mothers with a previous history of AN or other eating disorders. This exclusion is because it can be challenging to determine if strictly developing AN during pregnancy impacts the maternal-fetal bond. To understand the phenomenon of pregorexia, studies that used samples of mothers not experiencing their first pregnancy and surrogate mothers were excluded. This exclusion is because it can be challenging to determine the long-term consequences of attachment failure if there are multiple children or if the child does not reside with the birth mother. Furthermore, articles that discuss the development of AN after pregnancy met the exclusion criteria because they did not explain how the maternal-fetal bond is affected during pregnancy. Articles published before 2016, or those not included in peer-reviewed journals, were excluded from the primary search because they would not contain the most recent and updated data on this topic.

### **Selection of Articles**

Based on the key terms and the combinations of these words, 1,417 articles were published. Most of these articles discussed the impact of depression on maternal-fetal bonding. To narrow the search, inclusion and exclusion criteria found twenty-one studies applicable to this literature review (see appendix A). These articles included a combination of keywords and topics and were within the published year parameters. After reviewing each article's methodology and

search parameters, ten studies from this list answered the research question best. For example, one study was not a good fit because it focused on maternal and paternal bonding to the fetus while having depression. Although this met the inclusion criteria, it did not directly answer the research question of this literature review as it discussed the impact of depression on paternal bonding more than maternal. Articles that met the inclusion criteria but were not a part of the top ten became secondary sources as further evidence/support.

The ten articles discuss the topics of maternal-fetal bonding, AN during pregnancy, and depression. These articles included qualitative and quantitative studies to answer the research question. Most studies utilized valid and reliable tests, which made their results more dependable. For example, to measure the maternal-fetal bond, Ertman et al. (2021), Nordahl et al. (2019), and Røhder et al. (2020) used maternal antenatal attachment scale (MAAS). Therefore, the questionnaires utilized to collect data helped in the selection process of quantitative studies. One of the ten studies, Saleem et al. (2022), is qualitative and discusses the topic of pregorexia, which strongly supports this literature review. To address cultural/diversity implications, articles from various ethnic backgrounds are a part of this literature review. For example, six of the ten studies are from countries outside Canada and the US. These included Rusanen et al. (2021) article from Finland, Nordahl et al. (2019) article from Norway, Smorti et al. (2019) article from Italy, Ertman et al. (202) article from Denmark, Ohara et al. (2017) article from Japan, and Saleem et al. (2022) article from Pakistan. Therefore, an assumption here is that the findings from this literature review are generalizable to various ethnic backgrounds.

### **Data Analysis Procedures**

Data collection and analysis accompany each other, a standard practice for qualitative research (Creswell & Poth, 2017). Purposeful sampling occurred utilizing the inclusion and

exclusion criteria, with the understanding that the sampling criteria could change as the research process occurs. For example, through the data collection process, the researcher found that the maternal-fetal bond is a synonym for antenatal attachment. Therefore, the researcher included antenatal attachment as part of the keyword for this literature review. Afterwards, the researcher completes a critique of the strengths and limitations of each article. A thematic analysis helps to address the research problem (Xiao and Watson, 2019) (see Appendix B). In this analysis, the researcher starts by reviewing the data set from the ten articles. The researcher used the keywords identified in Chapter One to find the areas of commonality between the articles. For example, two studies discussed the symptoms and outcomes of pregorexia, forming a theme. Studies that are studying the maternal-fetal bond became another theme. The thematic analysis showed the common areas and overlap between the ten articles, painting a better picture of the development of AN during pregnancy and its impact on the maternal-fetal bond. The three themes included the maternal-fetal bond, depression and attachment, and symptoms and outcomes of pregorexia.

The network analysis approach assisted the researcher in making inferences for this literature review. Since 2009, there have been seven articles published on pregorexia, and most do not directly address the impact on the maternal-fetal bond. However, there is a strong representation of attachment outcomes for depression and its effect on the maternal-fetal bond during pregnancy, and AN's the impact on the maternal-fetal bond. Due to the overlap in symptomology, these deductions may be valid and clearly outline the need for further research. Another challenge the researcher faced was looking for articles that sampled first-time pregnancies. Most articles did not mention the number of pregnancies the mother has experienced. This omission from the research papers did impact the interpretation of this

literature review because it can be hard to determine if the mother was experiencing AN for the first time.

### **Methodological Critiquing**

In this section, there will be an analysis of the methodologies of the top ten studies. This analysis includes reviewing the data collection process, the measures used, and the mode of data analysis, such as statistical tests and descriptive statistics. In this literature review, one research article is a phenomenological qualitative study. A phenomenology study focuses on the lived experiences of the individual or community and depicts the essence of their experiences (Creswell & Poth, 2017). Data gathering is from the participants and the researcher's first-hand experience of the phenomenon. The result leads to a development of the meaning of the phenomenon.

The remainder of the studies in this literature review are quantitative studies, including longitudinal, prospective, retrospective, and cross-sectional. In a longitudinal study, the participants are followed over time with continuous collection of data, establishing cause and effect (Creswell, 2018). In a prospective study, data collection for the participants occurs in real time to look at the relationship between the exposure and the results. In a retrospective study, data collection is on events that have already occurred, with the understanding that the exposure and outcome have already happened (Creswell, 2018). Cross-sectional studies look at different sections of the population at one point in time and provide an understanding of the exposure at a specific moment.

### **Quantitative Studies**

#### ***Longitudinal studies***

Rusanen et al. (2021) used a quantitative longitudinal study design to understand how various factors can impact bonding disturbances postpartum. This study was part of the CHILD-SLEEP cohort longitudinal study. The sample was collected in maternity clinics in central Finland during the third trimester of pregnancy and when the infant was 3, 8, 18, and 24 months old. One thousand three hundred ninety-eight participants completed the questionnaires. The participants were independent of the researcher as the data collection was from a larger longitudinal study. The current study's basis was on the data set's first and second time points. The prenatal questionnaire assessed the mother's expectations towards the unborn baby and the mother's relationship with the other adults. The postnatal questionnaire measured the mother's risk of bonding disturbances with her newborn using Brockington's Postpartum Bonding Questionnaire (PBQ). The adult attachment scale measured the mother's attachment style. The researchers used the List of Threatening Experiences (LTE) questionnaire to measure the adverse life events. Depression was measured using the Center for Epidemiological Studies Depression Scale (CES-D). Part of the data analysis was a factor analysis to find three factors during the prenatal phase. A correlation analysis found an association between psychological factors, social factors, and the dependent variable. Rusanen et al. (2021) used cross-tabulation and chi-square tests to assess the relationship between demographic and psychological factors and their association with bonding disturbances. They used regression analysis to study this relationship without adjusting for demographic factors. SPSS 25 software helped with the statistical analysis. The reliability of the questionnaires was measured using Cronbach's alpha.

Nordahl et al. (2019) completed a longitudinal quantitative study. This study was part of the Northern Babies longitudinal study on parental and infant prenatal risk factors, parent-infant interaction and infant development. Recruitment occurred of 220 Norwegian-speaking women

from October 2015 to December 2017 by their midwives for the study. In total, data from 165 women made up the present study. The data was from a long-term study, so the participants were independent of the researcher. Families participated in six measuring points, including three points during the pregnancy and three postpartum until the infant was six months old. The collection of demographic information occurred at T1. Early Maladaptive Schemas (EMSs) were measured using the Young Schema Questionnaire short form 3 (YSQ-S3) at T2. The Maternal Antenatal Attachment Scale (MAAS) was used during T3 to measure maternal bonding. Maternal depression was measured using the Edinburgh Postnatal Depression Scale (EPDS) at T3. Data analysis involved using Spearman correlations, generating a confidence interval using the bootstrapping percentile approach for regression and mediation analysis. Hierarchical regression analysis tested the four domains for EMS to predict maternal bonding. SPSS 25 software provided descriptive statistics, correlations, and regression analysis. The PROCESS program provided mediation analysis.

Smorti et al. (2019) used a quantitative cohort longitudinal paradigm to understand the impact of maternal depression and prenatal attachment on delivery outcomes. Recruitment of the women occurred when they attended delivery preparation classes. Data collection happened in public health hospitals in Florence with 203 pregnant women. This collection was by trained psychologists not part of the research team. Data was gathered at two different times, between weeks 31-32 of pregnancy and the day of childbirth. Participants filled out questionnaires about depression symptomology and prenatal attachment to the infant. These questionnaires included the Beck Depression Inventory (BDI) and prenatal attachment inventory. Also, during childbirth, the hospital staff recorded the duration of labour and other birth-related information. Using SPSS version 23, the researchers calculated frequency, means, standard deviation, and bivariate

correlation for data analysis. Structural Equation Modelling on MPLUS tested the hypothetical model. Further testing of the model occurred using the Maximum Likelihood estimator. The assessment of the model's goodness of fit included using the chi-square test, the comparative fit index (CFI), the Tucker-Lewis, and the Root Mean Square Error of Approximation (RMSEA).

Brassel et al. (2020) used a quantitative prospective longitudinal cross-sectional study paradigm to examine self-criticism, mindfulness, and maternal bonding constructs. Women were invited by their midwives to a regional hospital before their 20th week of pregnancy, leading to 32 participants for data collection. There was limited researcher involvement with the participants during the data collection. Participants completed the following questionnaires: Depression Anxiety Stress Scale-21 short form, Five Facets Mindfulness questionnaire short form, Depressive Experiences Questionnaire (self-criticism scale), and Maternal Postnatal Attachment scale to assess the mother's emotional response to her infant and the mother-infant bonding. Data were collected at two time points using an online survey at 30 weeks and 18 months postpartum. Completion of data analysis was through the SPSS software version 22. Little's Missing Completely at Random test was used to determine how much data is missing and if it can be considered random. The researchers conducted a Wilcoxon signed-rank test on depression and anxiety variables and paired sample t-tests for other variables.

### ***Prospective studies***

Ertman et al. (2021) utilized a quantitative prospective study design to understand how first-trimester factors impact maternal antenatal attachment (MAA) during the third trimester. This study used health records of women attending antenatal care visits. One hundred ninety-two randomly selected GP practices in the Capitol region and region of Zealand participated. The researchers completed the data analysis while the data collection occurred by the GP. The

collection of data occurred between 1st April 2015 and 15th August 2016. The GP completed Clinical interviews (as part of the pregnancy health record) at the first antenatal visit. The researchers developed an electronic patient questionnaire for the participants to complete after each antenatal visit. The assessment of MAA occurred by using the MAAS questionnaire. Part of the data analysis was dominance analysis to understand MAA based on the information provided. Linear regression analysis showed the five most important factors of the MAAS. Completion of all data analysis was on the R version 3.6.1. software.

Ohara et al. (2017) examined the relationship between maternal depression and bonding failure during pregnancy and after delivery by using a quantitative prospective cohort study design. Participants were recruited from perinatal classes at the hospital between August 2004 and March 2015. These women were recruited during their 25th week of pregnancy, leading to 751 participants completing the questionnaires. The researchers played a role in sending out the questionnaires to the participants but did not have direct contact with them. Participants completed questionnaires, which included the Mother-Infant Bond Questionnaire (MIBQ), the EPDS, and the socio-demographic questions. MIBQ and EPDS were sent again to the participants at week 36 of their pregnancy and five days after delivery. The researchers calculated descriptive statistics to complete the data analysis and then created a correlation matrix. They made a regression model to understand the relationship between the variables on the subscales of MIBQ and EPDS. They utilized the Akaike Information Criterion (AIC) to compare the models and determine the best one. These analyses were on SPSS 22.0 and AMOS 21.0 software.

