

ANTENATAL DEPRESSION AND ANXIETY: PREGNANCY AND NEONATAL
OUTCOMES IN A POPULATION-BASED STUDY

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ABSTRACT

Depression occurs in approximately 20% of pregnant women, and up to 25% of them experience anxiety. Several pregnancy complications and labour and delivery outcomes have been associated with antenatal depression and anxiety, such as higher rates of nausea and vomiting, bleeding, psychosomatic complaints, preterm labour and delivery complications. Neonatal outcomes include lower Apgar scores, shorter gestation, smaller head circumference, and increased admissions to the neonatal intensive care unit.

Research Questions:

1. To examine the prevalence of pregnancy complications and neonatal outcomes in this study sample.
2. To examine whether there is a difference in the association between observed pregnancy complications and neonatal outcomes and major depression, when depression is episodic compared to when the depression is continuous.
3. To examine whether there is a difference in the association between observed pregnancy complications and neonatal outcomes and mild depression, when the mild depression is episodic compared to when it is continuous.
4. To examine whether there is a difference in the association between observed pregnancy complications and neonatal outcomes and anxiety, when anxiety is episodic compared to when it is continuous.

Methods:

The data for this study was collected for the Feelings in Pregnancy and Motherhood Study (FIP). This population-based study interviewed 649 participants three times: in the second trimester, the third trimester, and in the early postpartum. Participants were

screened for depression and anxiety with the Edinburgh Postnatal Depression Scale (EPDS), using the validated cut-off scores of ≥ 12 and ≥ 4 respectively. Sociodemographic data as well as detailed risk behaviours, and sources of stress and coping, were explored. Finally, pregnancy, labour and delivery and neonatal complications were collected. Descriptive and multivariate logistic regression analyses were completed.

Results:

Major depression in the second trimester was significantly associated with gestational diabetes (OR: 3.518; 95% CI 1.56, 7.93) and swelling/edema (OR: 2.099; 95% CI 1.13, 3.89). Major depression that occurred continuously throughout pregnancy was significantly associated with induced labour (2.417; 95% CI 0.99, 5.92) and antenatal bleeding/abruption (OR: 2.099; 95% CI 1.13, 3.89).

Anxiety in the second trimester was significantly associated with caesarean birth (OR: 0.522; 95% CI 0.29, 0.95). Anxiety occurring continuously throughout pregnancy was significantly associated with swelling/edema (OR: 1.816; 95% CI 1.19, 2.77) and there was a significant interaction between age and anxiety that predicted epidural use during pregnancy: while age decreased in the participants who had anxiety in both trimesters, the likelihood of using an epidural increased.

Finally, mild depression in the second trimester was significantly associated with antenatal bleeding/abruption (OR: 2.124; 95% CI 1.09, 4.14) and PROM (OR: 2.504; 95% CI 1.04, 6.05). Mild depression in the third trimester was associated with caesarean birth (OR: 0.298; 95% CI 0.10, 0.86). Mild depression that occurred continuously throughout pregnancy was significantly associated with the use of vacuum/forceps in delivery or an operative delivery (OR: 4.820; 95% CI 1.10, 21.16).

Conclusions:

These results show that episodic depression and anxiety can have a more profound impact on pregnancy complications and labour and delivery outcomes than continuous depression and anxiety. Furthermore, the results demonstrate that even mild depression can have a significant negative impact on pregnancy complications and labour and delivery outcomes. These results further highlight the imperative need for women to be screened and treated for depression and anxiety during pregnancy.

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DEDICATION

This thesis is first and foremost dedicated to my husband Jake, who provided me with endless love and support as I undertook this adventure. Without his motivation, encouragement, and belief in me, this road would have been much more difficult.

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ABBREVIATIONS

ADHD:	Attention Deficit Hyperactivity Disorder
BP:	Blood Pressure
CIHI:	Canadian Institutes for Health Information
CIHR:	Canadian Institutes of Health Research
DSM-IV:	Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition
EPDS:	Edinburgh Postnatal Depression Scale
FIP:	Feelings in Pregnancy and Motherhood Study
HPA:	Hypothalamic Pituitary Adrenal Axis
IES-R:	Impact of Event Scale- Revised
LGA:	Large for Gestational Age
MCDI:	MacArthur Communicative Development Inventory
MDD;	Major Depressive Disorder
MDI:	Mental Scale of the Bayley Scales of Infant Development
NICU:	Neonatal Intensive Care Unit
PPH:	Postpartum Hemorrhage
PROM:	Premature Rupture of Membranes
SGA:	Small for Gestational Age
SPI:	Standardised Psychiatry Inventory
STAI:	State and Trait Anxiety Inventory
STAI-S:	State Anxiety Inventory
UTI:	Urinary Tract Infection

CHAPTER ONE: INTRODUCTION

Depression occurs in approximately one in five pregnancies¹ and has been found to occur more often in the prenatal period than in the postpartum period.² Anxiety, which happens in about one quarter of all pregnancies, is also a serious problem.³ There are many factors that may put a woman at an increased risk for developing antenatal depression or anxiety, including but not limited to: the amount of emotional support she receives, past history of depression and/or anxiety, and financial issues.⁴⁻⁷

This thesis describes the secondary analysis of data collected for the CIHR-funded study entitled: The Feelings in Pregnancy and Motherhood Study (FIP) Grant #145179. A total of 649 participants from within the Saskatoon and the Five Hills Health Regions participated in the study. The participants answered questions related to their pregnancy, including medical, psychosocial, and socio-demographic factors, as well as questions about risk behaviours they may have engaged in. The questionnaires also screened participants for depression and anxiety. Participants completed similar questionnaires at three different times, as follows:

- Questionnaire One in the second trimester of pregnancy,
- Questionnaire Two in the third trimester of pregnancy, and
- Questionnaire Three in the early postpartum.

1.1 Rationale and Significance of the Study

The rationale for this thesis lies within the high prevalence of depression and anxiety during pregnancy and the number of complications and outcomes that have been associated with both issues. Antenatal depression and anxiety are associated with multiple health complications for the mother and the fetus.⁸ Not only do some women

diagnosed with antenatal depression and anxiety experience suicidal ideations and actions, they are also exposed to the strongest risk factors for developing postpartum depression.⁹ Many people are unaware of how prevalent depression and anxiety during pregnancy are,^{2,10} making it more difficult for women experiencing these problems to be identified or to reach out for help.

Potentially, the most significant outcome of this thesis will be to provide health care professionals, particularly local practitioners, with important information regarding complications and neonatal outcomes associated with antenatal depression and anxiety. This information will allow health care professionals to be cognizant of these complications when treating a patient suffering from antenatal depression and/or anxiety. Another significant attribute of this project is the breadth of variables it tests; therefore, allowing for the association of multiple, potentially negative outcomes for the mother and the baby with antenatal depression and anxiety.

Further, the effect of episodic depression and anxiety is compared to the effect of continuous depression on the mother and baby, which is important because it is not known which will impact the pregnancy more. For this thesis, episodic depression will be defined as depression that occurs only in the second trimester or occurs only in the third trimester and continuous depression will be defined as depression that occurs continuously throughout both the second and third trimester. As well, the impact of episodic and continuous mild depression on pregnancy and neonatal outcomes are considered, a topic that has been under-researched to date.

1.2 Objectives and Research Questions

This thesis has four key objectives:

1. To examine the prevalence of pregnancy complications and neonatal outcomes in this study sample.
2. To examine whether there is a difference in the association between observed pregnancy complications and neonatal outcomes and major depression, when depression is episodic compared to when the depression is continuous.
3. To examine whether there is a difference in the association between observed pregnancy complications and neonatal outcomes and mild depression, when the mild depression is episodic compared to when it is continuous.
4. To examine whether there is a difference in the association between observed pregnancy complications and neonatal outcomes and anxiety, when anxiety is episodic compared to when it is continuous.

The four research questions and hypotheses resulting from the objectives are as follows:

1. What is the prevalence of pregnancy complications and neonatal outcomes in this study population? For this question, I hypothesize that the prevalence of pregnancy complications and neonatal outcomes will be similar to what is found in the general population of pregnant women and neonates. This would be expected because the study sample was drawn from the general population of women living in Saskatoon, Saskatchewan and Canada.
2. Does the association between observed pregnancy complications and neonatal outcomes and major depression differ when the depression occurs episodically, compared to when it occurs continuously throughout pregnancy? For this question, I hypothesize that there will be a stronger association between continuous depression

and pregnancy complications and neonatal outcomes, compared with episodic depression, because logically, depression that occurs continuously should have a greater negative impact, since the mother and the baby are exposed to it for a longer period of time.

3. Does the association between observed pregnancy complications and neonatal outcomes differ when the depression is mild and occurs episodically compared to when it occurs continuously throughout pregnancy? For this question, I hypothesize that there will be a stronger association between continuous mild depression and pregnancy complications and neonatal outcomes, compared with episodic mild depression, because logically, mild depression that occurs continuously should have a greater negative impact, since the mother and the baby are exposed to it for a longer period of time.
4. Does the association between observed pregnancy complications and neonatal outcomes and anxiety differ when the anxiety occurs episodically, compared to when it occurs continuously throughout pregnancy? For this question, I hypothesize that there will be a stronger association between continuous anxiety and pregnancy complications and neonatal outcomes, compared with episodic anxiety, because logically, anxiety that occurs continuously should have a greater negative impact, since the mother and the baby are exposed to it for a longer period of time.

This thesis has two important potential implications. Firstly, given the frequency of anxiety and depression during pregnancy, health professionals need to be aware of the potential health risks of both conditions, to both the mother and the baby. With increased awareness of these associations, health professionals may also become more cognizant

about the presence of antenatal depression and anxiety in their patients and become more likely to encourage women to seek treatment for these issues. Secondly, it is important that women are aware of possible complications and know that depression and anxiety are common issues during pregnancy. If the results from this thesis show that antenatal depression and anxiety are associated with complications, a logical recommendation will be for women to be screened for antenatal depression and anxiety during their prenatal visits and treated appropriately to avoid any negative effects.

CHAPTER TWO: LITERATURE REVIEW

This chapter begins with definitions of antenatal depression and anxiety and examines the prevalence of both issues in past research. Next, the potential risk factors for developing antenatal depression and anxiety are discussed. This literature review then provides an in depth discussion of the risks that antenatal depression and anxiety can pose to the pregnancy, issues that may arise in labour and delivery, and potential adverse neonatal outcomes associated with antenatal depression and/or anxiety. Finally, this chapter discusses how the presence of depression and anxiety during pregnancy can impact the offspring through childhood, adolescence, and into adulthood.

2.1 Definition of Antenatal Depression and Anxiety

Antenatal depression is the presence of a major depressive disorder (MDD) during pregnancy.¹¹ According to the Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition (DSM-IV), to be diagnosed with a MDD, a person must have at least five of the following symptoms for a period of at least two weeks:

1. Depressed mood for the majority of the day
2. Anhedonia (lack of pleasure in activities one normally took pleasure in)
3. Changes in weight
4. Sleeping very little or too much
5. Psychomotor agitation/retardation
6. Feelings of worthlessness
7. Excessive or inappropriate guilt
8. Decreased concentration
9. Indecisiveness
10. Recurrent thoughts of death or suicidal ideation

Of the five symptoms needed for a MDD diagnosis, at least one of the symptoms must be either depressed mood or anhedonia.¹²

The DSM-IV also includes a diagnosis for mild or minor depression. It is sometimes referred to as dysthymic disorder and includes some, but not all, of the

symptoms required to make a diagnosis of MDD.¹² Rather than five symptoms being required for a period of two weeks, only two symptoms are required to make a diagnosis for mild depression. Again, at least one of these symptoms must be either depressed mood or anhedonia.¹² Despite this formal definition, several articles exploring the prevalence of antenatal depression consider mild depression to be the presence of some symptoms of depression, but not enough symptoms to be diagnosed with a MDD (regardless of what specific symptoms they experience).¹³

There are several types of anxiety disorders listed in the DSM-IV. These include diagnoses such as panic disorder, agoraphobia, and anorexia.¹² The literature examining anxiety during pregnancy does not indicate a specific diagnosis, but instead describes anxiety as a general concept.¹⁴ A person suffering from anxiety is often persistently worrisome or anxious, and cannot stop these feelings. Other possible anxiety symptoms experienced in pregnancy may include irritability, fatigue, and difficulty sleeping and poor concentration.¹²

2.2 Prevalence of Antenatal Depression and Anxiety

Women are more prone to develop depression during pregnancy than at other times in their life, likely because of their altered hormonal state.¹⁵ The prevalence of major antenatal depression can vary, and ranges between 10% and 19%, depending on the population studied and the stage in pregnancy.^{15,16} For example, Lee and colleagues¹⁰ demonstrated that depression was highest in the first and third trimester, while Bowen and Muhajarine¹⁷ found that socially high-risk participants had more symptoms of depression than participants who were not socially high-risk. A study conducted in Seattle, Washington, that recruited a community sample of 1,997 participants, found that

Black participants and Latina participants were significantly more likely to have antenatal depression compared to Caucasian participants.¹⁸ After controlling for risk factors for depression such as age, marital status, education, and smoking status, Black participants were still 2.93 times more likely to suffer from antenatal depression than Caucasian participants.¹⁸

Many women also suffer from mild depression during pregnancy and there is a wide range of prevalences reported in the literature. For example, Melville and colleagues¹⁹ found that 4.8% of participants had probable mild depression in a sample of 1,888 participants. Other research has demonstrated substantially higher rates. For example, in a longitudinal study, Andersson and colleagues found that in a sample of 1,555 participants, 14.5% had mild depression. Bowen and Muhajarine²⁰ demonstrated that 45% of participants considered high risk scored in the range for mild depression on the Edinburgh Postnatal Depression Scale (EPDS). Finally, a review by Bennett et al.¹⁵ estimated that up to 51% of women may experience some symptoms of depression during pregnancy, but will not meet the criteria for a major depressive disorder.

The prevalence of anxiety during pregnancy also varies.²¹ A study by Teixeira et al.²² found that the prevalence of anxiety fluctuated according to trimester. A total of 270 participants were recruited to complete the State Anxiety Inventory (STAI-S) by Spielberger²³ in their first, second, and third trimesters of pregnancy. The STAI-S is used to measure the anxiety a person experiences in a particular state or situation (i.e., pregnancy). They found 15.0% of the participants had anxiety in their first trimester and 12.3% of the participants had anxiety in their second trimester. The prevalence of anxiety peaked in the third trimester, with 18.2% of participants experiencing anxiety at that time.