### ***Retrospective studies***

Ante et al. (2020) utilized a quantitative retrospective cohort study to test their hypothesis that AN would be associated with a range of pregnancy outcomes in mothers and their children. Two million one hundred thirty-four thousand nine hundred forty-five singleton pregnancies in Quebec from 1989 to 2016 were the sample size. Furthermore, these researchers utilized the ninth and tenth revisions of the ICD identification of AN. The data collection was from a registry, making the participants independent of the researcher. Data collection occurred by stratifying women based on most recent admission for AN before or during pregnancy. The researchers used a reference group of women with no prior admission for AN at any time. They looked at several delivery outcomes and identified labour and delivery complications. Lastly, they accounted for confounders between AN and birth outcomes. A multiple-step approach occurred for the data analysis. The primary analysis determined the association between AN and birth outcomes. They estimated risk ratios and 95% confidence interval using regression analysis. During the secondary analysis, they selected the three most frequent birth outcomes associated with AN and assessed the relationship with the total number of hospitalizations for AN, the time between most recent admission and delivery, and whether the first admission was before or during pregnancy. Completion of data analysis was on the SAS v9.4 software.

Soltsman et al. (2021) utilized a quantitative retrospective study design to study the impact of new-onset depression on obstetric outcomes. This study used 202 medical records of women treated at high-risk pregnancy clinics. The researchers utilized data from their hospital and were directly involved in data collection. Participants completed the EPDS questionnaire during their first visit to the hospital. F-tests and multiple regression were used for the data analysis when EPDS scores were the dependent variable. The researchers used the chi-squared test when the dependent variable was the obstetric outcomes. The researchers placed the patients

into two groups depending on their EPDS scores being higher or lower than 10. From there, the researchers made correlations between the different variables.

### ***Cross-sectional study***

Røhder et al. (2020) utilized a quantitative cross-sectional and randomized control trial study design to understand the maternal-fetal bonding association with attachment and depression symptoms. The women participating in the study needed extended antenatal care due to psychosocial vulnerability, as determined by their midwives. Seventy-eight women participated in the study and participated in the Circle of Security parenting program. The researchers contacted the women via phone, visited their homes, and administered questionnaires. Data collection occurred from June 2017 to November 2018. An administration of a baseline assessment occurred during the second trimester of pregnancy. The researchers collected risk information from GP or hospital records. Participants completed a self-reported questionnaire, the MAAS. The Experiences in Close Relationship Scale-short assessed adult attachment style. The Prenatal Parental Reflective Functioning questionnaire assessed parental reflective functioning. EPDS was used to assess depressive symptoms. Data analysis occurred using Cronbach's alpha to look at the distribution of variables and internal consistency of scales. The regression model was used to test hypotheses about the association between attachment styles and depressive symptoms for each MAAS subscale. The chi-squared analysis explored the hypothesis about MAAS styles. All completion of data analysis occurred on SAS enterprise guide version 7.1. The researchers completed a power analysis for the study to detect the potential effects of the intervention. Then, post-hoc power analysis justified the number of predictors in the regression models.

### **Qualitative Study**

Saleem et al. (2022) utilized a phenomenological qualitative study design to understand the lived experiences and behaviours of young Pakistani women who reported symptoms similar to anorexia nervosa during pregnancy. The researchers played a role in collecting the interviews. They maintained neutrality and built good rapport using Rogerian principles. They had a sample size of 15 women who reported at a private gynecologist clinic in Islamabad. The participants selected for the study based on their lived experiences related to anorexia nervosa during pregnancy. Age ranged between 22-34 years, and participants screened for single fetus pregnancy and DSM 5 criteria for AN. Data was collected through interviews using an interview guide for 30-45 mins. The researchers recorded each interview and then transcribed it within 48 hours. The researchers completed the data analysis using the Colaizzi phenomenological method. Two researchers individually revised the interview transcriptions and made themes. Themes were reviewed with the participants to validate their experience. Two independent researchers verified data saturation, and occurred in parallel with data collection. Confirmation of the saturation was through consensus between the two researchers.

### **Methodological Strengths & Limitations**

This section outlines a brief discussion of the strengths and limitations of the core studies of this literature review. It will include critically discussing the data collection process and assessing the validity and reliability of the measures. Establishing validity in quantitative research means drawing meaningful conclusions from the tests used in a study (Creswell, 2018). Building these conclusions includes observing if the tests measure what their intent is or if there are correlations with other scores measuring the same item. The reliability of a measure means how consistent it is and if the parts of the test behave the same way repeatedly (Creswell, 2018). When modifying a test, it becomes essential to test for the validity and reliability of the test

again, as the original scores may not hold (Creswell, 2018). To assess the rigour of qualitative research, Lincoln & Guba (1985) discussed the use of credibility, dependability, confirmability and transferability. Triangulation, peer debriefing, and member checking increase credibility and construct validity (Houghton et al., 2013; Verleye, 2019). Using reflections to discuss the data gathering process and data analysis can improve confirmability and dependability (Houghton et al., 2013; Verleye, 2019). A detailed discussion section can improve the transferability of the findings to other cases (Houghton et al., 2013). Reviewing if the studies presented in this literature review establish validity and reliability can help display their strengths and weaknesses.

### **Strengths of the Studies**

In their study, Rusanen et al. (2021) used validated and reliable questionnaires which are replicable. Furthermore, they used comparison groups to explain the validity of the results. Nordahl et al. (2019) measured internal consistency for all three tests and translated MAAS and EPDS into Norwegian, making the results more valid. Furthermore, these researchers controlled for confounding variables. The study conducted by Smorti et al. (2019) contained a high sample size, and the researchers measured the validity and reliability of the questionnaires utilized. Additionally, the researchers used multiple forms of analysis to measure the model's goodness of fit.

In the research completed by Brassel et al. (2020), they utilized questionnaires with strong validity and reliability scores and measured internal consistency within their study. In addition to this, data was de-identified and stored in a secure server to reduce bias. The Ertman et al. (2021) study's strengths include using an MAAS questionnaire translated into Danish and testing its reliability and validity before being administered to participants. Furthermore, this

study utilized a large sample size to study maternal attachment. In the paper completed by Ohara et al. (2017), they used valid and reliable questionnaires. Furthermore, they translated the MIBQ into Japanese to have accurate responses from the participants and checked for the reliability of this version of the questionnaire. They also took into account any confounding variables.

In the study completed by Ante et al. (2020), they used a data set representative of the population, with generalizable findings that provided an objective outsider viewpoint of populations. Due to this, the study was more replicable, increasing validity and reliability. Furthermore, they accounted for confounding variables and had various stages of data analysis. The Soltsman et al. (2021) study measured the internal consistency and reliability of the questionnaires and their translations. A strength of the study by Røhder et al. (2020) is the inclusion of women from both high and low socioeconomic levels, as it can help improve the generalizability of the results. They also used instruments that have high reliability and validity scores. The researchers also used Danish versions of the tests and measured their validity. In the Saleem et al. (2022) study, they utilized triangulation, peer debriefing, and member checking, helping to increase the construct validity. They used active reflections to discuss the data collection and analysis, improving the confirmability and dependability of the study. Further strengths of this paper include using the opinions of experts in psychiatry, psychologists, and gynecology to make an interview guide.

### **Limitations of the Studies**

In their study, Rusanen et al. (2021) had some correlations stronger than others, which could have reduced the statistical significance of the results. Additionally, these researchers were looking at many factors at once to study association, which could impact the reliability of the results and pose a limitation to the study. In the research by Nordahl et al. (2019), their sample

size represented a small portion of the larger population, limiting the generalizability of the results. Additionally, self-report questionnaires could lead to response bias, and longitudinal studies can be demanding of the participants, which could explain the small sample size. In the study by Smorti et al. (2019), the results may not be as generalizable due to the inclusion criteria only looking at psychologically healthy women and their strong focus on the association between depression and delivery rather than other aspects of pregnancy.

The paper by Brassel et al. (2020) had a low sample size, which can impact the results' generalizability. Furthermore, they utilized questionnaires that relied on maternal self-reporting, leading to chances of bias. In Ertman et al. (2021) study, they formulated their questionnaire. It would have been beneficial for the researchers to measure the validity and reliability of the scale. They did not use exclusion criteria, which can make it challenging to understand cause and effect. Results may not be generalizable to people who are not fluent in Danish, as they were not provided the MAAS questionnaire by the GPs. The mode of data collection could lead to a bias because the GPs had direct contact with the participants. In the paper completed by Ohara et al. (2017), they used self-report measures to diagnose depression and bonding failure rather than utilizing formal diagnosis. Therefore, it can be hard to determine the severity of the diagnosis and if it would meet the criteria outlined by the DSM or ICD.

In the study by Ante et al. (2020), they did not limit their participants to only firstborn pregnancy, making it challenging to determine cause and effect. They only identified women with AN severe enough to need hospitalization, which can impact generalizability to the general population. They also did not consider the body mass index (BMI) of the participants or the use of prior medications. In the Soltsman et al. (2021) study, there was a lack of detail on the study design in the paper, making it challenging to understand the methodology. The patients were

provided with the questionnaire at the beginning of their pregnancy, making the sample limited to only those women who were experiencing depression symptoms at that time. Therefore, generalization of the results can be challenging, especially since the sample was of high-risk pregnancies. Lastly, the researchers were involved directly in the data collection process, leading to bias in the results.

The limitations of the Røhder et al. (2020) study include a low sample size of seventy-eight participants and the researchers playing a role in data collection. This limitation can reduce the reliability of the study design as it increases the chances of bias. In the Saleem et al. (2022) study, the limitations of this paper include using American medical standards to assess Pakistani women for their health during pregnancy and to assess AN. Furthermore, these researchers did not measure the BMI of the women, which could have helped to understand the severity of the AN symptoms.

### **Summary**

This chapter outlines a discussion on the network analysis approach to answer the research question and build an understanding of how pregorexia can impact the maternal-fetal bond. After an extensive data collection process and the use of inclusion and exclusion criteria, ten research articles guide this literature review. During the methodological analysis, there is a close examination of the paradigm, ethics, and main findings. The discussion of the findings of the three themes, the maternal-fetal bond, depression and attachment, and symptoms and outcomes of pregorexia is in Chapter Three.

## **Chapter Three: Review of Literature**

### **Literature Review**

This chapter reviews literature relevant to pregnancy-related anorexia nervosa and its effects on maternal-fetal bonds. This chapter answers the question, is the maternal-fetal bond impacted due to AN in pregnancy? Embedded within such literature are ideas about the attachment style most observed with this diagnosis, the relationship between depression and AN, and what pregorexia and its outcomes on the mother and child look like. As discussed in the first chapter, the cognitive model and attachment theory are common frameworks for understanding this phenomenon.