Research also shows that the prevalence of anxiety can be substantially higher during pregnancy compared to depression. Faisal-Cury and Menezes conducted a study with a population from a private clinic.²⁴ To measure anxiety, they used the State and Trait Anxiety Inventory (STAI), developed by Spielberger, which identifies people who are in a “state” of anxiety, as well as those who possess the “traits” of anxiety. As mentioned before, the state portion of the inventory speaks to a particular experience a person may feel anxiety about, while the trait questions explore characteristics intrinsic to the individual that may provoke anxiety.²³ Of the 432 participants recruited to participate in the study, 59.5% scored in the range for state anxiety, while 45.3% possessed a trait of anxiety. Participants were in either their second or third trimester of pregnancy; their exact gestations were not specified.

2.3 Risk Factors for Antenatal Depression and Anxiety

Several risk factors are associated with the development of antenatal depression and anxiety. Women with marital issues are three times more likely than women who are not experiencing marital issues to have antenatal depression.¹⁶ In addition, women who are unmarried are at a significantly higher risk of developing antenatal depression. In a cross-sectional study (n= 432), unmarried participants were 2.26 times more likely to have antenatal depression compared to their married counterparts.²⁴ Similarly, support from family and friends significantly reduces the likelihood of developing antenatal depression depression.²⁵

There are other risk factors associated with antenatal depression and anxiety. Leigh and Milgrom²⁶ recruited 367 participants to complete several questionnaires in their second and third trimesters to determine the factors associated with antenatal

depression. They found that those who had experienced major negative life events, had low self-esteem, had a history of abuse, or had negative thought processes were significantly more likely to have antenatal depression.

Research demonstrates that a history of depression and unplanned pregnancy can significantly increase a woman's likelihood of developing antenatal depression. Bunevicius et al.²⁷ conducted a longitudinal study with 230 participants, screening them for depression at three time points (at 12-16 weeks, 22-26 weeks, and 32-36 weeks gestation). At all three time points, a history of depression and an unwanted or unplanned pregnancy significantly predicted the likelihood of antenatal depression. At 12-16 weeks, participants with an unplanned/unwanted pregnancy were 7.78 times more likely to experience depression and participants with a history of depression were 11.78 times more likely to have depression. Those with an unplanned/unwanted pregnancy at 22-26 weeks were 16.83 times more likely to have depression, and those who had a history of depression were 10.10 times more likely to experience depression. Finally, at 32-36 weeks, unplanned pregnancy (OR = 10) and history of depression (OR = 6.67) predicted depression.

Lee et al.¹⁰ found that younger, primiparous women (i.e., pregnant with their first child) with a history of smoking were 2.33 times more likely to have antenatal anxiety. Women who have a history of alcohol use and who have a lower level of completed education experience significantly more antenatal depression and/or anxiety.^{10,24} Related to education, women with lower sociodemographic factors often have higher rates of antenatal depression. Bowen et al.²⁸ conducted a study of major depression in 256 pregnant, socially high-risk Canadian participants, compared to 134 pregnant participants

who were not socially high-risk. The socially high-risk participants had a prevalence of major depression of 32.2% and a significantly higher mean depression score compared to participants who were not high-risk. In addition, in North America, women of Caucasian ethnicity are significantly less likely to have depression or anxiety during pregnancy compared with women of other ethnicities.^{18,24} Finally, Lee et al.¹⁰ found that antenatal depression is the single greatest risk factor for developing postpartum depression.

2.4 Antenatal Depression and Anxiety and Pregnancy Complications

Antenatal depression and anxiety are related to several pregnancy complications that range from relatively mild to more severe. Andersson et al. conducted a large, prospective study with 1,495 participants; those with antenatal depression and/or anxiety were twice as likely to have nausea, vomiting, and take sick time off work during their pregnancy. They were 1.5 times more likely to visit their obstetrician compared to participants without depression or anxiety, and 2.4 times more likely to visit their doctor due to excessive fear of childbirth.²¹ Women with antenatal depression or anxiety also report an increase in somatic symptoms such as headaches, dizziness, difficulty breathing, and stomach pain.²⁹

Kozhimannil et al.³⁰ completed a retrospective cohort study with 11,024 participants using the Medicaid database (American medical insurance company). They found that participants with gestational diabetes (i.e., diabetes in pregnancy) were nearly twice as likely to also have antenatal depression. As well, a study exploring treatment options for participants with gestational diabetes found that close to half of the participants also screened positively for depression,³¹ and Bansil et al.³² also demonstrated that participants with depression at delivery were significantly more likely

to also have gestational diabetes. Currently, it is unclear whether antenatal depression plays a role in the development of gestational diabetes or if the experience of having gestational diabetes makes someone more susceptible to becoming depressed.³⁰

Women with depression and anxiety are also at an increased risk for gestational hypertension and preeclampsia.⁹ Gestational hypertension is high blood pressure (BP) that occurs during pregnancy. It is defined as a “systolic BP of at least 140 mm Hg and/or a diastolic BP of at least 90 mm Hg, on at least two occasions, at least 6 hours apart after the 20th week of gestation in women known to be normotensive before pregnancy and before 20 weeks’ gestation” (p.181).³³ It ranges from mild to very severe, with very severe being considered a BP of 160 mm Hg or greater, for a period of six hours or longer.³³ Along with other factors, gestational hypertension can be a serious warning sign for the development of preeclampsia.³³

Preeclampsia is the presence of both gestational hypertension and protein in the urine.³³ It can be deleterious for both the mother and the unborn baby, as it increases the risk for fetal death, abruption of the placenta, preterm labour, and birth of a baby considered small for gestational age (SGA).³³ Qui et al.³⁴ completed a case control study with 676 participants and found that the rate of preeclampsia increased with both moderate and severe depression by likelihoods of 2.3 and 3.2 respectively. Antenatal depression and anxiety pose a threat to the development of preeclampsia, while the expected stresses of everyday life do not.⁹

Women suffering from depression and anxiety during pregnancy may be more likely to experience bleeding or placental abruption. A case-control study by Preti and Colleagues,³⁵ with 41 pairs of participants, found that cases (those diagnosed with either

depression or anxiety) were significantly more likely to experience bleeding during pregnancy compared to controls. Additionally, a cohort study with 634 participants, which explored whether depression or anxiety impacts preterm labour, found a near significant association between anxiety and vaginal bleeding. Using the STAI²³ as a measure of anxiety, they found that those with state anxiety were 3.6 times more likely to experience vaginal bleeding.³⁶ While some bleeding may be considered relatively mild, it could also indicate the possibility of placental abruption, which can lead to an antenatal or postpartum hemorrhage.³⁷ Depending on the severity, the placental abruption or antenatal/postpartum hemorrhage may have negative consequences for the mother and the baby such as: excessive blood loss, fetal distress, and possible maternal or neonatal death.³⁸

In addition to these pregnancy complications, women who are depressed or anxious are less apt to take care of themselves and less likely to access prenatal care.⁹ Lack of compliance with prenatal care can put the unborn baby at an increased risk for complications. For example, if a woman neglects to take folic acid during pregnancy, the baby is at an increased risk for a neural tube defect.³⁹ Research also demonstrates that depressed or anxious women engage in more risky behaviours during pregnancy. For example, Webb and colleagues⁴⁰ conducted a study on smoking during pregnancy. They found a significant relationship between depression and incidence of smoking, where depressed participants took up smoking for the first time during pregnancy. Women with depression and anxiety are also more likely to engage in alcohol and recreational drug use during pregnancy.⁴¹

2.5 Antenatal Depression and Anxiety and Labour, Delivery, and Neonatal

Outcomes and Complications

The literature links antenatal depression and anxiety to complications during labour and delivery, as well as in the neonate. It is hypothesized that women suffering from anxiety and depression feel pain more acutely, and thus request more pain medications and often report their deliveries to be more painful than women without mood problems.⁹ Research shows antenatal depression and anxiety are associated with an increased use of epidurals or pain medication during labour.^{21,42} In a longitudinal study examining 959 women throughout pregnancy and into the postpartum, Chung et al.⁴³ found that participants with depression, specifically in the third trimester, were 2.5 times more likely to request an epidural.

Anxiety and depression are significantly related to preterm labour and preterm birth.^{9,44-47} Preterm labour and birth may be due to a decreased blood flow to the uterus.⁴² This decreased blood flow could be caused by a dysregulation with the Hypothalamic Pituitary Adrenal (HPA) axis.⁹ Depression and anxiety have been found to cause the HPA axis to become overactive, releasing an excessive amount of cortisol and subsequently disrupting the uterine environment.⁹ This disruption is likely closely tied with preterm labour and birth.⁴⁸

Anxiety and depression during pregnancy are associated with an increased rate of surgical deliveries, including caesarean birth.^{21,32} In the same study described above, Chung et al.,⁴³ found that depression occurring in late pregnancy (i.e., greater than 32 weeks gestation) was associated with a 2.28 increase in likelihood of caesarean births or instrument use in delivery (i.e., vacuum or forceps.)⁴³ This was also corroborated by

Andersson and colleagues,²¹ who conducted a study with 1,495 participants and found that those experiencing depression or anxiety during pregnancy were 1.76 times more likely to opt for an elective caesarean birth than those who did not have depression or anxiety.

Adverse neonatal outcomes have also been associated with depression and anxiety during pregnancy.⁴⁶ Antenatal depression and anxiety may affect the responsiveness and activity of the fetus.⁴⁹ For example, a review by Gold and Marcus⁴⁹ discussed how the fetus of a depressed woman exhibits a different heart rate pattern and has a decreased reactivity to stimulation compared to the fetus of a non-depressed woman. These findings may be related to an increase in cortisol released from the HPA axis or possibly because fetal movements are influenced by the heart rate of the mother.⁵⁰ Antenatal depression is associated with restricted fetal growth, likely related to the finding that women with depression and anxiety during pregnancy have a decreased amount of blood flow through the uterine artery.⁹

Maternal depression and anxiety are also related to low birthweight,⁵¹ which is defined as babies born with a weight of less than 2,500 grams. This association has been demonstrated by several other researchers,^{41,52-54} including a meta-analysis by Grote et al.,⁵¹ who found that babies of mothers who were depressed were 4.75 times more likely to have low birthweight.⁵⁵ This association with low birthweight may also be a result of a dysregulation of the HPA axis, as Diego et al.⁵⁶ demonstrated that an increase in maternal cortisol was associated with a higher risk for lower fetal weight.

Similar to low birthweight, a systematic review by Bonari et al. found three studies which demonstrated that depression and anxiety are associated with babies

considered small for gestational age (SGA).⁹ One of these studies found that participants who were depressed had babies weighing approximately 200 grams less than babies from participants who were not depressed.⁵⁷ SGA is similar to low birth weight, but it also takes into consideration the gestation of the baby at birth. Babies born below the 10th percentile for their week's gestation are considered to be SGA. Additionally, a review study by Henry et al.⁵⁸ found that babies exposed to antenatal depression were significantly more likely to be born with a smaller head circumference.

Lastly, women with anxiety and depression are more likely to have babies with lower Apgar scores.⁹ Apgar scores range between 0 and 10, and are based on the baby's vital performance (heart rate, respiratory rate, stimulus response, muscle tone, and colour) at one and five minutes after birth.⁵⁹ Each of these five areas is given a score between 0 and 2. They are used to predict the baby's probability of surviving outside of the womb and whether the baby is in need of medical assistance.⁶⁰ Overall, the Apgar score done at five minutes is the most indicative of probable medical issues with the newborn and an Apgar score of 7 or higher is considered to be a good score.^{59,61} A population-based study by Berle et al.⁶² with 680 participants found that babies of mothers experiencing anxiety during pregnancy were 2.27 times more likely to have an Apgar score of less than 8 at 1 minute and 4.49 times more likely to have an Apgar score of less than 8 at 5 minutes. Due to many of these complications, babies who are exposed to depression and/or anxiety in utero are significantly more likely to be admitted to the neonatal intensive care unit (NICU).⁸

2.6 Impact of Depression and Anxiety on Child Development

Depression and anxiety during pregnancy can have far-reaching effects on the children's social and mental health, including an increased risk for attention deficit hyperactivity disorder (ADHD), anxiety, depression, autism, and even schizophrenia later in life.^{41,63,64} Studies show that there are also cognitive and motor delays present in the child when the mother has suffered from antenatal depression or anxiety.⁶⁴

Van den Bergh et al.⁶⁵ completed a longitudinal study of 76 participants who were tested for the presence of anxiety during pregnancy using the STAI. The participants completed questionnaires at six time points throughout pregnancy and the early postpartum. The study showed that a greater amount of emotional tension and anxiety, particularly during 12 through 22 weeks gestation, were significantly correlated with the development of ADHD in children aged eight and nine years.⁶⁵

Prenatal stress is highly related to depression and anxiety; therefore, the effects are similar.⁶⁶ In a study involving 58 participants who were exposed to the Quebec Ice Storm of 1998 (a proxy for a “traumatic, stressful event”) during their pregnancy, children born to these mothers were tested on their intellectual abilities through the use of the Mental Scale of the Bayley Scales of Infant Development (MDI).⁶⁷ Their language acquisition was examined with the MacArthur Communicative Development Inventory (MCDI), to test words that a child “understands” and “speaks.”⁶⁸ The mothers were asked about the degree of stress they experienced shortly after the ice storm using the Impact of Event Scale- Revised (IES-R), which measures the amount of trauma experienced during and after a natural disaster.⁶⁹ Mothers who experienced a greater degree of prenatal stress

had children with significantly lower MDI intellectual scores and MCDI language acquisition scores, compared with children exposed to less prenatal stress.⁶⁶

In summary, the research indicates that exposure to depression and anxiety during pregnancy can be detrimental to the health of the mother and the fetus; however, this is not yet clearly established.⁶⁴ The impact of antenatal depression and anxiety on the mother and baby is not completely understood. It is unknown whether the observed outcomes may differ if the depression or anxiety is continuous throughout pregnancy, compared with depression or anxiety that is episodic. Furthermore, it is unclear how depression and anxiety cause these complications. For example, it is not yet clear whether depression and anxiety play a role in the etiology of complications or if the presence of complications induces a state of depression or anxiety in women. This thesis looks to explore how major and mild antenatal depression, as well as anxiety during pregnancy, can impact the mother and the newborn and if the outcomes differ when the depression and anxiety is episodic compared to continuous.