This literature review critically analyzes the research by others in this field and develops an understanding of this phenomenon. Among the studies reviewed, one research article was a phenomenological qualitative study, and the remainder were quantitative observational studies, including longitudinal (4), prospective (2), retrospective (2), and cross-sectional (1). Using the network analysis approach, three themes were apparent to answer the research question. The first theme examines the maternal-fetal bond and its association with adult insecure attachment style. The second theme looks at the association between depression and the maternal-fetal bond. The final theme discusses the symptoms of AN during pregnancy and its impacts on the fetus.

### **Review of the Literature and Discussion of Themes**

After reviewing the literature to answer the research question, the first theme found is on the maternal-fetal bond (see Table 1). An interpretation here is that mothers with pregorexia will present with an insecure attachment style, resulting in bond failure. This attachment style leads to changes in the body from lack of food intake, and it can lead to emotional blunting, dysfunctional means of coping with stress, and impact interpersonal relationships. Functioning

this way can allow for cognitive focus while numbing other aspects that an individual may consider unnecessary. The mother may not form closeness or tenderness built during pregnancy, which can impact the maternal-fetal bond. This bond failure occurs due to the changes the mother experiences in their body. Furthermore, this lack of emotional connection will result in mothers who present with pregorexia scoring below average on the Maternal Antenatal Attachment Scale (MAAS). Studies completed by Ertman et al. (2021), Nordahl et al. (2019), Røhder et al. (2020), and Rusanen et al. (2021) support these interpretations.

The second theme found is on depression and the maternal-fetal bond (see Table 1). An interpretation here is that due to symptom overlap between AN and depression, the negative impact on the maternal-fetal bond due to depression may be similar to AN. Based on the network analysis approach, eating disorder core symptoms, mood disorder, and self-esteem problems play a role in the maintenance of AN psychopathology. Therefore, body image plays a central role in the diagnostic criteria of AN and depression. Interpersonal difficulties and ineffectiveness are also overlapping symptoms between AN and depression. Feelings of worthlessness, not wanting to eat in social situations, and negative reactions to weighing oneself act as bridging symptoms among AN and depression. Studies completed by Brassel et al. (2020), Ohara et al. (2017), Smorti et al. (2019), and Soltsman et al. (2021) support these interpretations.

The last theme found is on pregorexia symptoms and their outcomes (see Table 1). An interpretation is that AN leads to undernutrition for the mother and the child, resulting in small gestational age and low birth weight. These symptoms result in a lower level of maternal-fetal bonding, leading to poor social-emotional development for the child. As antenatal attachment is required regardless of race or culture, an assumption is that the maternal-fetal bond plays a

crucial role in the development and birth outcomes and affects various cultural groups. Studies completed by Ante et al. (2020) and Saleem et al. (2022) support these interpretations.

**Table 1**

*Themes and Their Corresponding Keywords of the Ten Key Articles*

Theme	Keywords	Articles
The Maternal-Fetal Bond	Bonding	Rusanen et al. (2021)
	Maternal-antenatal attachment	Nordahl et al. (2019)
	Antenatal attachment and pregnancy	Røhder et al. (2020) Ertmann et al. (2021)
Depression and the Maternal-Fetal Bond	Maternal depression and bonding	Brassel et al. (2020)
	Depression and pregnancy	Ohara et al. (2017) Smorti et al. (2019)
	Antenatal depression and bonding	Soltsman et al. (2021)
	Maternal depression and pregnancy	
Pregorexia Symptoms and Outcomes	Pregorexia	Saleem et al. (2022)
	Anorexia nervosa and pregnancy	Ante et al. (2020)
	Anorexia nervosa and obstetric outcomes	

**The Maternal-Fetal Bond**

The first theme found in four of the ten articles was the maternal-fetal bond. Using the Maternal Antenatal Attachment Scale (MAAS), Ertman et al. (2021) found that higher scores predicted more feelings of closeness and tenderness toward the fetus. They also found that mothers who focused on their physical fitness scored higher on the scale, meaning they spent

more time thinking about, talking to, and feeling for the fetus. Lastly, these researchers found that social support, linked to secure adult attachment, is associated with developing the maternal-fetal bond. Using the same MAAS scale, Røhder et al. (2020) found that pregnant women who had below-average scores had a poor interest in their fetus (i.e. being uninvolved, experiencing negative emotions, and considering the fetus as objects instead of as beings.) The mothers in this study often had an insecure adult attachment style which meant that they had difficulty in forming close relationships and lowering the quality of the bonding process. Furthermore, the researchers found that depressive symptoms were associated with poor involvement with the fetus.

Researchers found that maternal-fetal bonding is more strongly associated with postpartum bonding rather than prenatal. Rusanen et al. (2021) found that not having positive expectations about the relationship with the fetus, postnatal stress, and depression were factors in predicting bonding outcomes. Like the aforementioned studies, the interpersonal relationship of the mother with others lead to difficulties in postpartum bonding. Furthermore, these researchers found that prenatal and postnatal depression was strongly associated with postnatal mother-baby bonding. Nordahl et al. (2019) found that schemas linked to disconnection and rejection are related to maternal bonding, and symptoms of depression mediate this. The researchers stated that mothers with these schemas tended to avoid emotional closeness toward the fetus. This study suggests that the bonding quality connects more strongly to the mother's mood than the number of bonding activities.

Based on the studies conducted by Ertman et al. (2021), Nordahl et al. (2019), Røhder et al. (2020), and Rusanen et al. (2021), there is a link showing that mothers with insecure attachment style and AN are more at risk of maternal-fetal bond failure. Individuals with AN

utilize emotional regulation strategies based on avoidance to achieve predictable and controlled behaviour (Civilotti et al., 2022). These strategies include hyper-focusing on food, diet, weight and body shape. Individuals with AN also experience high levels of disgust, shame, and guilt due to a weak self-concept and the belief that emotions are uncontrollable. This self-concept leads to avoidance, rumination, and suppression of emotions while also finding it challenging to express themselves (Startup et al., 2013). Individuals with AN rely on others for reassurance, which explains why emotional avoidance behaviours are observed in AN (Oldershaw et al., 2019). Controlling emotions may go on to trigger further negative experiences, leading to reinforcing the negative behaviours, such as excessive diet control.

### **Depression and the Maternal-Fetal Bond**

The second theme in the literature review is the connection between depression and maternal-fetal bond. Smorti et al. (2019) found that depression during pregnancy promoted worse prenatal attachment and impacted the delivery experience. Furthermore, this impact on the bond links to how the mother and child interacted after birth. In a study by Soltsman et al. (2021), 15.3% of pregnant mothers are suffering from a prenatal depressive state. Like Smorti et al. (2019), these researchers found a negative relationship between the depression scores of the mother and the birth weight of the child. They explained that these scores are a link to acute maternal stress conditions. However, they found no other association between antenatal depression and obstetric outcomes.

In addition to maternal stress, Brassel et al. (2020) found that self-criticism increased from pre- to post-birth due to the changes in maternal identity, autonomy, and sense of control. They stated that self-criticism pre-birth was positively associated with antenatal depression and that maternal depression increased from pre- to post-birth. These researchers concluded that the

mother's mental health pre-birth did account for maternal-fetal bonding during delivery. These findings are like Ohara et al. (2017), who found that when a mother presented with depressive mood and bonding failure during early pregnancy, the same results appeared in late pregnancy and five days after delivery. Therefore, these researchers stated that depressive mood and bonding failure during early pregnancy significantly affect both issues after birth.

Based on the findings of Brassel et al. (2020), Ohara et al. (2017), Smorti et al. (2019), and Soltsman et al. (2021), depression harms the maternal-fetal bond during pregnancy. According to a study by Carrot et al. (2017), more than 80% of the participants had a comorbidity of a major depressive episode with AN. Research has shown an overlap in depressive symptoms with core symptoms of AN, such as the drive to be thin and lack of introspective awareness (Elliott et al., 2019). Supporting these findings further is the study by Monteleone et al. (2019), who found that depressive symptoms and personal alienation had the most overlap in maintaining AN. Depressive symptoms could also represent the connection between anxiety, obsessive-compulsive, or post-traumatic stress symptoms, which can lead to negative self-worth and eating disorder symptoms.

Further research has shown that a comorbid diagnosis of major depression (MD) and AN strongly predicted health outcomes 22 years later (Franko et al., 2018.) In connection with this, short-term weight restoration in AN showed improvement in depression. Elliott et al. (2019) found that feeling fat, wanting to lose weight, discomfort looking at own body, and a fear of weight gain were key components to AN psychopathology and displayed a strong correlation to other disorders. According to Elliott et al. (2019), worthlessness could be the connection between the negative cognitive distortions observed in AN and other symptoms of depression. ANTOP longitudinal study supports this conclusion by explaining that perceptions of body image in

patients with AN are strongly associated with depression (Junne et al., 2016).

### **Pregorexia Symptoms and Outcomes**

The last theme in the literature review to address the research question involves looking at pregorexia and its outcomes. According to the study by Saleem et al. (2022), the common symptoms found in women diagnosed with AN during pregnancy were typical symptoms of anorexia nervosa. Symptoms included using other behaviours to avoid taking meals or tiny portions and taking them slowly, taking low-caloric diets, using various products to control weight gain, and engaging in low and high-impact exercise and activities. Furthermore, these researchers found that these women were distressed by the idea of getting fat after eating meals, leading to self-induced vomiting. They presented with dissatisfaction with their body and fear of rejection, displayed a lack of recognition of their low body weight, and engaged in social avoidance.

In terms of infant outcomes, Ante et al. (2020) showed a strong association between adverse infant outcomes for women who are in a hospital during pregnancy due to AN. There was an increased risk of poor fetal growth when the hospitalization occurred closer to pregnancy. Additional risks included precipitate labour, acute liver failure, and admission to the intensive care unit (ICU). These researchers clarified that the risk factors did not increase when hospitalization for AN occurred two years after the delivery of the infant.

Based on the work completed by Ante et al. (2020) and Saleem et al. (2022), there is a possibility that a low maternal-fetal bond could lead to poor obstetric outcomes for the fetus. A study completed by de Cock et al. (2016) reported that a higher level of bonding between the fetus and mother leads to better prenatal health practices. Likewise, Cildir et al. (2020) showed in their study that there is a link between prenatal attachment and socioemotional abilities and

general development, with poor attachment indicating worse outcomes for the infant. Research shows that these infant outcomes can present across generations and ethnic groups. A generational study completed by Watson et al. (2017) found that health risks are present for both mother and child, even when controlling the prior-generation risk factors. Similarly, Alhusen et al. (2012) found that low-income African American women with poor maternal-fetal bonds had poor neonate health outcomes despite receiving prenatal health care.

### **Summary**

Although there is limited research on this topic, both qualitative and quantitative findings completed in this literature review indicate that the maternal-fetal bond is negatively impacted in a population of women with AN during pregnancy. Pregorexia is a problematic behaviour that affects the attachment development of a fetus in utero. Using the MAAS scale, women with AN during pregnancy mostly present with an insecure attachment style, impacting the closeness a mother experiences to the fetus during the trimesters. Utilizing the research on depression and maternal-fetal bond, and with the understanding that AN and depression have overlapping symptoms, this is an assumption of the impact on maternal and fetal health. An evaluation of the research to date, and based on various forms of data collection, there is an indication that pregorexia impacts the maternal-fetal bond. This association of the disorder and attachment style leads to poor obstetric outcomes and overall health for the mother and the child.