CHAPTER THREE: METHODOLOGY

This chapter begins by describing the data source for this thesis, then explains the study design, illustrates the outcome variables and predictor variables, and finishes by detailing the how the data will be analyzed.

3.1 Data Source

The data for this thesis was collected for the Feelings in Pregnancy and Motherhood Study (FIP). This study was funded by the Canadian Institutes of Health Research (CIHR), under the strategic research priority: Analyzing and Reducing Health Disparities (Grant #145179). Between the years of 2006-2008, this study recruited pregnant women from Saskatoon and the surrounding area to participate in a longitudinal, population-based study throughout pregnancy and into the postpartum.

The participants were asked to complete three similar questionnaires: Time One in the second trimester; Time Two in the third trimester; and Time Three in the early postpartum. Although the majority of women completed the questionnaires at this time, there was a small percentage of women who completed their the questionnaire at Time One in their first trimester (6.7%) and some who completed their questionnaire at Time Two in their second trimester (1.8%). The questionnaires contained several of the same measurement scales; however, the first and third questionnaires included additional variables regarding health history and pregnancy outcomes. Each questionnaire is explained in detail.

3.2 Study Design and Variables

3.2.1 Outcome Variables

3.2.1.1 Obstetrical/Biological Variables

Participants responded to obstetrical and biological questions in both the second trimester and in the early postpartum. At Time One, participants were asked about their obstetrical history, including their number of previous pregnancies, any complications with previous pregnancies, and whether those pregnancies had resulted in children with anomalies. The questionnaire also included items about their general health history and whether or not they had previously experienced a variety of issues such as: diabetes, anemia, thyroid problems, and headaches. Additionally, health issues in the current pregnancy such as: nausea and vomiting, hypertension, bleeding, swelling/edema, and gestational diabetes were reported. Finally, participants were asked if the pregnancy was planned, their feelings about the pregnancy, and whether they intended to attend prenatal classes, and whether or not they intended to breastfeed their baby.

The variables unique to Time Three were those regarding the outcomes and complications of the participants' pregnancy. The pregnancy complications reported included: urinary tract infection, vaginal infection, antenatal bleeding/abruption, gestational diabetes, gestational hypertension, headaches, and swelling or edema. Labour and delivery outcomes were also recorded to determine their potential association with antenatal depression or anxiety. These outcomes included whether the labour was spontaneous or induced, and the type of delivery the participant experienced, such as spontaneous vaginal, use of vacuum or forceps, and caesarean birth. The type of anesthetic (if any) used in labour, such as epidural or spinal, was also recorded. Lastly, questions regarding specific complications that the mother may have experienced in labour included: preterm labour, premature rupture of membranes, and postpartum hemorrhage.

The pregnancy complications and outcomes were also reported at Time Three. These included the baby's gestation in weeks, birthweight in grams, length in centimeters, and the baby's Apgar scores at one and five minutes after birth. They are used to predict probability of the baby surviving outside of the womb and whether medical assistance is required.⁶⁰

Neonatal complications and outcomes were reported to determine whether there was a potential relationship with antenatal depression or anxiety. The neonatal complications recorded included meconium staining, infection in the baby, and jaundice. Meconium staining of the amniotic fluid puts the baby at an increased risk for meconium aspiration syndrome.⁷⁰ Jaundice is characterized by a yellowish tone to the skin that usually resolves within 2 weeks after delivery.⁷¹ Possible anomalies reported included neural tube defect, cleft lip/palate, and heart defect. Lastly, the questionnaire also inquired if the baby was admitted to the NICU and the amount of time the baby spent in the NICU.

In addition, the labour and delivery ward was accessed to find any missing Apgar scores that the participants could not remember. No other portion of the medical records was accessed to determine whether reported complications were accurately reported or if complications or outcomes were not reported.

3.2.2 Independent Variables

3.2.2.1 Primary Independent Variable: Edinburgh Postnatal

Depression Scale

The Edinburgh Postnatal Depression Scale (EPDS) was used at all three Time points to measure depression and anxiety and to determine the primary predictors of

interest (major depression, mild depression, and anxiety). The EPDS has been translated into multiple languages and is validated for use in several populations, both antenatal and postnatal.⁷² Ross et al.⁷³ conducted a study with 150 postpartum Canadian participants and found that there were three major factors present within the EPDS: depression, anxiety, and suicide. Bowen et al.⁷⁴ also found these major factors in a factor analysis, which used the same dataset that is used for this current thesis.

The EPDS can be separated into depression, anxiety, and suicide factors. There are four items related to the depression factor:

- “I have been able to laugh and see the funny side of things” (Item one),
- “I have looked forward with enjoyment to things” (Item two),
- “I have felt sad and miserable” (Item eight), and
- “I have been so unhappy that I have been crying” (Item nine).

There are three items related to the anxiety factor:

- “I have blamed myself unnecessarily when things went wrong” (Item three),
- “I have been anxious or worried for no good reason” (Item four), and
- “I have felt scared or panicky for no very good reason” (Item five).

The last factor, suicide, has one related item:

- “The thought of harming myself has occurred to me” (Item ten)

Each item on the EPDS has four possible answers, which are scored between 0-3.

The total possible score for all ten items can range between 0-30. The scale has a 87% sensitivity and 78% specificity.⁷⁵ For this thesis, a cut-off score of ≥ 12 on the EPDS scale was used to indicate probable major depression.⁷⁵ Several researchers have

validated the cut-off scores of 12 or 13 to detect probable major depression.^{75,76} The decision was made to use a score of ≥ 12 , based on the cut-off score clinically recommended by Cox and colleagues.⁷⁵

The cut-off score on the EPDS to indicate mild depression in the FIP study was 10.^{72,77} I was unable to find any studies validating a cut-off score for mild depression during pregnancy with the EPDS; however, there are validation studies for detecting mild depression with the EPDS in the postpartum period.⁷⁸ Murray and Carothers⁷⁹ conducted a study to validate the EPDS in a community sample of participants. This community sample had a similar age range and a comparable rate of married women to the FIP study.

In the Murray and Carothers⁷⁹ study, participants who were six weeks postpartum were sent the EPDS to complete and 646 returned a completed scale. The study used the Standardised Psychiatric Interview (SPI) as the gold standard compared to the EPDS. They found that a cut-off score of 9.5 for mild depression had a sensitivity of 81.6% and a cut-off score of 10.5 for mild depression had a sensitivity of 73.2%;⁸⁰ therefore, a cut-off score of 10 to detect mild depression was deemed appropriate for this thesis. Since the cut-off score for major depression was ≥ 12 , only those who scored 10 or 11 were considered to have probable mild depression.

For the purposes of this thesis, the cut-off score used on the anxiety subscale of the EPDS was ≥ 4 .⁸¹ This cut-off score has been validated to predict probable anxiety in perinatal women. A study by Swalm et al.⁸¹ included a factor analysis of the EPDS using data collected from 3,853 participants for the *beyondblue* National Depression Initiative in Australia. They confirmed that the anxiety subscale was comprised of Items 3, 4, and 5

and also validated the cut-off score of ≥ 4 .⁸¹ The entire scale can be found in Appendix A, which contains all three questionnaires used in the FIP study.

3.2.2.2 Sociodemographic Variables

All questions regarding socio-demographic factors were included in the questionnaire at Time One. Participants were asked to disclose their marital status, as single, common-law, married, divorced/separated, or widowed. They were also asked whether they were currently in a relationship with the father of the baby and how satisfied they were with the relationship. Participants reported the grade of school they finished, or the level of post-secondary education they had completed. They identified their ethnic background as Caucasian, Treaty-Status, Non-Status, Métis, or Other. Questions regarding their current housing and employment status were asked, as well as if they had any financial concerns and what their level of household income was. Finally, the age of the participants was recorded in the first questionnaire.

3.2.2.3 Psychosocial Variables

On the first questionnaire only, participants responded to questions about history of mental illness, including depression, antenatal depression, and postpartum depression. On all three questionnaires, participants identified from whom they received emotional support, if any (their partner, mother, friends, female relatives, and other). Also at all three time points the participants were asked if they were still currently in a relationship, and how satisfied they were with that relationship. A list of stressors that participants may have coped with at Time One, Two, or Three was also recorded. These included the

items: being pregnant, the relationship with their partner, money issues, other children, family, where they live, the health of the unborn baby, the birth of the baby, their own health, work, school, or other issues.

The participants reported any medications they were taking at and between each Time point. They listed what the medications were for, how many weeks pregnant they were when they began taking them, and the frequency with which they took them. Lastly, the participants were asked on all three questionnaires, if they were currently receiving counselling and if so, whether it was for depression, their relationship, an addiction, an eating disorder, abuse, or other problems.

3.2.2.4 Behavioural Variables

On all three questionnaires, participants reported how often they engaged in physical activity for a period of more than 20 minutes each week. Other behavioural variables included possible risk behaviours. On each questionnaire participants were asked if they engaged in smoking during pregnancy, and if they did, what was the frequency with which they had smoked (e.g., more than a pack a day). Next, participants reported whether or not they had drunk alcohol during their pregnancy. If yes, participants recorded how often they used alcohol during pregnancy and the frequency with which they had drunk more than five drinks at a time. Lastly, drug use was asked at all three time points and if yes, how often they used drugs each week.

Full versions of all three questionnaires are included in Appendix A.

3.3 Data Analysis

The analysis began with the calculation of basic descriptive statistics and frequencies of sociodemographic, lifestyle, and other pertinent variables that were needed

to gain a preliminary understanding of the study population. These variables included age, marital status, education, ethnicity, income, history of mental illness, treatment for mood disorders, and engagement in physical activity. Risk factors such as smoking, alcohol, and drug use were also analyzed.

Once the basic descriptive statistics and frequencies were calculated, the variables were recoded for multivariate analysis. Age was initially a continuous variable, but based on the descriptive results, it was transformed into a dichotomous variable where 1 = 15-28 years and 2 = 29-44 years. Marital status was transformed to be a dichotomous variable where 0 = married/common-law and 1 = single. The categories of the education variable were collapsed where 1 = completed post-secondary education, 2 = completed some post-secondary education, and 3 = less than Grade 12. Ethnicity was transformed so the categories were 1 = Caucasian, 2 = Aboriginal, and 3 = Other.

The income variable was collapsed so that 1 = >\$60,000, 2 = \$20,000-\$59,000, 3 = <\$20,000 or receiving social assistance. The history of mental illness was always a dichotomous variable, so it remained 0 = no and 1 = yes. The treatment variable was transformed to simply convey whether or not the participants were receiving any treatment for mood disorders, pharmaceutical or therapy (counselling, psychotherapy etc.), where 0 = no and 1 = yes. Exercise categories were collapsed so that 1 = everyday, 2 = two or three times a week, and 3 = occasionally or never. For smoking, the original question had several categorical answers; however, the multiple categories made the frequency in each category small, so the categories were collapsed into Yes and No (i.e., Never/Quit). Similarly for drinking, there were originally multiple categories; however, this yielded very small numbers in some categories, so they were collapsed into Yes and

No (i.e., Never/Quit). Finally, the same process was undertaken for drug use, the multiple categories were collapsed into Yes and No (i.e. Never/Quit). After the variables were transformed, analyses were completed to answer the four study questions.

3.3.1 Study Question 1: What is the prevalence of pregnancy complications and neonatal outcomes within this study population?

To answer this question, descriptive statistics and frequencies were run on the pregnancy complication, labour and delivery complication, and neonatal complication variables. As well, descriptive statistics and frequencies were completed on the labour and delivery outcomes, which included the type of anesthetic, spontaneous or induced labour, and the type of delivery. This was also done with the neonatal outcome variables, which included week's gestation at birth, birthweight, Apgar scores, and admittance to the NICU. The prevalence of pregnancy complications and neonatal outcomes will be primarily presented as percentages. The mean and standard deviation will be presented for the week's gestation at birth, birthweight, and Apgar scores.

3.3.2 Study Question 2: Does the association between complications and major depression differ when the depression occurs episodically, compared to when it occurs continuously throughout pregnancy?

3.3.2.1 Dependent Variables

To analyze the association between major depression and complications, the dependent variables of interest for this question consisted of the complications during pregnancy, labour and delivery complications and outcomes, and lastly, the neonatal complications and outcomes. The dependent variables for complications during pregnancy included: gestational diabetes, gestational hypertension, antenatal bleeding/abruption,

swelling/edema, and urinary tract infection. The dependent variables for labour and delivery complications included: preterm labour, postpartum hemorrhage, premature rupture of membranes, and infection. The labour and delivery outcome variables included: spontaneous or induced labour, type of delivery (i.e., spontaneous vaginal, caesarean birth, forceps, or vacuum use), and the type of anesthetic used, if any. Lastly, the dependent variables for neonatal complications and outcomes included: gestation at birth, birth weight, Apgar scores, and complications such as meconium, jaundice, and admittance to the NICU.

3.3.2.2 Independent Variables:

The key independent variable of interest when examining possible associated complications and outcomes was the EPDS. The EPDS was used to measure depression and anxiety. Using the cut-off for major depression (a score of ≥ 12), a categorical variable was created. The categories were as follows: 1 = No depression, 2 = Depression in the second trimester, 3 = Depression in the third trimester, and 4 = Depression in both trimesters. The secondary independent variable of interest was the omnibus stressors variable. This was a summed, continuous variable transformed from the stressor items found on each questionnaire. Other covariates included age, marital status, income, education, ethnicity, emotional support, physical activity, risk behaviours, treatment for mood disorders, and history of mental illness.

3.3.2.3 Analysis

In order to answer the second research question, multivariable logistic regression was used. The complications and outcomes were initially tested individually; however, because of the multiple complications measured, those related were combined. The

complications grouped together were as follows: abruption and bleeding were combined into one variable; swelling and edema were combined into one variable. Abruption and bleeding were combined because the symptoms and causes of these complications are similar. Swelling and edema were combined because they are essentially the same condition involving extra fluid in one area of the body.