### **Ethical Consideration**

Canadian Code of Ethics (CPA, 2017) provides guidelines for psychological research studies. One of the requirements is to obtain informed consent from all participants after reviewing the purpose of the research. This consent allows researchers to provide information on the purpose of the study and its duration. There needs to be a disclosure of the method and a

discussion of the risks and benefits of the research. Participants' contributions are voluntary and have the right to point during the study. The last component of informed consent includes confidentiality and anonymity limits (CPA, 2017). Besides the informed consent, a proposal for the research study is submitted to committees or approval bodies to ensure the study designs meet ethical standards.

### **Informed Consent and Withdrawal**

Informing participants of their choice to leave provides them an opportunity to make decisions for themselves, and adheres to the first principle of the code of ethics, respect for dignity of persons and people (CPA, 2017). Saleem et al. (2022) provided little information on their ethical practices, but the researchers did inform the participants they could leave the interview or withdraw at any time. Psychological counselling was also available to those who needed it to avert any harm to the participants.

Rusanen et al. (2021) discussed how all participants signed agreement forms for consent and were informed of their rights to terminate their participation. Developing an informed consent that adheres to the moral rights human beings as innate individuals, and is a key component of the first principle of the code of ethics (CPA, 2017). The local ethical committee accepted the study protocol.

Nordahl et al. (2019) discussed how all participants gave written informed consent and received approval from the regional committee for medical and health ethics in Northern Norway. Røhder et al. (2020) received approval from the Committee on Health Research Ethics of the Capital Region of Denmark for their study. The researchers obtained written informed consent, and participants received a gift of 300 Danish crowns. In Brassel et al. (2020) study, the

researchers obtained informed consent at each data collection stage and institutional review board provided ethical approval.

### **Confidentiality**

Ante et al. (2020) complied with Tri-Council policy requirements for research in Canada and discussed that the data was de-identified and informed consent was not required. By de-identifying the data, it maintains privacy of the participants adhering to the first principle of the code of ethics (CPA, 2017). Ante et al. (2020) study did not complete the ethical review by the institutional review board.

### **Debriefing**

In the Ertman et al. (2021) study, the researchers provided the participants with information about the project. The participants gave written consent to access data from pregnancy records. The Danish Data Protection Agency provided approval to the study. Ohara et al. (2017) explained the study verbally and obtained written consent. The review committee approved the study protocol. The Italian Psychological Association approved the Smorti et al. (2019) study, and the participants were informed about the aim of the study and signed written informed consent. Soltsman et al. (2021) ensured that those women scoring high on EPDS received a referral for therapeutic services and treatment. By providing referrals, it demonstrates active concern for the wellbeing of the participants, meeting second principle of the code of ethics, responsible caring (CPA, 2017). The institutional review board provided ethical approval for this study.

### **Summary**

This chapter outlined a discussion on the limited understanding of AN during pregnancy and the impact it has on the maternal-fetal bond. These articles were critically evaluated,

showing three themes: maternal-fetal bond, depression and maternal-fetal bond, and pregorexia symptoms and outcomes. The next chapter outlines how to integrate the findings from this literature review into clinical practice.

## **Chapter Four: Application to Clinical Practice**

This chapter discusses the practical applications of the themes and information collected in the literature review. It begins with discussing how the findings of this literature review can impact scientific knowledge, the well-being of society, and the cultural/diversity implications. Following this, the chapter discusses a possible framework for practitioners wanting to enhance the maternal-fetal bond among mothers experiencing AN during pregnancy.

As per the Canadian Code of Ethics (CPA, 2017), psychologists will follow the clinical practice guidelines of providing best practices and respecting diversity as per the first principle of the code of ethics. Under principle two, responsible caring, clinical practice should offset any harm to the client and offer general caring. Also under principle two is maximizing benefits through the use of other disciplines. This means working with a multidisciplinary team to support mothers with AN during pregnancy. Under principle three, integrity in relationships, an open and honest therapeutic relationship is recommended. At any point, if the therapist feels incompetent, they will need to use a referral or consultation to reduce harm to the client. Considering the lack of information available on pregorexia and its impact on the maternal-fetal bond, it becomes essential to assess one's knowledge and skills. As per principle four, responsibility to society (CPA, 2017), it will be the therapist's responsibility to continue researching and gaining knowledge on the topic of this literature review and guide social structures and policies.

### **Clinical/Therapeutic Applications**

This literature review aimed to provide insight for psychologists in supporting mothers who present with symptoms of AN during pregnancy. It identifies that there is a lack of apparent risk factors for pregorexia, which makes it challenging to determine appropriate treatment

(Mandera et al., 2019). Research indicates that a common modality that has shown to be effective in treating AN is cognitive behavior therapy (CBT) (Danielsen et al., 2016). A treatment modality that can utilize the findings of this literature review is a specialized form of CBT created for eating disorders, CBT-E. CBT-E follows the transdiagnostic theory, which states that across all categories of eating disorders similar underlying mechanisms are observed (de Jong et al., 2020). Based on this theory, a diminished sense of self-worth stemming from preoccupation with one's shape and weight is a common characteristic of eating disorders (Danielsen et al., 2016). Therapy involves challenging and modifying this belief system. CBT-E is also for individuals with other aspects of eating disorders, such as perfectionism, that may interfere with the process of change. Rather than addressing the root causes, CBT-E focuses on the factors that sustain the disorder. The therapy aims to improve self-esteem by changing the domain of self-worth away from body image and towards other things like relationships, activities, or work (de Jong et al., 2020). By focusing on early behaviour change and fostering an understanding of the processes maintaining their problem, clients can develop a sense of hope and subsequently increase their self-esteem.

CBT-E may require some modification when applied to pregnant women. While there is limited research on the use of CBT-E during pregnancy, the effectiveness of CBT has been established (Bledose & Grote, 2006). Pregnant women may be more open to interventions targeting their mental health, as most of them want healthy pregnancies. During the perinatal period, women commonly face challenges like internalizing motherhood myths, feelings of self-sacrifice, and the need for social support (Ingram et al., 2021). Since CBT focuses on the relationship between thoughts, emotions, and behaviour, it can support women in navigating their perinatal experience. In a study conducted by O'Mahen et al. (2013), they found that CBT,

when applied during the perinatal period, effectively treated depression with an average of seven sessions. This study also found that pregnant women benefited from increased flexibility with the session scheduling and locations, the presence of reminders, and positive relationships with healthcare providers. Considering the overlap between depression and AN symptomology, it suggests that CBT-E provides support for women during pregnancy.

Keeping this in mind, it becomes clear that a therapeutic team comprising a psychologist, psychiatrist, dietician, and obstetrician is essential to provide the necessary support for women diagnosed with pregorexia. The presence of such a multidisciplinary team can present in-depth discussion to assess the specific mental health support the mother requires. Research has shown that a mother's psychological well-being, her levels of anxiety and depression, and the extent of familial support are closely linked to better antenatal attachment to the fetus (Brandão et al., 2019). Using the findings from this literature review can offer a better understanding of how AN can impact the maternal-fetal bond during pregnancy.

### **Scientific Knowledge**

Body image concerns often trigger distorted thought patterns and eating behaviours associated with AN. Since AN has the highest mortality rate and can lead to severe psychosocial and physical harm (Jenne et al., 2016), it is essential to incorporate the findings of this literature review into therapeutic benefit for an individual's well-being. Pregnancy introduces additional stressors, which can increase the likelihood of postpartum mental health concerns for women (Gioia et al., 2023). As these stressors may contribute to the emergence of pregorexia, it's essential to note that mothers with this diagnosis may face an increased risk for postpartum depression (Mandera et al., 2019). It is worth noting that women with eating disorders tend to stop breastfeeding earlier than those without eating disorders. Therefore, maternal bonding

difficulties resulting from AN can have lasting effects on both the mother and her infant.

Low maternal-fetal bonds can have various consequences for the mother and child following pregnancy. According to Gioia et al. (2023), the relationship between a mother and her baby in the early stages of life can serve as a model relationships. A diminished attachment with the baby and the mother's reduced self-efficacy during pregnancy can heighten the risk of postpartum depression (Talmon et al., 2021). Therefore, mothers who are unable to form the mother-fetal bond during pregnancy may impact their future attachment style.

Psychological distress experienced during pregnancy can lead to complications during this critical time, affecting the development of the mother-fetus bond and impacting the attachment process and the child's psychological development (Gioia et al., 2023). This impact on the development of the child is especially concerning, considering that the prevalence of mother-child relationship disorders is at 10-25%, with significant implications for the cognitive functioning of the child (Daglar & Nur, 2018). The limited studies on AN during pregnancy and its influence on the maternal-fetal bond suggest that post-pregnancy outcomes can be harmful for both the mother and the infant. Consequently, there is a need for further scientific knowledge and a greater understanding of this topic.

### **Cultural/Diversity Implications**

AN has been widely considered to be a Western culture-bound syndrome because of the strong focus on the Western ideals of body image. In this sense, Western etiology, diagnosis, and treatment would be explained best by Western norms and beliefs (Yslas, 2016). Recent research has shown that AN is observed across geographic and economic backgrounds (Katzman et al., 2004), in a study conducted by Bennett et al. (2004), girls in Ghana displayed wanting to gain control of themselves and others through starvation, a common symptom of the Western AN.

These researchers found that the girls strived for perfectionism and believed they had low self-efficacy. These girls did not display severely low weight, but they did show signs of AN thought patterns, indicating that AN may present differently across cultures. Therefore, AN may not be just a Western culture-bound syndrome but a disorder propagated through social media.

According to Zharkyn (2023), many healthcare professionals point to socio-cultural pressures spread by the media as a contributing factor to AN. Research has shown a recent increase in cases of AN in African, Latin American, and Asian communities (Agüera et al., 2017). A study completed by Katzman et al. (2004) found that women in Curaçao exposed to Western ideals had similar traits of AN, such as having high expectations but perceiving themselves as inadequate. Observing AN in Curaçao would mean that having exposure to media that spreads Western ideals would make each woman vulnerable to AN, with slight variations in their symptomology depending on their cultural background.

The slight variations in symptom presentation of AN are due to the differences in collectivist and individualistic views. In their study, Agüera et al. (2017) found that women in individualistic countries, which are Western, presented with more desire for thinness and displayed body dissatisfaction, but collectivist countries like China appeared less clinically ill. These researchers found that Chinese participants had less fat phobia and different weight control behaviours. This difference may be because of the collectivist value of not placing strain on the family and internalizing distorted beliefs (Agüera et al., 2017). An interesting finding of this study was that a collectivist country like Spain displayed similar symptomology to a Western country due to the Western ideal exposure, meaning that collectivist values play little role in psychopathology.

Exposure to Western ideals and the increase of globalization leads to many growing countries wanting to adopt Western norms. The desire to conform to Western societal norms and the fear of racial discrimination may lead to harmful eating behaviours (Javier & Belgrave, 2019). Consequently, an individual's environment and support network, including family, play a critical role in the development of pregorexia. This disorder, in turn, can contribute to a global pattern of maternal-fetal bonding difficulties.