To explore the effect of major depression at the three time points (second trimester only, third trimester only, and both trimesters) on the outcomes, the EPDS was entered into the model on its own as a categorical variable. If one of these categories reached significance at the $p \leq 0.25$ level, a cut-off often used when beginning model-building,⁸² the secondary predictors were explored.

Each secondary predictor was placed into the model individually, in order to determine its relationship with the outcome variable. After all of the variables were fitted individually to the logistic regression model, those reaching the initial cut-off significance of $p \leq 0.25$ were all placed in the multiple logistic regression model. This is done to determine how the associations with the dependent variable may change in the presence of other covariates. The associations between one independent variable/covariate and outcome may change because another variable included in the model may be associated with the outcome as well as with the independent /covariate. After this, variables were subsequently dropped until only those that reached significance at the $p \leq 0.05$ level were left in the final model.⁸² Once a model with only significant predictors was established, the variables were tested for possible interactions.

3.3.3 Study Question 3: Does the association between complications and mild depression differ when the mild depression is episodic compared to when it is continuous throughout pregnancy?

3.3.3.1 Dependent Variables

To analyze the association between mild depression and complications, the dependent variables of interest for this question consisted of the complications during pregnancy, labour and delivery complications and outcomes, and lastly, the neonatal complications and outcomes. The dependent variables for complications during pregnancy included: gestational diabetes, gestational hypertension, antenatal bleeding/abruption, swelling/edema, and urinary tract infection. The dependent variables for labour and delivery complications included: preterm labour, postpartum hemorrhage, premature rupture of membranes, and infection. The labour and delivery outcome variables included: spontaneous or induced labour, type of delivery (i.e., vaginal, caesarean birth, forceps, or vacuum), and the type of anesthetic used, if any. Lastly, the dependent variables for neonatal complications and outcomes included: gestation at birth, birth weight, Apgar scores, and complications such as meconium, jaundice, and admittance to the NICU.

3.3.3.2 Independent Variables:

The key independent variable of interest when examining possible associated complications and outcomes was the EPDS. The EPDS was used to measure for depression and anxiety. Using the cut-off for mild depression (10 or 11), a categorical variable was created. The categories were as follows: 1 = No mild depression, 2 = Mild depression in the second trimester, 3 = Mild depression in the third trimester, and 4 = Mild depression in both trimesters. The secondary independent variable of interest was

the omnibus stressors variable. This was a summed, continuous variable transformed from the stressor items found on each questionnaire. Other covariates important to consider included age, marital status, income, education, ethnicity, emotional support, physical activity, risk behaviours, treatment for mood disorders, and history of mental illness.

3.3.3.3 Analysis

In order to answer the third question, logistic regression was used. The complications and outcomes were initially tested individually, however, because of the multiple complications measured, those related were combined. As described above, the complications grouped together were as follows: abruption and bleeding were combined into one variable; swelling and edema were combined into one variable.

To explore mild depression at the three time points (second trimester only, third trimester only, and both trimesters), the EPDS was entered into the model on its own as a categorical variable. If one of these categories reached significance at the $p \leq 0.25$ level, a cut-off often used when beginning model-building,⁸² the secondary predictors were explored. Each secondary predictor was placed into the model individually in order to determine its relationship with the outcome variable. Based on standard model building techniques described above, variables significant at $p \leq 0.25$ were included in the multivariate model building. Only those that reached significance at the $p \leq 0.05$ level were left in the final model.⁸² Once a model with only significant predictors was established, the variables were tested for possible interactions.

3.3.4 Study Question 4: Does the association between complications outcomes and anxiety differ when the anxiety occurs episodically, compared to when it occurs continuously throughout pregnancy?

3.3.4.1 Dependent Variables

To analyze the association between anxiety and complications, the dependent variables of interest for this question consisted of the complications during pregnancy, labour and delivery complications and outcomes, and lastly, the neonatal complications and outcomes. The dependent variables for complications during pregnancy included: gestational diabetes, gestational hypertension, antenatal bleeding/abruption, swelling/edema, and urinary tract infection. The dependent variables for labour and delivery complications included: preterm labour, postpartum hemorrhage, premature rupture of membranes, and infection. The labour and delivery outcome variables included: spontaneous or induced labour, type of delivery (i.e. vaginal, caesarean birth, forceps, or vacuum), and the type of anesthetic used, if any. Lastly, the dependent variables for neonatal complications and outcomes included: gestation at birth, birth weight, Apgar scores, and complications such as meconium, jaundice, and admittance to the NICU.

3.3.4.2 Independent Variables

The key independent variable of interest when examining possible associated complications and outcomes was the EPDS. The EPDS was used to measure for depression and anxiety. Using the cut-off for anxiety (≥ 4), a categorical variable was created. The categories were as follows: 1 = No anxiety, 2 = Anxiety in the second trimester, 3 = Anxiety in the third trimester, and 4 = Anxiety in both trimesters. The secondary independent variable of interest was the omnibus stressors variable. This was a

summed, continuous variable transformed from the stressor items found on each questionnaire. Other covariates important to consider included age, marital status, income, education, ethnicity, emotional support, physical activity, risk behaviours, treatment for mood disorders, and history of mental illness.

3.3.4.3 Analysis

In order to answer the fourth question, logistic regression was used. The complications and outcomes were initially tested individually, however, because of the multiple complications measured, those related were combined. As described above, the complications grouped together were as follows: abruption and bleeding were combined into one variable; swelling and edema were combined into one variable.

To explore anxiety at the three time points (second trimester only, third trimester only, and both trimesters), the EPDS was entered into the model on its own as a categorical variable. If one of these categories reached significance at the $p \leq 0.25$ level, a cut-off often used when beginning model-building,⁸² the secondary predictors were explored. Each secondary predictor was placed into the model individually in order to determine its relationship with the outcome variable. Based on standard model building techniques described above, variables significant at $p \leq 0.25$ were included in the multivariate model building. Only those that reached significance at the $p \leq 0.05$ level were left in the final model.⁸² Once a model with only significant predictors was established, the variables were tested for possible interactions.

In summary, this thesis will answer four research questions about how major depression, mild depression, and anxiety can impact pregnancy complications and neonatal outcomes. The pregnancy complications and neonatal outcomes will be the

dependent variables, while the EPDS will serve as the primary predictor variable. Other important covariates include, age, marital status, education, exercise, and smoking status. The statistical tests that will be used to carry out the analysis will be descriptive statistics and multivariate logistic regression.

The table on the following page provides a visual depiction of the outcome and predictor variables that are included in this analysis.

Table 3.1 Summary of Variables in the Analyses

	Study Questions		
	Major Depression as Main Risk Factor in Second Trimester and Third Trimester	Mild Depression as Main Risk Factor in Second Trimester and Third Trimester	Anxiety as Main Risk Factor in Second Trimester and Third Trimester
	Other Predictor Variables		
Complications Related to Pregnancy: <ul style="list-style-type: none"> - Gestational Diabetes - Abruption/Bleeding - Hypertension - Swelling/Edema - Urinary Tract Infection 	Sociodemographic: <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status Psychosocial: <ul style="list-style-type: none"> - Summative Support - Summative Stress - History of Depression - Treatment for mood disorder Behavioural: <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use - Drug Use 	Sociodemographic: <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status Psychosocial: <ul style="list-style-type: none"> - Summative Support - Summative Stress - History of Depression - Treatment for mood disorder Behavioural: <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use - Drug Use 	Sociodemographic: <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status Psychosocial: <ul style="list-style-type: none"> - Summative Support - Summative Stress - History of Depression - Treatment for mood disorder Behavioural: <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use - Drug Use

<p>Complications Related to Labour and Delivery:</p> <ul style="list-style-type: none"> - Induction - Preterm Labour - Preterm Birth - Postpartum Hemorrhage - PROM - Caesarean Birth - Vacuum/Forceps Use - Epidural/Spinal Use 	<p>Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support - Summative Stress - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use - Drug Use 	<p>Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support - Summative Stress - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use - Drug Use 	<p>Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support - Summative Stress - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use - Drug Use
<p>Complications Related to the Neonate</p> <ul style="list-style-type: none"> - Jaundice - Meconium - Infection - Apgar Scores - SGA - LGA - Admittance to the NICU 	<p>Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support - Summative Stress - History of Depression 	<p>Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support - Summative Stress - History of Depression 	<p>Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support - Summative Stress - History of Depression

	<ul style="list-style-type: none">- Treatment for mood disorder Behavioural: <ul style="list-style-type: none">- Exercise- Smoking- Alcohol Use- Drug Use	<ul style="list-style-type: none">- Treatment for mood disorder Behavioural: <ul style="list-style-type: none">- Exercise- Smoking- Alcohol Use- Drug Use	<ul style="list-style-type: none">- Treatment for mood disorder Behavioural: <ul style="list-style-type: none">- Exercise- Smoking- Alcohol Use- Drug Use
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CHAPTER FOUR: RESULTS

4.1 Description of the Study Population

There were 649 (100%) participants who completed the questionnaire at Time One (second trimester), 604 (93.1%) participants completed at Time Two (third trimester), and 596 (91.8%) women completed at Time Three (early postpartum). Time One was completed at 17.37 (\pm 4.95) mean gestational weeks, Time Two was completed at 30.63 (\pm 2.67) mean gestational weeks, and Time Three was completed at 4.17 (\pm 2.12) mean postpartum weeks. Five hundred and eighty-one (89.5%) participants completed all three questionnaires. The age range of the participants within the study was 15-44 years and the mean age was 28.99 \pm 4.83.

4.1.1 Socio-demographic Variables

Table 4.1 below shows the frequency of socio-demographic factors within the study population. Nearly all of the participants were either married or in a common-law relationship 90.1% (585), and as depicted in the table, a large percentage of the participants were Caucasian. As well, more than half of the participants had completed post-secondary education and nearly half had a household income of \$60,000 or greater.

Table 4.1 Socio-demographic Factors of the Study Population

Covariate	%(n)
Marital Status	
Married/Common-Law:	90.1% (585)
Single/Divorced:	9.9% (64)
Ethnicity	
Caucasian:	83.8% (544)
Aboriginal:	8.6% (56)
Other:	7.6% (49)
Education	

Post-Secondary:	66.7% (433)
Some Post-Secondary:	15.6% (101)
High School Diploma:	12.6% (82)
Grade 9-11:	4.9% (32)
< Grade 8:	0.2% (1)
Income	
≥ \$60,000:	46.6% (298)
\$40,000-\$59,000:	20.9% (134)
\$20,000-\$39,000:	19.1% (122)
< \$20,000 or Social Assistance:	13.1% (84)

4.1.2 Psychosocial Variables

Participants were asked about emotional support at Time One (second trimester) and at Time Two (third trimester). In the second trimester, 98.5% (639) had at least one support, with the mean number of sources of supports being 2.69 ± 1.165 . In the third trimester, 99.0% (598) had at least one support, with the mean number of sources of supports being 2.60 ± 1.162 . Overall, the partner of the participant was more likely to be named a source of support compared to any other source (mother, friend, female relatives, and other).

4.1.3 Prevalence of Major Depression, Mild Depression, and Anxiety

Table 4.2 below shows the prevalence of mild depression, major depression, and anxiety in the study population. As can be seen, these were broken down into three categories: depression or anxiety occurring in the second trimester, or in the third trimester, and depression or anxiety occurring continuously throughout pregnancy. Anxiety at any time point occurred more frequently than mild or major depression. Major depression was highest in the first trimester and very few participants had mild depression or major depression that occurred continuously throughout pregnancy. Additionally, the mean score of those who scored within the range for major depression

in the second trimester (≥ 12) was 14.89. In the third trimester, the mean score on the EPDS of those with probable major depression was 15.18. Furthermore, of those women with probable anxiety in the second trimester (a score of ≥ 4), the mean score was 5.23. Lastly, the mean score for women with probable anxiety in the third trimester was 4.99.

Table 4.2 Prevalence of Depression and Anxiety

	2nd Trimester n = 649 %(n)	3rd Trimester n = 609 %(n)	Continuously in 2nd and 3rd Trimesters n = 632 %(n)
Mild Depression (Score of 10 or 11)	10.2% (66)	9.3% (56)	1.8% (11)
Major Depression (Score of ≥ 12)	14.0% (91)	10.3% (62)	4.8% (29)
Anxiety (Score of ≥ 4)	47.5% (308)	38.5% (232)	26.6% (168)

Nearly half, or 45.5% (295) of participants reported they had experienced a previous bout of depression, either during pregnancy or not. Treatment during pregnancy was collapsed into a dichotomous variable to convey whether participants had counselling or pharmaceutical treatment. In the second trimester, 12.0% (78) of participants had some form of treatment for mood disorders and in the third trimester 17.7% (115) received treatment.

4.1.4 Behavioural Variables

Figure 4.1 below shows the amount of exercise the participants engaged in during the second and third trimesters of their pregnancy. As can be seen by, nearly half of the women rarely or never engaged in exercise in both the second and third trimesters of their pregnancy.

Figure 4.1 Frequency of Exercise During Pregnancy

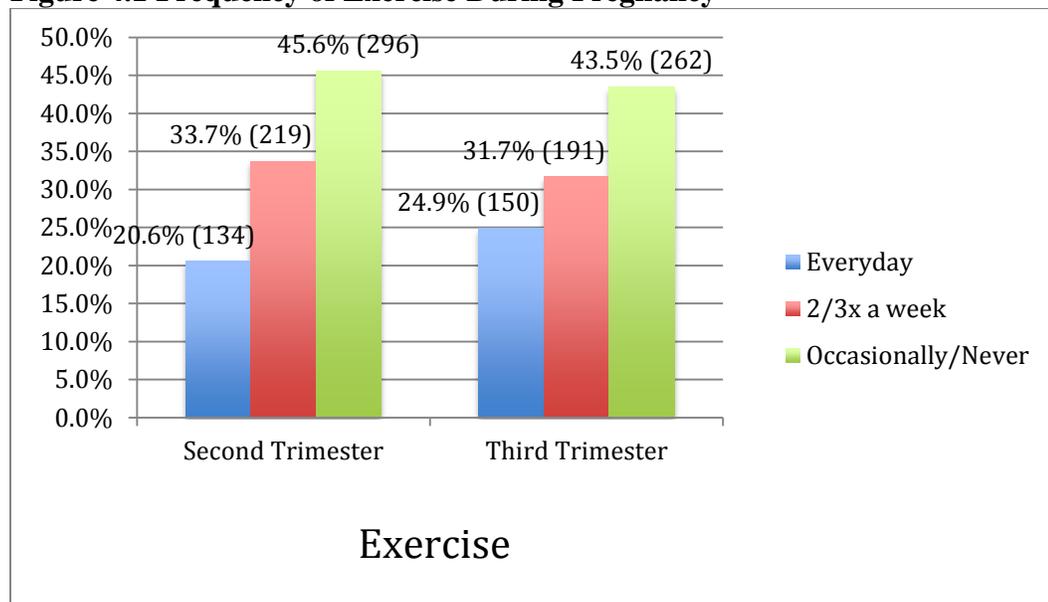
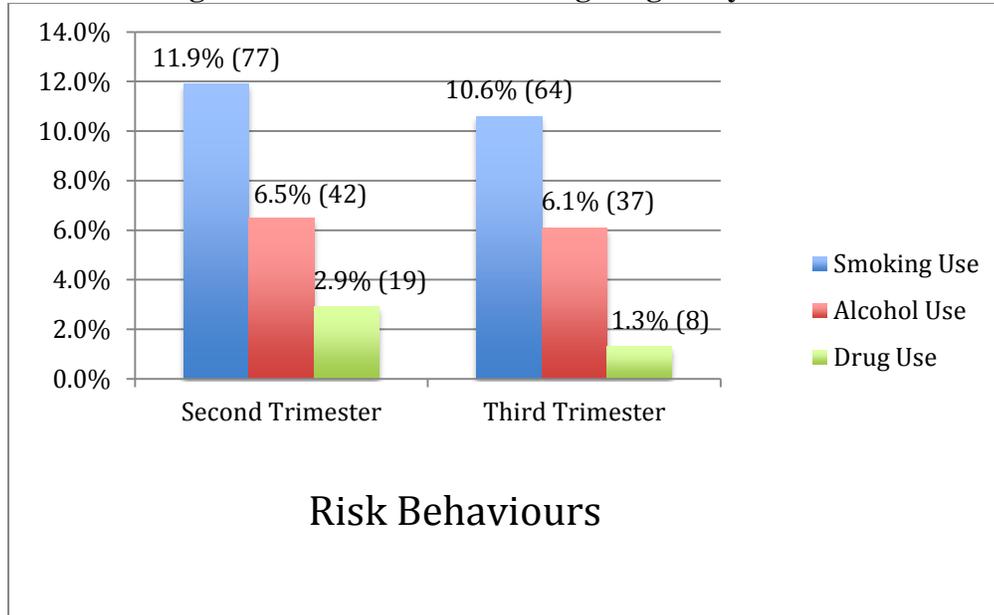


Figure 4.2 below depicts the percentage of participants that chose to engage in risk behaviours during pregnancy such as smoking, alcohol use, and drug use. As can be seen, very few participants reported being engaged in risk behaviours during pregnancy, with smoking being the behavior with the highest frequency.

Figure 4.2: Percentage of Risk Behaviours During Pregnancy



4.2 Effects of Major, Minor, Depression, and Anxiety on Pregnancy and Perinatal Outcomes

4.2.1 Study Question 1: What is the prevalence of the pregnancy complications and neonatal outcomes within this study population?

Figure 4.3 shows the frequency of pregnancy complications in the study population. Swelling/Edema was the most common complication, with gestational diabetes occurring the least frequently. Overall, the frequency of complications fell within the 10%-20% range.

Figure 4.3 Pregnancy Complications

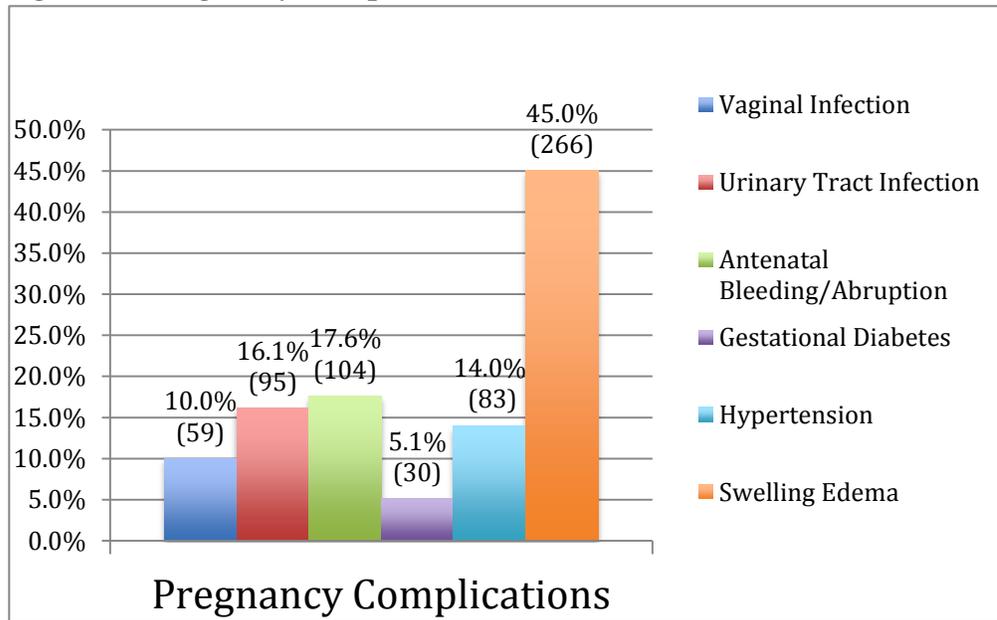


Figure 4.4 below shows the frequency of labour and delivery complications. The prevalence of labour and delivery complications was quite low. All complications occurred in less than 10% of the study population. Postpartum hemorrhage and premature rupture of membranes occurred most often with slightly more than 7 in every 100 participants experiencing these complications.

Figure 4.4 Labour and Delivery Complications

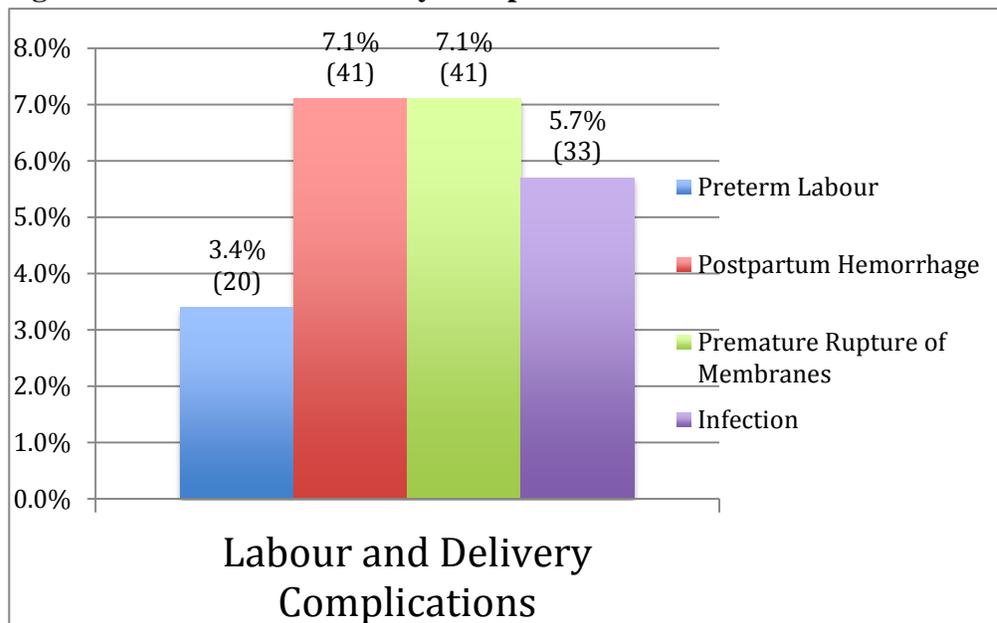


Table 4.3 below depicts the frequency of the different labour and delivery outcomes. This table shows whether labour was spontaneous or induced, whether any anesthetic was used during delivery, and the frequency of each type of delivery. The frequency of spontaneous and induced labour does not add up to 100% because some women had elective caesarean births. A very high percentage, (83.7%), of the participants had some type of anesthetic during labour and delivery, with over half using an epidural for pain relief. Also, just over half of participants had an unassisted vaginal birth, with a third of women having a caesarean birth (this number includes both elective and non-elective caesarean births).

Table 4.3 Labour and Delivery Outcomes n=581

Labour and Delivery Outcomes	%(n)
Spontaneous Labour	65.7% (145)
Induced Labour	24.9% (383)
Epidural	58.8% (341)
Spinal	20.3% (118)
Other Anesthetic	4.2% (24)
No Anesthetic	16.7% (97)
Unassisted Vaginal Birth	52.7% (304)
Caesarean Birth	33.6% (194)
Vacuum	10.6% (61)
Forceps	3.1% (18)

Figure 4.5 below depicts the frequency of neonatal complications. The frequency of neonatal complications in this group was for the most part quite low. The only complication that had a high frequency was jaundice, however the questionnaire did not record the severity of jaundice, and therefore this frequency includes both mild and severe cases of jaundice.

Figure 4.5 Neonatal Complications

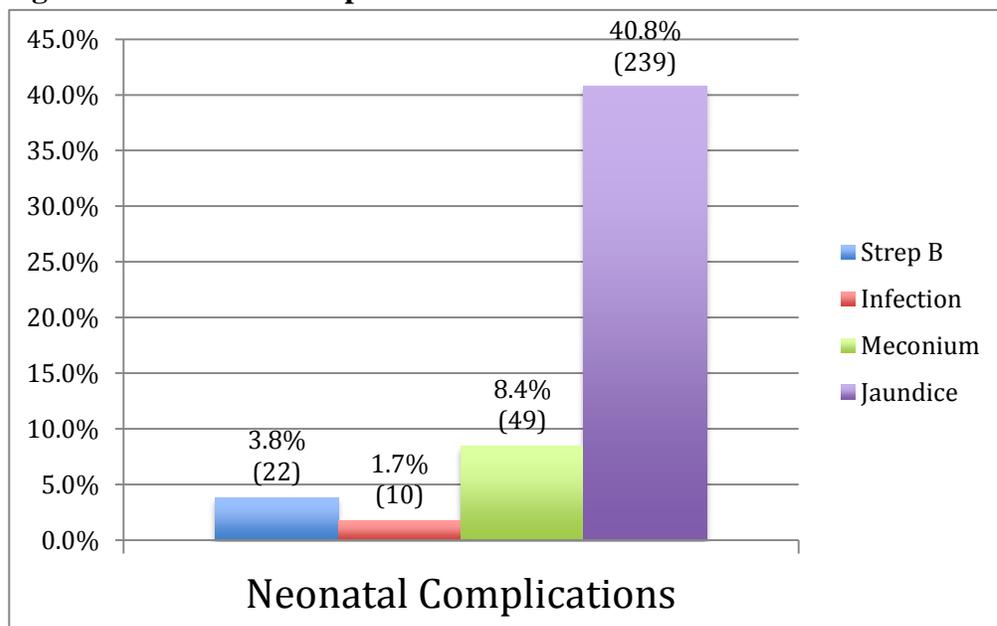


Table 4.4 below shows the neonatal outcomes in this study population. This table depicts several of the birth outcomes of the study population. Overall, the mean weeks gestation (39.22) was close to full term, which is 40 weeks, with term gestation falling between 37-40 weeks. A large percentage of the participants had babies that were born within the normal birthweight; however, 12.3% had babies born that were considered to be small for gestational age. The percentage of preterm birth, which is defined as < 37 weeks gestation, was quite low with 5.7% of women giving birth preterm. Finally, the mean Apgar scores were high, an Apgar score of 7 or higher is considered to be a good score.⁶¹

Table 4.4 Neonatal Outcomes
(n=587)

Neonatal Outcome	
Gestation at Birth (weeks), Mean \pm Standard Deviation; (minimum – maximum)	39.22 \pm 1.78; (25.0 - 42.0)
Birthweight (kg), Mean \pm Standard Deviation; (minimum – maximum)	3.47 \pm 0.576; (0.73 – 5.27)
	%(n)
Normal Birthweight	78.1% (456)
Small for Gestational Age	12.3% (72)
Large for Gestational Age	9.6% (56)
Preterm (< 37 weeks gestation)	Yes: 6.3% (37) No: 93.7% (550)
Apgar 1 minute, Mean \pm Standard Deviation; (minimum – maximum)	7.85 \pm 1.43; (1.0 - 10.0)
Apgar 5 minutes, Mean \pm Standard Deviation; (minimum – maximum)	8.77 \pm 0.762; (4.0 - 10.0)

4.2.2 Study Question 2: Does the association between pregnancy complications and neonatal outcomes and major depression differ when the

depression occurs episodically, compared to when it occurs continuously throughout pregnancy?

Four significant complications/outcomes were associated with major depression:

- gestational diabetes,
- induced labour,
- swelling/edema, and
- bleeding/abruption.

The outcomes that did not reach significance are listed in Appendix B with their respective *p*-values and odds ratios. Next, the models for the outcomes listed above that were significantly associated with major antenatal depression are presented.

Table 4.5 below shows the results of the logistic regression model for the outcome gestational diabetes. The multiple logistic regression model for gestational diabetes included major depression in the second trimester, smoking in the second trimester, and summative emotional support in the second trimester. Support was a summative variable that ranged from 0-5. This was summed from the number of sources of support a participant received during their second and third trimester. The sources of support included their partner, mother, friend, female relatives, and other. In this particular model, only depression in the second trimester was included because women are screened for gestational diabetes in the second trimester and therefore, for most participants, depression in the third trimester would not impact gestational diabetes.

Major depression in the second trimester had an odds ratio of 3.518, indicating that women who experienced depression in the second trimester were 3.5 times more likely to suffer from gestational diabetes compared to participants who did not experience

depression. As well, participants who smoked in the second trimester were three times more likely to have gestational diabetes. Finally, summative support and gestational diabetes had a negative association; as the emotional support a participant received increased, significantly decreased the likelihood of the participant experiencing gestational diabetes significantly decreased. Interactions were explored with the variables in this model; however, none were found to be significant.