This literature review included articles from around the world, including Japan, Denmark and Pakistan, to understand the cultural and diversity implications. The central themes of maternal-fetal bonding, pregnancy, and AN are concepts that impact across cultural boundaries and apply to various age groups. The expansion of the thin-body ideal and weight control behaviours in most societies, spurred by the rise of social media and urbanization, has an elevated risk of disordered eating and negative body image among younger generations (Chua et al., 2022). The findings of this literature review can apply to women from various backgrounds and age groups. Although there might be slight variations in the symptom presentation, research displays that AN is no longer a culture-bound syndrome, has evolved into categories, and requires further understanding.

### **Summary**

This chapter outlined a discussion on how the findings of the literature review findings is applicable to clinical practice. As mentioned in previous chapters, there is sparse research available on how AN during pregnancy affects the maternal-fetal bond. Considering that AN is no longer a Western culture-bound syndrome, it becomes even more important to continue inquiring and gaining knowledge on this topic. The findings from this literature review provide a guideline for potential therapeutic frameworks to support clients. The next chapter outlines

recommendations and a conclusion to this literature review.

## **Chapter Five: Recommendations and Conclusion**

Pregorexia is a form of AN where women practice excessive weight control behaviour during pregnancy. Prior research has shown that pregnancy can be a risk factor for initiating the development of AN. Pregorexia may cause the mother distress, impacting the pregnancy and obstetric outcomes. This literature review set out to explore the gap of knowledge on the phenomenon called pregorexia and how it impacts the relationship between the fetus and the mother. Studies are available on the independent concepts of AN, maternal-fetal bonding, and AN during pregnancy, but limited research discussing all three topics together. Without a better understanding of this topic, there is a risk of negative bonding experiences and future outcomes for the mother and child.

This chapter provides a conclusive summary of this study and reviews the influence of AN on the maternal-fetal bond during pregnancy within a non-eating disorder population. This chapter will review the main findings from the literature and methodological analysis. This chapter aims to conclude the literature review and provide recommendations for future research questions and practical applications.

### **Conclusions**

#### **From Literature Analysis**

Based on the literature analysis completed of the ten key articles, an inference can be made that maternal-fetal bonding is significantly influenced by AN. The works completed by Ertman et al. (2021), Nordahl et al. (2019), Røhder et al. (2020), and Rusanen et al. (2021), collectively suggest that mothers with an insecure attachment style and AN are more at risk of having difficulties in forming a secure maternal-fetal bond. This attachment style impedes the development of emotional connections and fondness towards the fetus during pregnancy. The

work completed by these researchers suggests that mothers with pregorexia will present with emotional blunting and inappropriate forms of coping with stress, which will impact their interpersonal relationships. This form of coping will lead to maternal-fetal bond failure caused by the changes in the mother's body during pregnancy. Furthermore, this lack of emotional connection will result in a below-average score on the Maternal Antenatal Attachment Scale (MAAS).

A key finding from this literature review is that the core symptoms of eating disorders, mood disorders, and self-esteem problems play a role in maintaining AN psychopathology. For example, body image concerns not only play a central role in the diagnostic criteria of AN but could contribute to comorbid depression. The works completed by Brassel et al. (2020), Ohara et al. (2017), Smorti et al. (2019), and Soltsman et al. (2021), collectively indicate that there is a negative impact on the maternal-fetal bond due to depression. Using the network analysis approach, the bridging symptoms of AN and depression may lead to an adverse effect on the maternal-fetal bond.

Another important finding from this literature review is the potential for weak maternal-fetal bonds to result in poor obstetric outcomes for the fetus. AN causes undernutrition for the mother and the child, resulting in small gestational age and low birth weight. These symptoms will result in poor social-emotional development for the infant. Support for this finding is from the analysis of the work completed by Ante et al. (2020) and Saleem et al. (2022). Beyond the impact on infant outcomes, research indicates that AN can present risk factors across generations and affect individuals from diverse ethnic backgrounds. As this literature review includes studies from various ethnic and cultural groups, it becomes apparent that the maternal-fetal bond not

only plays a crucial role in development and birth outcomes but also exerts its influence on various cultural groups.

Until recently, AN was a Westernized disorder because of the focus on the Western ideals of body image. However, recent research has shown AN across geographic borders with variations in symptomology. Therefore, AN is no longer a Western culture-bound syndrome but a disorder spread through social media. Research has shown that exposure to Western norms, and the increase of globalization, leads to many countries wanting to adopt the Western lifestyle. This, in turn, will increase the risk of preeclampsia propagating worldwide, harming maternal-fetal bonds regardless of culture or ethnicity.

### **From Methodological Analysis**

To address the research question in a non-eating disorder group, is the maternal-fetal bond impacted due to AN in pregnancy, ten key articles were utilized for further analysis. These articles met the exclusion and inclusion criteria and answered the research question best. Due to the lack of direct research available on the topic, the researcher applied the network analysis approach to address the question. According to the network analysis approach, comorbidities arise because of bridging symptoms. Using this approach can allow the researcher to make inferences due to the overlap in symptoms of AN and depression. Therefore, research on depression and its impact on the maternal-fetal bond during pregnancy can shine a light on answering the research question of this literature review. Among the studies, one research article adopted a phenomenological qualitative study, while the remaining were quantitative observational studies consisting of longitudinal, prospective, retrospective, and cross-sectional. The varied methodological approaches represent both strengths and weaknesses but were effective in answering the main problem highlighted in this literature review.

Most studies utilized validated and reliable questionnaires, creating the potential for replication. For example, Brassel et al. (2020) and Nordahl et al. (2019) measured the internal consistency of the questionnaires they utilized, in turn making the study results valid. Ertman et al. (2021) and Smorti et al. (2019) utilized substantial sample sizes, rendering their data analysis more generalizable and applicable. Furthermore, most studies conducted in non-English speaking countries translated the main questionnaires into other languages while checking these translations for reliability and validity. For example, Ohara et al. (2017) and Røhder et al. (2020) measured the reliability of the questionnaires they translated.

One of the limitations observed is that most of these researchers examined many factors at once to study association. While informative, this multifaceted approach could impact the results' reliability review. It may be challenging to determine because there could be confounding factors. For example, Rusanen et al. (2021) examined how various factors can impact disturbances postpartum. By looking at postpartum bonding disturbances, there is a chance that there may be overlapping effects. The majority of the studies samples sizes were too small to represent the larger population, thereby limiting the generalizability of their results. Studies with small sample sizes included Brassel et al. (2020), Nordahl et al. (2019), and Røhder et al. (2020).

Additionally, it is essential to consider that self-report questionnaires may lead to response bias and longitudinal studies place demands on the participants. The risk of response bias especially true for Ertman et al. (2021), who formulated their questionnaire but did not measure the validity or reliability of the scales. Most studies, such as Ante et al. (2020), focused on individuals with AN severe enough to need hospitalization or medical intervention, which can also influence the generalizability of their outcomes.

## **Recommendations**

### **Clinical /Therapeutic Level**

At the clinical level, there is a clear need for better therapeutic practices to support women experiencing pregnancy and AN. Based on the research completed for this literature review, there is a lack of clear evidence about the effectiveness of CBT-E for pregnant women. Considering the efficacy of CBT in pregnancy, it is advisable to conduct further research in this area. Studies so far have shown that during pregnancy, women often face problems such as internalizing motherhood myths and seek support. Furthermore, other therapeutic modalities, such as interpersonal psychotherapy (IPT) or ACT should be explored and evaluated for suitability.

Another therapeutic recommendation is the establishment of a multidisciplinary team dedicated to supporting mothers during pregnancy who meet the diagnostic criteria for AN. Having this team can create an opportunity for women to have immediate access to mental health support during this critical period. Using the findings from this literature, achieving a better understanding of how AN can impact maternal-fetal bonds during pregnancy can be possible. Considering the overlap between depression and AN symptomology, this multidisciplinary team may be able to support women experiencing a wide array of challenges during their pregnancy.

Based on the inferences and themes identified in this literature review and considering the influence of urbanization, it is essential to raise awareness about the impact of social media during pregnancy. Recent research is starting to show that AN is no longer a Western culture-bound syndrome but a disorder spread through social media. As women around the world become exposed to media that spreads Western ideals and start to adopt these practices, they will increase their vulnerability to AN. Themes derived from this literature review can apply to

women from various cultures and ethnicities. Although there might be slight variations in the symptom presentation, AN has now evolved into different categories, building a need for further understanding.

As a counsellor of Generation Z, I know how social media shapes individual perceptions and sets societal standards. I am actively on social media, watching TikTok or Instagram reels. As a conscious consumer of social media, I have observed the extensive promotion of thin or curvy body ideals and the need to look a certain way to appear attractive. Therefore, it is essential for me to build a better understanding of how expectant mothers experiencing AN can find a balance between healthy habits in their day-to-day lives. Expecting mothers exposed to this social media content may be confused or have certain expectations of their pregnancy that are unhealthy. Furthermore, considering that women from diverse cultural backgrounds may present with different symptoms of AN, I need to be conscious of the biases and expectations I hold of the disorder. This approach can support me as a counsellor in guiding mothers to form a stronger mother-fetal bond and reduce potential long-term negative outcomes.

### **Future Research**

Based on the themes derived from this literature review, further research on this topic is required. A possible research question could be: “What symptoms of AN specifically impact the maternal-fetal bond during pregnancy?” While this study provided some evidence that AN impacts antenatal attachment, the limited direct evidence of AN’s effects suggests that both qualitative and quantitative research are required to understand this matter. It appears that pregorexia shares common symptoms of AN, however, there is a possibility that pregnant women may not meet the low body-mass criteria of AN due to some weight gain during this time. Therefore, it may be beneficial to know in what ways symptoms of pregoerxia differ from

AN to quantify this category better. Another possible question could focus on the elements of CBT-E and the efficacy of support to women during pregnancy who are experiencing difficulties with maternal-fetal bonds. Looking into this topic will further help clinicians and doctors support women experiencing the transition into motherhood while also managing their symptoms of AN. Further research is required to find a form of therapy that is beneficial for individuals with AN during pregnancy, given the likelihood of symptoms emerging in this population.

To enhance elements of this paper it is advisable to access more databases to dig deeper into this topic. This literature used a limited database available to the researcher, however, there is a possibility that more research exists on this topic. A more extensive search may help to build stronger inferences about the impact of AN on the maternal-fetal bond during pregnancy. Based on the research completed for this study, this is an evolving field which will continue to provide insightful information. Also, having more extensive inclusion and exclusion criteria may enhance the accuracy of results. For example, it was challenging to find literature that explicitly discussed first-time pregnancies, making it difficult to determine if other factors could initiate preeclampsia. Lastly, as the basis of this literature review is on inferences made from the impact of depression during pregnancy on the maternal-fetal bond, it would be beneficial to find more articles focusing on AN during pregnancy and its impact on the maternal-fetal bond. This deeper look will help provide a more extensive perspective on the subject.

### **Summary**

This literature review set out to answer the research question: is the maternal-fetal bond impacted due to AN in pregnancy? This paper outlines the significance of this study, addressing a gap in the knowledge on this topic. It illuminated factors such as triggers, cognitions, and attachment styles relevant to preeclampsia. Using thematic analysis, and the network analysis

approach, this literature review found ten relevant articles and answered the research question. This literature review described in detail the attachment style most observed with this diagnosis, the relationship between depression and AN, and the long-term outcomes of maternal-fetal bond rupture. Due to the limited research available on this topic, there is a need for further research into how pregorexia effects the maternal-fetal bond. The need for further research is essential due to the impact it has on societal well-being. The findings from this literature review can guide practitioners to further assess and support their clients through CBT-E as a potential therapeutic framework.

## References

- Agüera, Z., Brewin, N., Chen, J., Granero, R., Kang, Q., Fernandez-Aranda, F., & Arcelus, J. (2017). Eating symptomatology and general psychopathology in patients with anorexia nervosa from China, UK and Spain: A cross-cultural study examining the role of social attitudes. *PloS One*, *12*(3), e0173781. <https://doi.org/10.1371/journal.pone.0173781>
- Ainsworth, M. D. S. (1978). The Bowlby-Ainsworth attachment theory. *Behavioural and Brain Sciences*, *1*(3), 436-438. <https://doi.org/10.1017/S0140525X00075828>
- Alhusen, J. L., Gross, D., Hayat, M. J., Woods, A. B., & Sharps, P. W. (2012). The influence of maternal-fetal attachment and health practices on neonatal outcomes in low-income, urban women. *Research in Nursing & Health*, *35*(2), 112–120. <https://doi.org/10.1002/nur.21464>
- American Psychiatric Association (APA) (2022). *Diagnostic and statistical manual of mental disorders (DSM-5-TR)*. Washington, DC: American Psychiatric Association.
- Ante, Z., Luu, T. M., Healy-Profitós, J., He, S., Taddeo, D., Lo, E., & Auger, N. (2020). Pregnancy outcomes in women with anorexia nervosa. *International Journal of Eating Disorders*, *53*(5), 673-682. <https://doi.org/10.1002/eat.23251>
- Bailer, U. F., Price, J. C., Meltzer, C. C., Wagner, A., Mathis, C. A., Gamst, A., & Kaye, W. H. (2017). Dopaminergic activity and altered reward modulation in anorexia nervosa—insight from multimodal imaging. *International Journal of Eating Disorders*, *50*(5), 593-596. <https://doi.org/10.1002/eat.22638>
- Beck, A. T. (1964). Thinking and depression: II. Theory and therapy. *Archives Of General Psychiatry*, *10*(6), 561-571. <https://doi.org/10.1001/archpsyc.1964.01720240015003>
- Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. Madison, CT, USA:

International Universities Press.

- Bennett, D., Sharpe, M., Freeman, C., & Carson, A. (2004). Anorexia nervosa among female secondary school students in Ghana. *The British Journal of Psychiatry*, *185*(4), 312-317.  
<https://doi.org/10.1192/bjp.185.4.312>
- Blackmore, E. R., Putnam, F. W., Pressman, E. K., Rubinow, D. R., Putnam, K. T., Matthieu, M. M., Gilchrist, M. A., Jones, I., & O'Connor G. (2016). The effects of trauma history and prenatal affective symptoms on obstetric outcomes. *Journal of Traumatic Stress*, *29*(3), 245–252. <https://doi.org/10.1002/jts.22095>
- Bledsoe, S. E., & Grote, N. K. (2006). Treating depression during pregnancy and the postpartum: A preliminary meta-analysis. *Research on Social Work Practice*, *16*(2), 109-120.  
<https://doi.org/10.1177/1049731505282202>
- Bora, E., & Köse, S. (2016). Meta-analysis of theory of mind in anorexia nervosa and bulimia nervosa: A specific impairment of cognitive perspective taking in anorexia nervosa? *International Journal of Eating Disorders*, *49*(8), 739-740.  
<https://doi.org/10.1002/eat.22572>
- Borsboom D. (2017). A network theory of mental disorders. *World Psychiatry :Official Journal of the World Psychiatric Association (WPA)*, *16*(1), 5–13.  
<https://doi.org/10.1002/wps.20375>
- Bowlby, J. (1982). *Attachment* (2nd edn). New York: Basic Books.
- Brandão, T., Brites, R., Pires, M., Hipólito, J., & Nunes, O. (2019). Anxiety, depression, dyadic adjustment, and attachment to the fetus in pregnancy: Actor–partner interdependence mediation analysis. *Journal of Family Psychology*, *33*(3), 294-303.  
<https://doi.org/10.1037/fam0000513>

- Brassel, A., Townsend, M. L., Pickard, J. A., & Grenyer, B. F. S. (2020). Maternal perinatal mental health: Associations with bonding, mindfulness, and self-criticism at 18 months' postpartum. *Infant Mental Health Journal*, *41*(1), 69–81.  
<https://doi.org/10.1002/imhj.21827>
- Calugi, S., Dametti, L., Chimini, M., Dalle Grave, A., & Dalle Grave, R. (2021). Change in eating-disorder psychopathology network structure in patients with anorexia nervosa treated with intensive cognitive behavior therapy. *International Journal of Eating Disorders*, *54*(10), 1800-1809. <https://doi.org/10.1002/eat.23590>
- Canadian Psychological Association (CPA). (2017, January). *Canadian Code of Ethics*.  
[https://cpa.ca/docs/File/Ethics/CPA\\_Code\\_2017\\_4thEd.pdf](https://cpa.ca/docs/File/Ethics/CPA_Code_2017_4thEd.pdf)
- Carrot, B., Radon, L., Hubert, T., Vibert, S., Duclos, J., Curt, F., & Godart, N. (2017). Are lifetime affective disorders predictive of long-term outcome in severe adolescent anorexia nervosa? *European Child & Adolescent Psychiatry*, *26*(8), 969–978.  
<https://doi.org/10.1007/s00787-017-0963-5>
- Chua, S. N., Fitzsimmons-Craft, E. E., Austin, S. B., Wilfley, D. E., & Taylor, C. B. (2022). Estimated prevalence of eating disorders in Malaysia based on a diagnostic screen. *International Journal of Eating Disorders*, *55*(6), 763-775.  
<https://doi.org/10.1002/eat.23711>
- Cildir, A., Ozbek, A., Topuzoglu, A., Orcin, E., & Janbakhishov, C. E. (2020). Association of prenatal attachment and early childhood emotional, behavioral, and developmental characteristics: A longitudinal study. *Infant Mental Health Journal*, *41*(4), 517–529.  
<https://doi.org/10.1002/imhj.21822>

- Civilotti, C., Franceschinis, M., Gandino, G., Veglia, F., Anselmetti, S., Bertelli, S., D'Agostino, A., Redaelli, C. A., Del Giudice, R., Giampaolo, R., Fernandez, I., Finzi, S., Celeghin, A., Donarelli, E., & Di Fini, G. (2022). State of mind assessment in relation to adult attachment and text analysis of adult attachment interviews in a sample of patients with anorexia nervosa. *European Journal of Investigation in Health, Psychology and Education, 12*(12), 1760–1779. <https://doi.org/10.3390/ejihpe12120124>
- Creswell, J.W. (2018). *Research design: Qualitative, quantitative, and mixed methods approach* (5th ed). Sage.
- Creswell, J., & Poth, C. (2017). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage.
- Dafei, M., Mojahed, S., Dastjerdi, G., Dehghani, A., & Ardakani, T. S. (2021). The effect of cognitive-behavioral counseling of pregnant women with the presence of a spouse on stress, anxiety, and postpartum depression. *Journal of Education and Health Promotion, 10*, 131. [https://doi.org/10.4103/jehp.jehp\\_926\\_20](https://doi.org/10.4103/jehp.jehp_926_20)
- Daglar, G., & Nur, N. (2018). Level of mother-baby bonding and influencing factors during pregnancy and postpartum period. *Psychiatria Danubina, 30*(4), 433-440. <https://doi.org/10.24869/psyd.2018.433>
- Dahlenburg, S. C., Gleaves, D. H., & Hutchinson, A. D. (2019). Anorexia nervosa and perfectionism: A meta-analysis. *International Journal of Eating Disorders, 52*(3), 219-229. <https://doi.org/10.1002/eat.23009>
- Dalle, G. R., Marwan, E. G., Massimiliano, S., & Simona, C. (2016). Cognitive behavioral therapy for anorexia nervosa: An update. *Current Psychiatry Reports, 18*(1). <https://doi.org/10.1007/s11920-015-0643-4>

- Danielsen, Y. S., Guro, A. R., Frostad, S., & Kessler, U. (2016). Effectiveness of enhanced cognitive behavioural therapy (CBT-E) in treating anorexia nervosa: A prospective multidisciplinary study. *BMC Psychiatry, 16*.  
<http://dx.doi.org.proxy.cityu.edu/10.1186/s12888-016-1056-6>
- de Cock, Evi S. A., Henrichs, J., Vreeswijk, C. M. J. M., Maas, A. J., Rijk, C. H. A. M., & van Bakel, Hedwig J. A. (2016). Continuous feelings of love? The parental bond from pregnancy to toddlerhood. *Journal of Family Psychology, 30*(1), 125-134.  
<https://doi.org/10.1037/fam0000138>
- de Jong, M., Spinhoven, P., Korrelboom, K., Deen, M., van der Meer, I., Danner, U. N., Schuur, S., Schroot, M., & Hoek, H. W. (2020). Effectiveness of enhanced cognitive behaviour therapy for eating disorders: A randomized controlled trial. *International Journal of Eating Disorders, 53*(5), 717-727. <https://doi.org/10.1002/eat.23239>
- Department of Health (2015). *What is maternal depression?* [https://www.health.ny.gov/community/pregnancy/health\\_care/perinatal/maternal\\_depression/providers/what\\_is\\_maternal\\_depression.htm](https://www.health.ny.gov/community/pregnancy/health_care/perinatal/maternal_depression/providers/what_is_maternal_depression.htm)
- Dobson, D., & Dobson, K. S. (2018). *Evidence-based practice of cognitive-behavioural therapy*. Guilford publications.
- Duman, B., Senturk Cankorur, V., Taylor, C., & Stewart, R. (2018). Prospective associations between recalled parental bonding and perinatal depression: A cohort study in urban and rural Turkey. *Social Psychiatry & Psychiatric Epidemiology, 53*(4), 385–392.  
<https://doi.org/10.1007/s00127-018-1484-3>