Table 4.5 Final Model from Multivariate Logistic Regression for Gestational Diabetes
(n = 587)

Variable	β (S.E.)	<i>p</i> -value	Odds Ratio	95% Confidence Interval
Depression 2 nd Trimester ^a	1.258 (0.173)	0.002	3.518	1.560-7.936
Smoking 2 nd Trimester ^b	1.104 (0.453)	0.015	3.017	1.241-7.332
Summative Support 2 nd Trimester	-0.370 (0.173)	0.032	0.691	0.492-0.969

^a Reference category is No Depression

^b Reference category is Never Smoked or Quit Smoking

Table 4.6 below shows the results of the logistic regression model for the outcome induced labour. In this model major depression was entered as a categorical variable, where no depression was the reference category. The other categories were depression in the second trimester only, depression in the third trimester only, and depression in both trimesters. Participants who had major depression in both trimesters continuously were 2.4 times more likely to have induced labour compared to women who did not have depression in either trimester. Stress was a summative continuous variable, made up of several potential stressors throughout pregnancy such as financial issues and relationship issues. Stress had a positive association; the greater the stress the participants experienced, the more likely they were to have induced labour.

Table 4.6 Final Model from Multivariate Logistic Regression for Induced Labour
(n = 569)

Variable	β (S.E.)	<i>p</i> -value	Odds Ratio	95% Confidence Interval
Depression				
2 nd Trimester ^a	-0.116(0.352)	0.741	0.890	0.447-1.774
3 rd Trimester ^a	-0.380(0.452)	0.401	0.684	0.282-1.661
Both Trimesters ^a	0.883(0.457)	0.053	2.417	0.988-5.916
Summative Stress				
3 rd Trimester	0.141(0.058)	0.015	1.152	1.028-1.290

^a Reference category is No Depression

Table 4.7 below presents the results for the swelling/edema outcome. In the swelling/edema model, there were five significant predictors, major depression, summative support, marital status, age, and exercise. Depression in the second trimester was significant and had an odds ratio of 2.1, indicating that participants with depression were twice as likely to have swelling/edema during their pregnancy. The reference category for marital status was yes and its odds ratio was 0.504, so married participants were 50% less likely to experience swelling/edema during pregnancy, compared to participants who were not married. Summative support in the third trimester is a continuous variable that had a positive association, indicating that participants who had more support were more likely to have swelling/edema. The age variable was dichotomous, where one category was 15-28 years and the other was 29-44 years. In this model, age had an odds ratio of 1.43, meaning that participants in the older category (29-44) were 1.43 times more likely than participants in the younger category (15-28) to have swelling/edema during pregnancy.

The last variable that was significant in the swelling/edema model was exercise. The reference category for exercise was every day and the model revealed a dose-response relationship with swelling/edema. In this situation, the more exercise a person

engaged in, the less likely they were to have swelling/edema, this association increased as the levels of exercise increased. The odds ratio for the category occasionally or never was 2.90, meaning that participants who occasionally or never exercised were 2.90 times more likely to have swelling or edema during pregnancy compared to participants who exercised every day. This model was further explored for possible interactions, however no significant interactions were found.

Table 4.7 Final Model from Multivariate Logistic Regression for Swelling/Edema (n = 576)

Variable	β (S.E.)	<i>p</i> -value	Odds Ratio	95% Confidence Interval
Depression				
2 nd Trimester ^a	0.0741(0.314)	0.018	2.099	1.134-3.885
3 rd Trimester ^a	0.189(0.307)	0.609	1.208	0.585-2.494
Both Trimesters ^a	0.600(0.463)	0.196	1.821	0.735-4.515
Summative Support				
3 rd Trimester	0.204(0.077)	0.008	1.226	1.055-1.424
Marital Status ^b	-0.684(0.335)	0.041	0.504	0.261-0.973
Age				
29-44 years ^c	0.358(0.177)	0.043	1.430	1.011-2.022
Exercise 2 nd Trimester				
2-3x a week ^d	0.397(0.252)	0.114	1.488	0.908-2.437
Occasionally/Never ^d	0.869(0.240)	0.000	2.385	1.491-3.817

^a Reference category is No Depression

^b Reference category is Married

^c Reference category is 15-28 years

^d Reference category is No Exercise

The last outcome associated with major depression, antenatal bleeding/abruption, is outlined in Table 4.8 below. In this model a slight dose-response relationship can be seen between depression during pregnancy and the outcome antenatal bleeding/abruption. Participants who experienced depression in both trimesters were 2.7 times more likely to experience abruption or bleeding during pregnancy. The other variable that reached significance was continuous, summative support in the second trimester. The association with bleeding or abruption was negative, so the more support that participants had, the

less likely they were to experience bleeding or abruption. Support and depression were checked for possible interactions; however, the test did not yield any significant results.

Table 4.8 Final Model from Multivariate Logistic Regression for Antenatal Bleeding/Abruption
(n = 576)

Variable	β (S.E.)	<i>p</i> -value	Odds Ratio	95% Confidence Interval
Depression				
2 nd Trimester ^a	-0.196 (0.411)	0.633	0.822	0.367-1.840
3 rd Trimester ^a	0.635 (0.415)	0.126	1.887	0.837-4.254
Both Trimesters ^a	1.003 (0.467)	0.032	2.727	1.092-6.812
Summative Support				
2 nd Trimester	-0.267 (0.099)	0.007	0.766	0.630-0.930

^a Reference category is No Depression

4.2.3 Study Question 3: Does the association between pregnancy complications and neonatal outcomes and mild depression differ when the mild depression is episodic compared to when it is continuous throughout pregnancy?

Four complications/outcomes were significantly associated with mild depression:

- antenatal bleeding/abruption
- premature rupture of membranes (PROM)
- caesarean birth
- vacuum/forceps.

The outcomes that did not reach significance can be found in Appendix C, along with their respective *p*-values and odds ratios. The next four models explain in detail the association between the above outcomes and mild depression. The only significant category of mild depression was mild depression in the second trimester. Participants

whose scores were indicative of mild depression were 2.1 times more likely to have antenatal bleeding or abruption compared to participants who did not have mild depression in the second trimester. Participants who had experienced a previous bout of depression were 1.9 times more likely to have antenatal bleeding or abruption. Lastly, the summative support variable had a negative association, indicating that the less support a participant had, the more likely their chance of experiencing antenatal bleeding or abruption. The variables in the model were tested for interactions but none were found to be significant.

Table 4.9 Final Model from Multivariate Logistic Regression for Antenatal Bleeding/Abruption
(n =577)

Variable	β (S.E.)	<i>p</i> - value	Odds Ratio	95% Confidence Interval
Mild Depression				
2 nd Trimester ^a	0.754(0.341)	0.027	2.125	1.089-4.144
3 rd Trimester ^a	-0.271(0.464)	0.559	0.763	0.307-1.893
Both Trimesters ^a	-0.499(1.078)	0.644	0.607	0.073-5.021
History of Depression ^b	0.663(0.227)	0.003	1.941	1.245-3.026
Summative Support				
2 nd Trimester	-0.260(0.099)	0.009	0.771	0.635-0.937

^a Reference Category is No Mild Depression

^b Reference Category is No History of Depression

Next, as presented in Table 4.10, the premature rupture of membranes (PROM) model was tested with all possible covariates, but the only variable that remained significant was mild depression. In this situation, only mild depression in the second trimester was significant. Participants who experienced mild depression in the second trimester were 2.5 times more likely to have PROM compared to participants who did not have mild depression in the second trimester. However, it is important to note that the only time PROM is considered a major problem is when it occurs prior to 37 weeks gestation and thus results in preterm birth. In this thesis it was not recorded at what

gestation PROM occurred, however not all participants who reported experiencing PROM also reported having a preterm birth, so this is important to consider when interpreting the odds ratio.

Table 4.10 Final Model from Multivariate Logistic Regression for PROM
(n = 570)

Variable	β (S.E.)	<i>p</i> -value	Odds Ratio	95% Confidence Interval
Mild Depression				
2 nd Trimester ^a	0.918(0.450)	0.042	2.504	1.036-6.054
3 rd Trimester ^a	-1.052(1.029)	0.307	0.349	0.046-2.625
Both Trimesters ^a	0.606(1.077)	0.317	0.574	0.222-15.144

^a Reference Category is No Mild Depression

The next model predicting unplanned caesarean birth had three significant variables: mild depression in the third trimester, summative stress in the second trimester, and age. Participants with mild depression in the third trimester were 70% less likely to have an unplanned caesarean birth compared to participants who did not have probable mild depression in the third trimester. There was a positive association between summative stress and unplanned caesarean birth, meaning that the greater amount of stress a participant experienced, the more likely they were to have an unplanned caesarean birth. Participants aged 29-44 were 1.8 times more likely to have an unplanned caesarean birth compared to younger participants (aged 15-28). This model was explored for significant interactions, however none were found.

Table 4.11 Final Model from Multivariate Logistic Regression for Caesarean Birth
(n=562)

Variable	β (S.E.)	<i>p</i> - value	Odds Ratio	95% Confidence Interval
Mild Depression				
2 nd Trimester ^a	-0.021(0.367)	0.954	0.979	0.477-2.008
3 rd Trimester ^a	-1.210(0.542)	0.026	0.298	0.103-0.862
Both Trimesters ^a	-0.319(0.817)	0.697	0.727	0.147-3.604

Summative Stress				
3 rd Trimester	0.127(0.058)	0.028	1.136	1.014-1.272
Age				
29-44 years ^b	0.632(0.214)	0.003	1.881	1.238-2.859

^a Reference Category is No Mild Depression

^b Reference Category is 15-28 years

The next model explored the probability of operative deliveries or the use of vacuum or forceps instruments during delivery. As outlined in Table 4.12 below, there were three variables that were found to significantly predict the use of vacuum/forceps. These were mild depression, summative support, and treatment for mood disorders. As with the other models, the reference category for mild depression was no depression in either trimester. There was only one category that was significant in the mild depression variable and that was mild depression in both trimesters. Participants with probable mild depression in both trimesters were 4.8 times more likely to have an operative delivery compared to participants who did not have mild depression in either trimester. The continuous summative support variable in the third trimester had a positive association, meaning that the more support that a participant had, the greater the odds of them having an operative delivery. Lastly, participants who were receiving some type of therapy for a mood disorder in the second trimester were 67% less likely to have an operative delivery compared to participants who were not receiving treatment in the second trimester. The model was further explored for possible interactions between variables; however, none were found to be significant

Table 4.12 Final Model from Multivariate Logistic Regression for Vacuum/Forceps (n = 563)

Variable	β (S.E.)	<i>p</i> -value	Odds Ratio	95% Confidence Interval
Mild Depression				
2 nd Trimester ^a	-0.241(0.496)	0.628	0.786	0.297-2.078
3 rd Trimester ^a	0.626(0.404)	0.121	1.870	0.848-4.128
Both Trimester ^a	1.573(0.755)	0.037	4.820	1.098-21.161

Summative Support 3 rd Trimester	0.207(0.109)	0.057	1.230	0.994-1.523
Treatment for Mood Disorders 2 nd Trimester ^b	-1.116(0.543)	0.040	0.328	0.113-0.950

^a Reference Category is No Mild Depression

^b Reference Category is No Treatment for Mood Disorders

4.2.4 Study Question 4: Does the association between pregnancy

complications and neonatal outcomes and anxiety differ when the anxiety occurs episodically, compared to when it occurs continuously throughout pregnancy?

There were three outcomes found to be significantly associated with anxiety:

- Swelling/edema
- Caesarean birth
- Epidural use

The outcomes that did not reach significance can be found in Appendix D, along with their respective *p*-values and odds ratios. The specific results for each of the three outcomes (swelling/edema, caesarean birth, and epidural use) are presented in the ensuing paragraphs.

Table 4.13 below outlines the model for swelling/edema. In this model, the significant variables were anxiety, summative support, marital status, age, and exercise. Anxiety was broken into four categories: no anxiety, anxiety in the second trimester only, anxiety in the third trimester only, and anxiety in both trimesters. The reference category was no anxiety. Anxiety in both trimesters had a significant association with swelling/edema and an odds ratio of 1.8, meaning participants with anxiety in both trimesters were 1.8 times more likely to experience swelling or edema during pregnancy. The association between swelling/edema and summative support was positive, meaning

that the more support participants had, the greater their likelihood of experiencing swelling/edema during pregnancy.

The reference category for marital status was yes and it had an odds ratio of 0.53, meaning that married participants were 47% less likely to have swelling/edema during pregnancy. The reference category for age was 15-28. Participants who were in the age category 29-44 were 1.43 times more likely to have swelling/edema during pregnancy, compared to participants in the age category 15-28 years. The variable exercise had a dose-response relationship with swelling/edema. The reference category for exercise was every day. The participants who occasionally or never exercised were 2.4 times more likely to have swelling/edema compared to participants who exercised everyday. The variables in the model were tested for interactions and none were found to be significant.

Table 4.13 Final Model from Multivariate Logistic Regression for Swelling/Edema (n = 581)

Variable	β (S.E.)	<i>p</i> -value	Odds Ratio	95% Confidence Interval
Anxiety				
2 nd Trimester ^a	0.318 (0.240)	0.185	1.374	0.859-2.199
3 rd Trimester ^a	0.192 (0.293)	0.514	1.211	0.682-2.152
Both Trimesters ^a	0.597 (0.215)	0.005	1.816	1.192-2.766
Summative Support				
3 rd Trimester	0.198 (0.076)	0.009	1.426	1.008-2.018
Marital Status ^b	-0.644 (0.333)	0.053	0.525	0.274-1.008
Age				
29-44 years ^c	0.355 (0.177)	0.045	1.426	1.008-2.018
Exercise (2 nd Trimester)				
2-3x a week ^d	0.361 (0.252)	0.152	1.434	0.876-2.350
Occasionally/Never ^d	0.872 (0.240)	0.000	2.391	1.495-3.824

^a Reference Category is No Anxiety

^b Reference Category is Married

^c Reference category is 15-28 years

^d Reference category is No Exercise

This next model, outlined in Table 4.14, looked at the association between anxiety and unplanned caesarean birth. This model included anxiety, age, and summative stress

in the second trimester. The only category of anxiety that was significantly associated was anxiety in the second trimester. Participants who experienced anxiety in the second trimester were 48% less likely to have an unplanned caesarean birth compared to participants who did not have anxiety in the second trimester.