- Elliott, H., Jones, P.J., & Schmidt, U. (2019). Central symptoms predict posttreatment outcomes and clinical impairment in anorexia nervosa: A network analysis. *Clinical Psychological Science* 8(1), 139-154. <https://doi.org/10.1177/2167702619865958>
- Emanuele, C., Rossi, E., Giovanni, C., Carolina, S., Milena, M., Lorenzo, L., Monteleone, A. M., Valdo, R., & Giovanni, S. (2020). Sexuality, embodiment and attachment style in anorexia nervosa. *Eating and Weight Disorders*, 25(6), 1671-1680. <https://doi.org/10.1007/s40519-019-00805-6>
- Ertmann, R. K., Bang, C. W., Kriegbaum, M., Væver, M., S., Kragstrup, J., Siersma, V., Wilson, P., Lutterodt, M. C., & Smith-Nielsen, J. (2021). What factors are most important for the development of the maternal–fetal relationship? A prospective study among pregnant women in Danish general practice. *BMC Psychology*, 9, 1-9. <https://doi.org/10.1186/s40359-020-00499-x>
- Franko, D. L., Tabri, N., Keshaviah, A., Murray, H. B., Herzog, D. B., Thomas, J. J., Coniglio, K., Keel, P.K., & Eddy, K. T. (2018). Predictors of long-term recovery in anorexia nervosa and bulimia nervosa: Data from a 22-year longitudinal study. *Journal of psychiatric research*, 96, 183-188. <https://doi.org/10.1016/j.jpsychires.2017.10.008>
- Fullen, T., Galab, N., Abbott, K. A., & Adamou, M. (2020). Acceptance and commitment therapy for adults with ADHD during COVID-19: An open trial. *Open Journal of Psychiatry*, 10(04), 205. <https://doi.org/10.4236/ojpsych.2020.104017>
- Gander, M., Sevecke, K., & Buchheim, A. (2018). Disorder-specific attachment characteristics and experiences of childhood abuse and neglect in adolescents with anorexia nervosa and a major depressive episode. *Clinical Psychology & Psychotherapy*, 25(6), 894–906. <https://doi.org/10.1002/cpp.2324>

- Gerontidis, A., Grammatikopoulou, M. G., Tzimos, C., Gkiouras, K., Taousani, E., Athanasiadis, L., & Goulis, D. G. (2022). Effectors of pregorexia and emesis among pregnant women: A pilot study. *Nutrients, 14*(24), 5275. <https://doi.org/10.3390/nu14245275>
- Ghahremani, S., Aryan, H., Ghahremani, S., Rakhshanizadeh, F., Rahimi, R., & Ghazanfarpour, M. (2019). Factorial structures of postpartum bonding questionnaire (PBQ): A systematic review. *International Journal of Pediatrics, 7*, 9295–9303. <http://dx.doi.org/10.22038/IJP.2018.36262.3164>
- Gioia, M. C., Cerasa, A., Muggeo, V. M. R., Tonin, P., Cajiao, J., Aloï, A., Martino, I., Tenuta, F., Costabile, A., & Craig, F. (2023). The relationship between maternal-fetus attachment and perceived parental bonds in pregnant women: Considering a possible mediating role of psychological distress. *Frontiers in Psychology, 13*, 1095030. <https://doi.org/10.3389/fpsyg.2022.1095030>
- Gregertsen, E. C., Mandy, W., & Serpell, L. (2017). The egosyntonic nature of anorexia impedes recovery in anorexia nervosa treatment. *Frontiers in Psychology, 8*, 2273. <https://doi.org/10.3389/fpsyg.2017.02273>
- Hayes, S. C., Strosahl, K., & Wilson, K. G. (2003). *Acceptance and commitment therapy: An experiential approach to behavior change*. Guilford Press.
- Hayes, S. C., Pistorello, J., & Levin, M. E. (2012). Acceptance and commitment therapy as a unified model of behavior change. *The Counseling Psychologist, 40*(7), 976-1002. <http://dx.doi.org/10.1177/0011000012460836>
- Houghton, C., Casey, D., Shaw, D., & Murphy, K. (2013). Rigour in qualitative case-study research. *Nurse Researcher, 20*(4), 12-7. <https://www.proquest.com/scholarly-journals/rigour-qualitative-case-study-research/docview/1317920491/se-2>

- Ingram, J., Johnson, D., O'Mahen, H. A., Law, R., Culpin, I., Kessler, D., Beasant, L., & Evans, J. (2021). 'Asking for help': A qualitative interview study exploring the experiences of interpersonal counselling (IPC) compared to low-intensity cognitive behavioural therapy (CBT) for women with depression during pregnancy. *BMC Pregnancy and Childbirth*, *21*(1), 765. <https://doi.org/10.1186/s12884-021-04247-w>
- Javier, S. J., & Belgrave, F. Z. (2019). "I'm not White, I have to be pretty and skinny": A qualitative exploration of body image and eating disorders among Asian American women. *Asian American Journal of Psychology*, *10*(2), 141-153. <https://doi.org/10.1037/aap0000133>
- Junne, F., Zipfel, S., Wild, B., Martus, P., Giel, K., Resmark, G., Friederich, H., Teufel, M., de Zwaan, M., Dinkel, A., Herpertz, S., Burgmer, M., Tagay, S., Rothermund, E., Zeeck, A., Ziser, K., Herzog, W., & Löwe, B. (2016). The relationship of body image with symptoms of depression and anxiety in patients with anorexia nervosa during outpatient psychotherapy: Results of the ANTOP study. *Psychotherapy*, *53*(2), 141-151. <https://doi.org/10.1037/pst0000064>
- Katzman, M. A., Hermans, K. M. E., Daphne, V. H., & Hoek, H. W. (2004). Not your "typical island woman": Anorexia nervosa is reported only in subcultures in Curaçao. *Culture, Medicine and Psychiatry*, *28*(4), 463-92. <https://doi.org/10.1007/s11013-004-1065-7>
- Kucharska, K., Kulakowska, D., Starzomska, M., Rybakowski, F., & Biernacka, K. (2019). The improvement in neurocognitive functioning in anorexia nervosa adolescents throughout the integrative model of psychotherapy including cognitive remediation therapy. *BMC Psychiatry*, *19*(1), 15. <https://doi.org/10.1186/s12888-018-1984-4>

- Kudinova, A. Y., Woody, M. L., James, K. M., Burkhouse, K. L., Feurer, C., Foster, C. E., & Gibb, B. E. (2019). Maternal major depression and synchrony of facial affect during mother-child interactions. *Journal of Abnormal Psychology, 128*(4), 284-294.  
<https://doi.org/10.1037/abn0000411>
- Lincoln, Y.S., & Guba, E.G. (1985). *Naturalistic Inquiry*. Sage.
- Mandera, A., Pawlikowska, A., Szuster, E. M., Całkosiński, A., Kostrzewska, P., & Majewski, M. (2019). The pregorexia-anorexia during the pregnancy. *Journal of Education, Health and Sport, 9*(5), 137-144. <http://dx.doi.org/10.5281/zenodo.2718477>
- Mantel, Ä., Hirschberg, A. L., & Stephansson, O. (2020). Association of maternal eating disorders with pregnancy and neonatal outcomes. *JAMA Psychiatry, 77*(3), 285–293.  
<https://doi.org/10.1001/jamapsychiatry.2019.3664>
- Megan, G., Watson, S. J., van IJzendoorn Marinus, H., Anne, T., Maartje, L., & Lewis, A. J. (2022). Maternal trauma but not perinatal depression predicts infant-parent attachment. *Archives of Women's Mental Health, 25*(1), 215-225.  
<https://doi.org/10.1007/s00737-021-01192-7>
- Moe, V., von Soest, T., Fredriksen, E., Olafsen, K., & Smith, L. (2018). The multiple determinants of maternal parenting stress 12 months after birth: The contribution of antenatal attachment style, adverse childhood experiences, and infant temperament. *Frontiers in Psychology, 9*, 14. <https://doi.org/10.3389/fpsyg.2018.01987>
- Monteleone, A. M., Mereu, A., Cascino, G., Criscuolo, M., Castiglioni, M. C., Pellegrino, F., Patriciello, G., Ruzzi, V., Monteleone, P., Vicari, S., & Zanna, V. (2019). Re-conceptualization of anorexia nervosa psychopathology: A network analysis study in

- adolescents with short duration of the illness. *International Journal of Eating Disorders*, 52(11), 1263–1273. <https://doi.org/10.1002/eat.23137>
- National Institute of Health. (2017). *About Pregnancy*. <https://www.nichd.nih.gov/health/topics/pregnancy/conditioninfo>
- Nordahl, D., Ragnhild Sørensen Høifødt, Bohne, A., Landsem, I. P., Catharina Elisabeth, A. W., & Thimm, J. C. (2019). Early maladaptive schemas as predictors of maternal bonding to the unborn child. *BMC Psychology*, 7. <https://doi.org/10.1186/s40359-019-0297-9>
- O'Mahen, H., Himle, J. A., Fedock, G., Henshaw, E., & Flynn, H. (2013). A pilot randomized controlled trial of cognitive behavioral therapy for perinatal depression adapted for women with low incomes. *Depression and Anxiety*, 30(7), 679–687. <https://doi.org/10.1002/da.22050>
- Ohara, M., Okada, T., Kubota, C., Nakamura, Y., Shiino, T., Aleksic, B., Morikawa, M., Yamauchi, A., Uno, Y., Murase, S., Goto, S., Kanai, A., Masuda, T., Ando, M., & Ozaki, N. (2017). Relationship between maternal depression and bonding failure: A prospective cohort study of pregnant women. *Psychiatry & Clinical Neurosciences*, 71(10), 733–741. <https://doi.org/10.1111/pcn.12541>
- Oldershaw, A., Startup, H., & Lavender, T. (2019). Anorexia nervosa and a lost emotional self: A psychological formulation of the development, maintenance, and treatment of anorexia nervosa. *Frontiers In Psychology*, 10, 219. <https://doi.org/10.3389/fpsyg.2019.00219>
- Pan, J. R., Li, T. Y., Tucker, D., & Chen, K. Y. (2022). Pregnancy outcomes in women with active anorexia nervosa: A systematic review. *Journal of Eating Disorders*, 10(1), 25. <https://doi.org/10.1186/s40337-022-00551-8>

- Paolacci, S., Aysha, K. K., Manara, E., Beccari, T., Ceccarini, M. R., Stuppia, L., Chiurazzi, P., Laura, D. R., & Bertelli, M. (2020). Genetic contributions to the etiology of anorexia nervosa: New perspectives in molecular diagnosis and treatment. *Molecular Genetics & Genomic Medicine*, 8(7). <http://dx.doi.org.proxy.cityu.edu/10.1002/mgg3.1244>
- Røhder, K., Væver, M. S., Aarestrup, A. K., Rikke, K. J., Smith-Nielsen, J., & Schiøtz, M.,L. (2020). Maternal-fetal bonding among pregnant women at psychosocial risk: The roles of adult attachment style, prenatal parental reflective functioning, and depressive symptoms. *PLoS One*, 15(9). <https://doi.org/10.1371/journal.pone.0239208>
- Rusanen, E., Vierikko, E., Kojo, T., Lahikainen, A. R., Pölkki, P., & Paavonen, E. J. (2021). Prenatal expectations and other psycho-social factors as risk factors of postnatal bonding disturbance. *Infant Mental Health Journal*, 42(5), 655–671. <https://doi.org/10.1002/imhj.21941>
- Russotti, J., Swerbenski, H., Handley, E. D., Michl-Petzing, L., Cicchetti, D., & Toth, S. L. (2023). Intergenerational effects of maternal depression and co-occurring antisocial behaviors: The mediating role of parenting-related processes. *Journal of Family Psychology*, 37(3), 408-419. <https://doi.org/10.1037/fam0001021>
- Saleem, T., Saleem, S., Shoib, S., Shah, J., & Ali, S. A. (2022). A rare phenomenon of pregorexia in Pakistani women: Need to understand the related behaviors. *Journal of Eating Disorders*, 10(1), 74. <https://doi.org/10.1186/s40337-022-00589-8>
- Smorti, M., Ponti, L., & Tani, F. (2019). Maternal depressive symptomatology during pregnancy is a risk factor affecting newborn's health: A longitudinal study. *Journal of Reproductive & Infant Psychology*, 37(4), 444–452. <https://doi.org/10.1080/02646838.2019.1581919>

- Sommerfeldt, B., Skårderud, F., Kvalem, I. L., Gulliksen, K. S., & Holte, A. (2022). Bodies out of control: Relapse and worsening of eating disorders in pregnancy. *Frontiers in Psychology, 13*, 986217. <https://doi.org/10.3389/fpsyg.2022.986217>
- Soltsman, S., Tomsis, Y., Konforty, A., & Ben Shlomo, I. (2021). The impact of prenatal depression in patients of high risk pregnancy clinic on obstetric outcomes. *Psychiatric Quarterly, 92*(4), 1673–1684. <https://doi.org/10.1007/s11126-021-09925-8>
- Startup, H., Lavender, A., Oldershaw, A., Stott, R., Tchanturia, K., Treasure, J., & Schmidt, U. (2013). Worry and rumination in anorexia nervosa. *Behavioural and Cognitive Psychotherapy, 41*(3), 301-16. <https://doi.org/10.1017/S1352465812000847>
- Stice, E., Gau, J. M., Rohde, P., & Shaw, H. (2017). Risk factors that predict future onset of each DSM–5 eating disorder: Predictive specificity in high-risk adolescent females. *Journal of Abnormal Psychology, 126*(1), 38. <https://doi.org/10.1037/abn0000219>
- Talmon, A., Finzi-Dottan, R., & Ginzburg, K. (2021). "I will love you (me) forever"—A longitudinal study of narcissism and emotional adjustment during the transition to motherhood. *Personality Disorders: Theory, Research, and Treatment, 12*(6), 534-545. <https://doi.org/10.1037/per0000442>
- Tasca, G. A., & Balfour, L. (2014). Attachment and eating disorders: A review of current research. *International Journal of Eating Disorders, 47*(7), 710-717. <https://doi.org/10.1002/eat.22302>
- Tuncer, E., Gumus, A. B., & Keser, A. (2020). The importance of pregorexia awareness. *Clinical and Experimental Health Sciences, 10*(3), 186-190. <https://doi.org/10.33808/clinexphealthsci.673306>
- Verleye, K. (2019). Designing, writing-up and reviewing case study research: An equifinality

perspective. *Journal of Service Management*, 30(5), 549-576.

<https://doi.org/10.1108/JOSM-08-2019-0257>

Watson, H. J., Zerwas, S., Torgersen, L., Gustavson, K., Diemer, E. W., Knudsen, G. P., Reichborn-Kjennerud, T., & Bulik, C. M. (2017). Maternal eating disorders and perinatal outcomes: A three-generation study in the Norwegian mother and child cohort study. *Journal of Abnormal Psychology*, 126(5), 552–564.

<https://doi.org/10.1037/abn0000241>

World Health Organization (WHO). (2019). *International statistical classification of diseases and related health problems* (11th ed.). <https://icd.who.int/>

Xiao, Y., & Watson, M. (2019). Guidance on conducting a systematic literature review. *Journal of Planning Education and Research*, 39(1), 93-112.

<https://doi.org/10.1177/0739456X17723971>

Yslas, J. (2016). Redefining western culture-bound syndromes: The classification of anorexia nervosa. *UC Merced Undergraduate Research Journal*, 8(2).

<https://doi.org/10.5070/M482030792>

Zachrisson, H. D., & Kulbotten, G. R. (2006). Attachment in anorexia nervosa: An exploration of associations with eating disorder psychopathology and psychiatric symptoms. *Eating and Weight Disorders*, 11(4), 163-170. <https://doi.org/10.1007/BF03327567>

Zdolska-Wawrzekiewicz, A., Bidzan, M., Chrzan-Dętkoś, M., & Pizuńska, D. (2019). The dynamics of becoming a mother during pregnancy and after childbirth. *International Journal of Environmental Research and Public Health*, 17(1), 57.

<https://doi.org/10.3390/ijerph17010057>

- Zeanah, C. H., Berlin, L. J., & Boris, N. W. (2011). Practitioner review: Clinical applications of attachment theory and research for infants and young children. *Journal of Child Psychology and Psychiatry*, 52(8), 819-833. <https://doi.org/10.1111/j.1469-7610.2011.02399.x>
- Zharkyn, M. (2023). Anorexia nervosa through the lens of primary health care practitioners in the Kyrgyz Republic. *Consortium Psychiatricum*, 4(2), 41-52. <https://doi.org/10.17816/CP6184>

## Appendix A

### Twenty-One Studies Applicable to the Literature Review After Meeting Exclusion and

#### Inclusion Criteria

Database	Keywords	Search Results	Title of the Publication	Reference
PubMed	Pregroxia	7 results <ul style="list-style-type: none"> <li>• 2009-2023</li> </ul>	Effectors of pregorexia and emesis among pregnant women: A pilot study.	Gerontidis et al. (2022)
			A rare phenomenon of pregorexia in Pakistani women: Need to understand the related behaviors.	Saleem et al. (2022)
PubMed	Anorexia nervosa and pregnancy	70 results <ul style="list-style-type: none"> <li>• 2017-2023</li> </ul>	Bodies out of control: Relapse and worsening of eating disorders in pregnancy.	Sommerfeldt et al. (2022)
			Maternal eating disorders and perinatal outcomes: A three-generation study in the Norwegian mother and child cohort study.	Watson et al. (2017)
			Association of maternal eating disorders with pregnancy and neonatal outcomes.	Mantel et al. (2020)

			Pregnancy outcomes in women with anorexia nervosa.	Ante et al. (2020)
PsycINFO	Anorexia nervosa and pregnancy	30 results <ul style="list-style-type: none"> <li>• last 5 years</li> </ul>		
PsycINFO	Antenatal attachment and pregnancy	61 results <ul style="list-style-type: none"> <li>• last 5 years</li> </ul>	The multiple determinants of maternal parenting stress 12 months after birth: The contribution of antenatal attachment style, adverse childhood experiences, and infant temperament.	Moe et al. (2018)
PsycINFO	Maternal-antenatal attachment	147 results <ul style="list-style-type: none"> <li>• last 5 years</li> </ul>	What factors are most important for the development of the maternal-fetal relationship? A prospective study among pregnant women in Danish general practice.	Ertmann et al. (2021)
			Maternal-fetal bonding among pregnant women at psychosocial risk: The roles of adult attachment style, prenatal parental reflective functioning, and	Røhder et al. (2020)

			depressive symptoms.	
			Early maladaptive schemas as predictors of maternal bonding to the unborn child.	Nordahl et al. (2019)
			Maternal trauma, but not perinatal depression, predicts infant-parent attachment.	Megan et al. (2022)
PsycINFO	Maternal depression and pregnancy	506 results <ul style="list-style-type: none"> <li>• last five years</li> </ul>	Intergenerational effects of maternal depression and co-occurring antisocial behaviours: The mediating role of parenting-related processes.	Russotti et al. (2023)
			Maternal major depression and synchrony of facial affect during mother-child interactions.	Kudinova et al. (2019)
Psychological and behavioural sciences collection	Depression and pregnancy	437 results <ul style="list-style-type: none"> <li>• last five years</li> </ul>	The impact of prenatal depression in patients of high-risk pregnancy clinic on obstetric outcomes.	Soltsman et al. (2021)
Psychological and behavioural	Antenatal depression and bonding	Three results <ul style="list-style-type: none"> <li>• last five years</li> </ul>	Prospective associations between recalled	Duman et al. (2018)

---

sciences collection			parental bonding and perinatal depression: A cohort study in urban and rural Turkey.	
Psychological and behavioural sciences collection	Maternal depression and bonding	18 results • last five years	Prenatal expectations and other psycho- social factors as risk factors of postnatal bonding disturbance.	Rusanen et al. (2021)
			Maternal perinatal mental health: Associations with bonding, mindfulness, and self-criticism at 18 months postpartum.	Brassel et al. (2020)
			Relationship between maternal depression and bonding failure: A prospective cohort study of pregnant women.	Ohara et al. (2017)
			Maternal depressive symptomatology during pregnancy is a risk factor affecting newborn's health: A longitudinal study.	Smorti et al. (2019)

---

Psychological and behavioural sciences collection	Anorexia nervosa and depression	89 results <ul style="list-style-type: none"> <li>• last five years</li> </ul>	Disorder-specific attachment characteristics and experiences of childhood abuse and neglect in adolescents with anorexia nervosa and a major depressive episode.	Gander et al. (2018)
			Are lifetime affective disorders predictive of long-term outcomes in severe adolescent anorexia nervosa?	Carrot et al. (2017)
PsycINFO	Mother fetal bond and obstetric outcomes	49 results <ul style="list-style-type: none"> <li>• last five years</li> </ul>		

## Appendix B

### A Thematic Analysis of The Ten Articles

Theme	Keywords	Title of the Publication	Reference	Type of Publication
The Maternal-Fetal Bond	Bonding	Prenatal expectations and other psycho-social factors as risk factors of postnatal bonding disturbance.	Rusanen et al. (2021)	Quantitative longitudinal study design
	Maternal-antenatal attachment	Early maladaptive schemas as predictors of maternal bonding to the unborn child.	Nordahl et al. (2019)	Longitudinal quantitative study
	Antenatal attachment and pregnancy	Maternal-fetal bonding among pregnant women at psychosocial risk: The roles of adult attachment style, prenatal parental reflective functioning, and depressive symptoms.	Røhder et al. (2020)	Quantitative cross-sectional and randomized control trial study design
		What factors are most important for the development of maternal–fetal relationships? A prospective study among pregnant women	Ertmann et al. (2021)	Quantitative prospective study design

		in Danish general practice.		
Depression and the Maternal-Fetal Bond	Maternal depression and bonding	Maternal perinatal mental health: Associations with bonding, mindfulness, and self-criticism at months' postpartum.	Brassel et al. (2020)	Quantitative prospective longitudinal cross-sectional study
	Depression and pregnancy			
	Antenatal depression and bonding			
	Maternal depression and pregnancy	Relationship between maternal depression and bonding failure: A prospective cohort study of pregnant women.	Ohara et al. (2017)	Quantitative prospective cohort study design
		Maternal depressive symptomatology during pregnancy is a risk factor affecting newborn's health: A longitudinal study.	Smorti et al. (2019)	Quantitative cohort longitudinal paradigm
		The impact of prenatal depression in patients of high-risk pregnancy clinics on obstetric outcomes.	Soltsman et al. (2021)	Quantitative retrospective study design
Pregorexia Symptoms and Outcomes	Pregorexia	A rare phenomenon of pregorexia in Pakistani	Saleem et al. (2022)	Phenomenological qualitative study

---

Anorexia nervosa and pregnancy	women: Need to understand the related behaviours.		
Anorexia nervosa and obstetric outcomes	Pregnancy outcomes in women with anorexia nervosa.	Ante et al. (2020)	Quantitative retrospective cohort study

---