Summative stress in the third trimester had a significant, positive association with unplanned caesarean birth. This means the more stress that the participants experienced in their second trimester; the more likely they were to have an unplanned caesarean birth. The last significant variable in the model was age. The reference category was 15-28 years and the associated odds ratio was 1.9, so participants who were in the age category 29-44 years, were 1.9 times more likely than the younger participants to have an unplanned caesarean birth. The variables in this model were tested for interactions, but none were found to be significant.

Table 4.14 Final Model from Multivariate Logistic Regression for Caesarean birth (n = 562)

Variable	β (S.E.)	<i>p</i>-value	Odds Ratio	95% Confidence Interval
Anxiety				
2 nd Trimester ^a	-0.651(0.306)	0.034	0.522	0.286-0.951
3 rd Trimester ^a	-0.221(0.343)	0.519	0.801	0.409-1.570
Both Trimesters ^a	-0.157(0.251)	0.531	0.854	0.522-1.397
Summative Stress				
3 rd Trimester	0.123(0.060)	0.041	1.131	1.005-1.272
Age				
29-44 ^b	0.620(0.213)	0.004	1.859	1.223-2.824

^a Reference Category is No Anxiety

^b Reference Category is 15-28 years

The following model, presented in Table 4.15 and Figure 4.6, explores the association between anxiety and epidural use during pregnancy and demonstrates a significant interaction between age and anxiety. There was an interaction between age and anxiety in both trimesters. Referring to Figure 4.6, as age increased in the

participants who had anxiety in both trimesters, their likelihood of using an epidural significantly decreased. Participants who engaged in drinking alcohol during the second trimester were 2.3 times more likely to choose to use an epidural during delivery compared to those who did not use alcohol in the second trimester.

Table 4.15 Final Model from Multivariate Logistic Regression for Epidural Use
(n = 574)

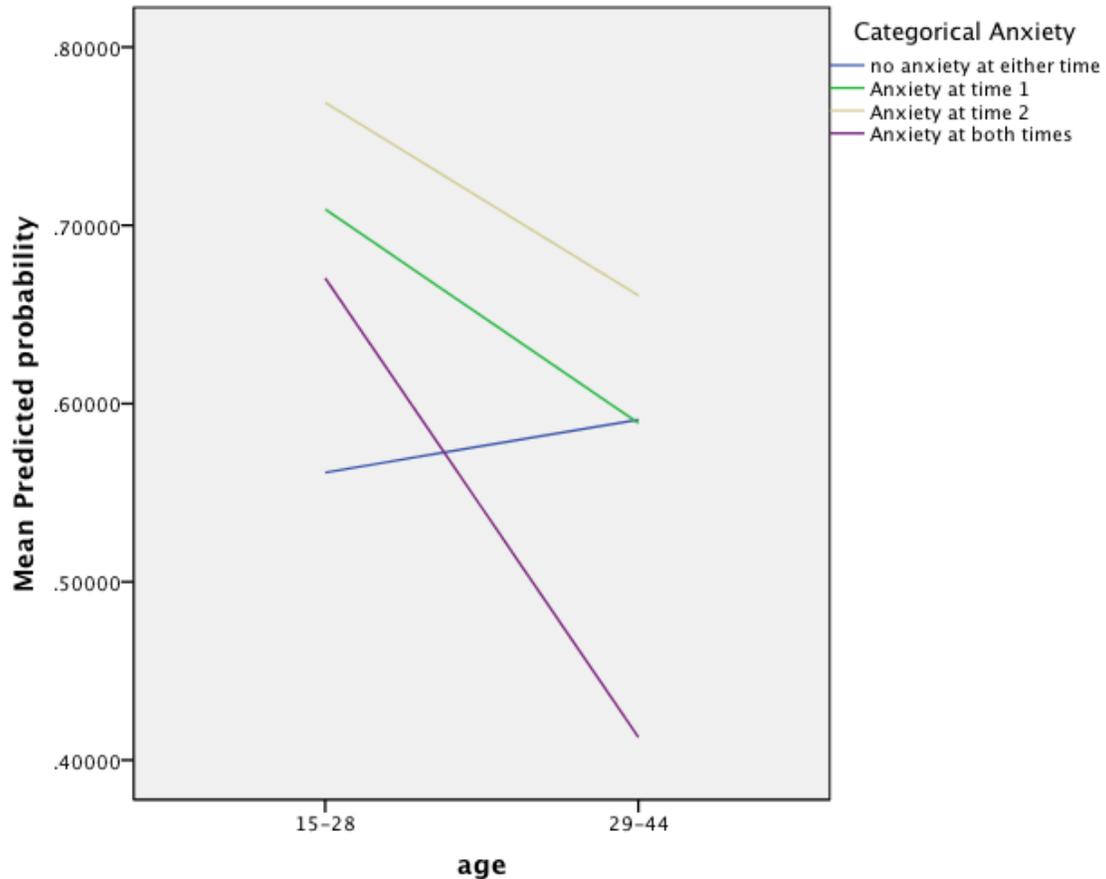
Variable	β (S.E.)	<i>p</i> -value	Odds Ratio	95% Confidence Interval
Anxiety				
2 nd Trimester ^a	1.283(0.781)	0.100	3.607	0.780-16.670
3 rd Trimester ^a	1.630(1.089)	0.134	5.105	0.604-43.138
Both Trimesters ^a	1.644(0.713)	0.021	5.177	1.280-20.937
Drinking				
2 nd Trimester ^b	0.867(0.423)	0.040	2.380	1.039-5.451
Age				
29-44 years ^c	0.105(0.262)	0.689	1.110	0.665-1.854
Anxiety*Age				
2 nd Trimester*Age	-0.642(0.475)	0.176	0.526	0.207-1.335
3 rd Trimester*Age	-0.690(0.644)	0.284	0.501	0.142-1.772
Both Trimesters*Age	-1.185(0.431)	0.006	0.306	0.131-0.712

^a Reference Category is No Anxiety

^b Reference Category is No Drinking

^c Reference Category is 15-28 years

Figure 4.6 Interaction between Age and Anxiety in Both Trimesters



In summary, there were several pregnancy complications and outcomes associated with mild, major depression, and anxiety. Major depression in the second trimester was significantly associated with gestational diabetes and swelling/edema. Major depression occurring continuously throughout pregnancy was significantly associated with induced labour, and antenatal bleeding/abruption. There were no significant associations with major depression occurring in the third trimester. Mild depression in the second trimester was significantly associated with antenatal bleeding/abruption, and PROM. Mild

depression in the third trimester had a significant association with caesarean birth, however instead of being a risk factor, it was found to have a protective effect over the likelihood of caesarean birth. This means that those participants with mild depression were significantly less likely to have a caesarean birth, compared to those with mild depression. Additionally, mild depression occurring continuously during pregnancy was significantly associated with operative delivery.

Lastly, anxiety in the second trimester was significantly associated with unplanned caesarean birth. Anxiety occurring continuously throughout pregnancy was significantly associated with antenatal bleeding/abruption and epidural use. There were no significant associations with anxiety occurring in the third trimester. All models were explored for interactions, however only one significant interaction was found between age and anxiety when exploring epidural use, where the younger and more anxiety the participant was experiencing, the greater the likelihood of epidural use.

The next three tables summarize the results for study question two, three, and four. The variables that are bolded are those that were included in the final multivariate model.

Table 4.16 Summary of Results for Study Question Two

Complications/Outcomes Associated with Major Depression			
Gestational Diabetes	Induced Labour	Swelling/Edema	Antenatal Bleeding/Abruption
Predictor Variables			
<p>Major Depression (2nd Trimester) Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support (2nd Trimester) - Summative Stress - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise - Smoking (2nd Trimester) - Alcohol Use - Drug Use 	<p>Major Depression (Both Trimesters) Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support - Summative Stress (3rd Trimester) - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use - Drug Use 	<p>Major Depression (2nd Trimester) Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support (3rd Trimester) - Summative Stress - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise (2nd Trimester) - Smoking - Alcohol Use - Drug Use 	<p>Major Depression (Both Trimesters) Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support (2nd Trimester) - Summative Stress - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use - Drug Use

Table 4.17 Summary of Results for Study Question Three

Complications/Outcomes Associated with Mild Depression			
Antenatal Bleeding/Abruption	Premature Rupture of Membranes	Caesarean Birth	Vacuum/Forceps
Predictor Variables			
<p>Mild Depression (2nd Trimester)</p> <p>Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support (2nd Trimester) - Summative Stress - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use - Drug Use 	<p>Mild Depression (2nd Trimester)</p> <p>Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support - Summative Stress - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use - Drug Use 	<p>Mild Depression (3rd Trimester)</p> <p>Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support - Summative Stress (3rd Trimester) - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise (2nd Trimester) - Smoking - Alcohol Use - Drug Use 	<p>Mild Depression (Both Trimesters)</p> <p>Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support (3rd Trimester) - Summative Stress - History of Depression - Treatment for mood disorder (2nd Trimester) <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use - Drug Use

Table 4.18 Summary of Results for Study Question Four

Complications/Outcomes Associated with Anxiety		
Swelling/Edema	Caesarean Birth	Epidural Use
Predictor Variables		
<p>Anxiety (Both Trimesters) Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support (3rd Trimester) - Summative Stress - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise (2nd Trimester) - Smoking - Alcohol Use - Drug Use 	<p>Anxiety (2nd Trimester) Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support - Summative Stress (3rd Trimester) - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use - Drug Use 	<p>Anxiety (Both Trimesters) Sociodemographic:</p> <ul style="list-style-type: none"> - Age - Age*Anxiety (Both Trimesters) - Income - Ethnicity - Education - Marital Status <p>Psychosocial:</p> <ul style="list-style-type: none"> - Summative Support - Summative Stress - History of Depression - Treatment for mood disorder <p>Behavioural:</p> <ul style="list-style-type: none"> - Exercise - Smoking - Alcohol Use (2nd Trimester) - Drug Use

CHAPTER FIVE: DISCUSSION

This chapter provides a discussion of the study results previously presented. The first section of the discussion describes the study sample and integrates the current literature. The next four sections answer each of the research questions and related hypotheses that were laid out in Chapter Three, and relate the results back to the literature. Finally, the sixth section explores the limitations, biases, and practical implications of this thesis.

5.1 Study Sample

This section will discuss the prevalence of depression and anxiety, the socio-demographic variables (age, marital status, income, and education), psychosocial variables, and behavioural variables of the study sample on which this thesis is based. The study sample is not truly representative of childbearing women in the Saskatoon Health Region and surrounding areas, which may have introduced some biases. These are presented at the end of the chapter.

5.1.1 Prevalence of Depression and Anxiety

In this sample of pregnant women, 14.0% of participants experienced major depression in the second trimester, while 10.3% experienced major depression in the third trimester. Only 4.8% experienced major depression continuously throughout pregnancy. The prevalence of depression in the study sample is consistent with prevalences that have been reported in previous research, with around 10-20% of the population experiencing antenatal depression.⁸³ While these prevalence's fit with the past literature, they are on the lower side of what has been demonstrated, particularly the prevalence of continuous major depression.

In the study sample, 10.2% of participants met the criteria for mild depression in the second trimester, and 9.3% had mild depression in the third trimester, but only 1.8% experienced mild depression continuously throughout pregnancy. Though these prevalence rates fit within the reported range of women who experience mild depression during pregnancy, from 5%-45%,¹⁹⁻²¹ they are on the lower side of what has been found in previous literature.

The prevalence of anxiety in this thesis was 47.5% of participants experiencing anxiety in the second trimester, 38.5% in the third trimester, and 26.6% experiencing probable anxiety continuously throughout the pregnancy. Other authors have reported a large range in the prevalence of anxiety during pregnancy. For example, Teixeira et al.²² report the prevalence of anxiety to be between 12.3%-18.2% during pregnancy. Using the State and Trait Anxiety Inventory (STAI), they reported that 15.2% experienced anxiety in the first trimester, 12.3% experienced anxiety in the second trimester, and 18.2% experienced anxiety in the third trimester. There were 300 participants participating in the study and similar to this thesis, nearly all of the participants were Caucasian, and a large percentage of them were either married or living with their partner. However, these participants resided in Portugal rather than Canada, which could impact the prevalence of anxiety.

The literature also shows that the prevalence of anxiety can be considerably higher during pregnancy, with a study by Faisal-Cury²⁴ reporting that between 45-60% of women experienced anxiety issues in pregnancy. These rates are more comparable to what has been found in this thesis and the sample in the Faisal-Cury²⁴ study is similar to

mine, where nearly all the participants were Caucasian, fell between a similar age range, and had a high percentage of married women.

Prevalence of major depression, mild depression, and anxiety was highest in the second trimester. This is similar to what has been found in past research, with depression and anxiety being higher earlier in pregnancy and symptoms decreasing as the pregnancy proceeds.^{84,85} The EPDS is considered to be a valid and reliable tool when screening for depression and anxiety.⁷⁵ Therefore, we can be relatively confident that close to all of those detected by the EPDS to have depression or anxiety have not been wrongly labeled and that this study has strong internal validity.

5.1.2 Sociodemographic Variables

5.1.2.1 Age

The age range for the study sample was 15 to 44 years, with a mean age of 28.9 ± 4.83 years. This age range is similar to what is found in the general population of childbearing women.⁸⁶ The age at which women give birth to their first child continues to increase over time (2.7 years since 1975)⁸⁷ and this may have some serious implications regarding the health of the mother and the child.⁸⁶ Currently in Canada, the mean age to give birth is 29.4 years.⁸⁷ The mean age of this study sample falls well within what is considered the “optimal” time to bear children, which is between 20-35 years.⁸⁶

5.1.2.2 Marital Status

The percentage of participants who are married in this study is very high, with 90% of the participants being either married or in a common-law relationship. Women, who are married and have increased support, are significantly less likely to have antenatal

depression and anxiety.²⁴ Additionally, married women are less likely to experience complications throughout pregnancy, such as hypertension,⁸⁸ and low birthweight.⁸⁹ Therefore, it can be speculated that because the marital status is high, this may result in a lower prevalence of antenatal depression and anxiety, along with a lower level of pregnancy and neonatal complications. Indeed, the prevalence of antenatal depression in this sample is on the lower side of what has been found in the general population.¹

5.1.2.3 Income

Nearly 50% of participants in this study sample had an average household income of greater than \$60,000. As stated earlier, the FIP study recruited participants between 2006 and 2008, during that time, the average household income of all individuals in Saskatoon ranged from \$53,000-\$56,000.⁹⁰ The income category of greater than \$60,000 was the highest category on the questionnaire that participants could choose, so it can be reasonably speculated that the income of the majority of participants in this study sample was higher than that of the general population.

It has been well documented that women of higher socioeconomic status, are significantly less likely to experience depression and anxiety during pregnancy.^{10,28} In some cases this may be because they have less things to worry or be anxious about.⁹¹ Moreover, women in higher income groups are also less likely to experience pregnancy and neonatal complications.⁹² This is likely partly because women with a higher income often have more access to adequate prenatal care.⁹³

5.1.2.4 Education

There were 67% of participants in this study who had completed a post-secondary education. Data from the 2006 Canadian census show that in 2006, 25.4% of

individuals aged 25-54 in Saskatoon had completed post-secondary education; this number includes men as well as women.⁹⁴ This figure is drastically smaller than the 67% of participants in the study sample who have completed their post-secondary education.

As with income, lower education can decrease the likelihood of a woman initiating prenatal care.⁹⁵ Therefore, it is possible that there would be a lower rate of pregnancy and neonatal complications in this thesis because of education. Higher education is also protective over the development of antenatal depression;¹⁰ therefore the high education in this thesis may partly explain why the prevalence of depression is on the lower side of what is reported in the general population.

5.1.3 Psychosocial Variables

5.1.3.1 Social Support

The amount of social support that the woman experienced during pregnancy was explored by asking if they received support from their partner, mother, friends, female relatives, or other sources. Overall, nearly all of the participants had at least one support, with 98.5% having at least one support in the second trimester, and 99.0% with at least one support in the third trimester. As previously stated, support is a protective factor for development of depression and anxiety during pregnancy.^{24,88} Since nearly all participants in this study had at least some emotional support, this may have had a protective influence over the prevalence of depression and anxiety.

5.1.3.2 History of Depression

One of the strongest predictors for antenatal depression is a history of a previous episode of depression, either in pregnancy or during another stage of an individual's life.^{27,96} A high percentage of participants in this study sample experienced a previous

bout of depression. Nearly half or 45.5% of the participants responded “yes,” when they were asked to report if they had a history of depression. Since the risk for experiencing another episode of depression is very strong during pregnancy,²⁷ I would have expected there to be a higher prevalence of depression in this thesis based on the number of participants who had had a previous episode of depression.

5.1.3.3 Treatment for Depression and Anxiety

Treating antenatal depression and anxiety with antidepressants has been debated extensively in the medical literature.^{97,98} Despite the common fear that women taking antidepressants are at an increased risk of pregnancy or fetal complications, there is ample research demonstrating that antidepressants are safe for use during pregnancy and that depression or anxiety itself may be more detrimental.^{99,100} Few participants sought treatment for depression and/or anxiety. Only 12.0% (78) of the participants in their second trimester were receiving treatment for depression or anxiety, either pharmaceutically or through counselling. In their third trimester, only 17.7% (115) of the participants sought either the use of counselling or antidepressants to alleviate symptoms of depression or anxiety.

5.1.4 Behavioural Variables

5.1.4.1 Exercise

Several studies have demonstrated the therapeutic benefits of exercise and physical activity to reduce or prevent symptoms of depression or anxiety.^{101,102} Furthermore, studies have suggested that exercise during pregnancy can significantly reduce the likelihood of developing pregnancy complications such as edema and gestational diabetes.^{103,104} Despite substantial evidence regarding the benefits of exercise

during pregnancy, 45.6% of participants reported that they never or occasionally engaged in exercise in their second trimester, and 43.5% of participants in their third trimester never or occasionally engaged in exercise. Given that the benefits of exercise are commonly known, I expected that there would be more individuals to engage in exercise during pregnancy.

5.1.4.2 Risk Behaviours

This thesis explored the frequency of risk behaviours of smoking, alcohol use, and drug use during pregnancy. Overall, the frequency of reported risk behaviours was quite low, especially for alcohol and drug use. The highest prevalence was smoking, with 11.9% of participants smoking in the second trimester, and 10.6% of participants smoking in the third trimester. These prevalences are similar to the general population in Canada and the United States, with approximately 11% of women choosing to smoke during pregnancy.^{105,106} In this study sample, approximately 6% of participants reported that they used some alcohol throughout pregnancy. In the general population, approximately 12% of pregnant women between the years of 15-44 engage in alcohol use at some point during pregnancy.⁷¹ Less than 3% of participants in this thesis responded positively to questions regarding drug use during pregnancy. This is lower than what is found in the general population, where around 5% of women between the years of 15-44 use drugs during pregnancy.⁷¹ This low frequency of reported drug use did not allow me to explore how it could influence the likelihood of pregnancy and neonatal complications.

5.2 Discussion of Results

5.2.1 Study Question One: What is the prevalence of pregnancy complications and neonatal outcomes within the study sample?

5.2.1.1 Prevalence of Pregnancy Complications

There were five major pregnancy complications explored in this thesis; 1) urinary tract infection; 2) bleeding/abruption; 3) gestational diabetes; 4) hypertension; and 5) swelling/edema.

Urinary Tract Infection (UTI): As reported in Chapter 3, the prevalence of urinary tract infection in this study sample was 16.1%. UTI is the most common complication to occur during pregnancy, with the likelihood of developing a UTI much higher in pregnant women than in non-pregnant women.^{107,108} Approximately 30% of women will have a urinary tract infection during pregnancy; therefore, the prevalence of 16.1% found here in this thesis, is substantially lower than what is found in the general population.

Antepartum Bleeding or Abruptio: Bleeding is experienced by 25% of pregnant women¹⁰⁹ and can indicate more serious conditions such as incompetent cervix, abruptio, or placenta previa.¹¹⁰ The prevalence of participants experiencing bleeding during pregnancy in this study sample was 17.6%; this is lower than what has been found in the general population. These low prevalences of UTI and bleeding may be related to the high sociodemographic status of participants in this study sample.

Gestational Diabetes: The likelihood of experiencing diabetes increases during pregnancy and has been increasing over time; in the general population, between 4 to 5% of women develop gestational diabetes (i.e., diabetes in pregnancy).¹¹¹ In this thesis, 5.1% of participants experienced gestational diabetes, which is consistent with what has been found in the general population.

Gestational Hypertension: Gestational hypertension is the presence of high blood pressure during pregnancy. If left uncontrolled, it can lead to preeclampsia, which is the

presence of high blood pressure and protein in the urine.³³ The prevalence of hypertension in this study was 14.0%. An incidence study done in Calgary, Alberta found that the incidence of hypertension in a ten-year period was 6.3%¹¹² and other studies have reported that severe hypertension complicates around 6-8% of pregnancies. Therefore, the prevalence of hypertension in this study appears to be higher than what has been found in the general population, however in this thesis no distinction was made between mild and severe hypertension as it is in the general population, so it is unknown how many participants in this sample experienced mild hypertension and how many experienced severe hypertension.

5.2.1.2 Labour and Delivery Complications

This thesis also examined several labour and delivery complications including preterm labour, postpartum hemorrhage, premature rupture of membranes (PROM), use of anesthetic during labour, and caesarean birth.

Preterm Labour: Labour is considered to be preterm if it occurs at < 37 weeks gestation.⁷¹ It is estimated that 13% of women experiencing preterm labour, with the number increasing by 20% in the last twenty years.⁷¹ The prevalence of preterm labour in this study (3.4%) is much lower than what would be expected, based on what is found in the general population. This low prevalence may be related to the high sociodemographic levels discussed earlier in this chapter.

Premature Rupture of the Membranes (PROM): PROM occurs when the membranes rupture prior to the start of labour. This is a serious condition as it puts the woman and unborn baby at a higher risk for an infection and also increases the chances for the abruption of the placenta and postpartum hemorrhage.⁷¹ Overall, between 5-10%

of women experience PROM.⁷¹ In this study, 7.1% of participants had PROM and therefore, this fits within the expected prevalence, however, not all of the participants who reported they experienced PROM also had a preterm birth.

Postpartum Hemorrhage: A postpartum hemorrhage (PPH) occurs when a woman has an excessive loss of blood (more than 500 mL), shortly after giving birth.⁷¹ Between 3-5% of women experience a PPH.^{113,114} If not treated quickly, it can cause maternal death.¹¹³ Postpartum hemorrhage occurred in 7.1% of the participants in this study, which is one of the few complications, which was higher in our sample than the general population.

Epidural Use: The rate of epidural use during delivery in the United States and Canada has increased from 20% to 60% over the past 30 years.¹¹⁵ A study in Saskatchewan found that incidence of epidural use was 56.8%.¹¹⁶ The prevalence of epidural use in this study sample was 58.8%, similar to the general population.

Caesarean Birth. Over 33% of women in this study had either a planned or unplanned caesarean birth. The rate of caesarean births are the highest they have ever been with 23.7% of women having a caesarean birth in Canada,¹¹⁷ and 12% worldwide.⁷¹

5.2.1.3 Neonatal Complications and Outcomes

There were several neonatal complications and outcomes explored. These included preterm birth, meconium staining, jaundice, and babies born SGA, and LGA.

Preterm Birth: Birth is considered to be preterm if the occurs at <37 weeks gestation.⁷¹ Approximately 12% of women in the general population experience a preterm birth.⁷¹ The prevalence of preterm birth within this study was 5.7%; therefore, it was much lower than what is found in the general population.

Meconium Staining: Meconium staining of the amniotic fluid puts the baby at an increased risk for meconium aspiration syndrome.⁷⁰ The prevalence of meconium staining in this study sample was 8.4%, this is lower than 13% found in the general population.⁷⁰

Jaundice: Jaundice is the most common complication in the neonate.⁷¹ It is characterized by a yellowish tone to the skin that is usually resolved within 2 weeks after delivery.⁷¹ Jaundice occurs when the newborn liver does not clear a deposit called bilirubin, which causes the yellowish colour. Jaundice occurs in between 60-80% of newborns.⁷¹ In this thesis, the prevalence of jaundice is 40.0%, which is much lower than what has been found in the general population and is therefore lower than what would be expected.

Small for Gestational Age (SGA): A recent report by the Canadian Institutes for Health Information (CIHI) showed that Saskatchewan had the lowest rate of babies born SGA, at 7.3%.¹¹⁸ However, within this study the prevalence of SGA was 12.3%, which is slightly higher than the general population in Saskatchewan.

Overall, several of the complications and adverse outcomes in this study are much lower than what has been found within the general population. Only two complications were much greater than average, SGA and caesarean birth. It is possible the high prevalence of caesarean birth is related to the sociodemographics of the study sample, as research shows that older women are more likely to have a caesarean birth.¹¹⁹ While the prevalence of gestational diabetes, PROM, and epidural use in this study sample fell within the common rates, many of the complications were lower than what has been

found in the general population and this is likely related to the high demographics present in this study sample.

5.2.2 Study Question Two: Does the association between pregnancy complications and neonatal outcomes and major depression differ when the depression occurs episodically, rather than when it occurs continuously throughout pregnancy?

I hypothesized that major depression occurring continuously would have a stronger association with the pregnancy and neonatal outcomes, compared to major depression that occurred episodically during pregnancy. Four outcomes were significantly associated with antenatal depression: gestational diabetes, induced labour, swelling/edema, and antenatal bleeding/abruption.

Surprisingly, there were no adverse neonatal outcomes that were associated with major depression. This is unexpected because past researchers have found major depression to be related to preterm birth, low birthweight, and SGA.⁵⁵ Researchers have identified that the etiology behind several of these neonatal complications is linked to reduced uterine blood flow;⁹ since reduced blood flow is associated with major depression,⁹ I expected to find an association between depression and these outcomes.

In the results for this research question, some outcomes had a stronger association with episodic major depression, while others were more strongly associated with continuous major depression. Gestational diabetes and swelling/edema were significantly associated with depression in the second trimester, while induced labour and bleeding/abruption were significantly associated with depression occurring continuously throughout pregnancy in both trimesters. The finding that swelling/edema is significantly

associated with depression in the second trimester is opposite of what was expected, because I hypothesized that depression occurring continuously throughout pregnancy would have a greater impact on possible complications.

Major depression in the second trimester was significantly associated with gestational diabetes. However, since women are screened for gestational diabetes in the second trimester, around the 25-26th week of pregnancy, I would expect most women to know by then if they had developed gestational diabetes. Although it is possible for a woman to go on to develop gestational diabetes in the third trimester, the questionnaire did not ask when the woman received a diagnosis. Therefore, it is not possible to test how depression in the third trimester influences gestational diabetes because many of the participants would have been diagnosed in the second trimester because there is no way to know which participants were diagnosed in the third trimester. It would not make theoretical sense to explore how major depression impacts an outcome that has already been diagnosed.

Ragland et al.,³¹ reported that 42% of women who had been diagnosed with gestational diabetes also met the criteria for antenatal depression, where gestational diabetes was the predictor variable and antenatal depression was the outcome variable. Katon et al.¹²⁰ examined the link between depression and subsequent gestational diabetes; however, they were unable to find an association. The association between major depression and gestational diabetes in this thesis was strong, with participants experiencing depression in the third trimester to be 3.52 times more likely to gestational diabetes. This suggests that there may be some biological pathway that connects antenatal depression to the development of gestational diabetes, instead of what was found in

Ragland et al.'s study, which reported that antenatal depression was an outcome of gestational diabetes.³¹

Major depression that occurred in both trimesters was significantly associated with induced labour. It is difficult to explain why induced labour was significantly associated with depression in both trimesters, since often antenatal depression is associated with spontaneous, preterm labour.¹²¹ However, in this thesis the participants were nearly 2.5 times more likely to have induced labour if they had antenatal depression continuously throughout pregnancy.

Summative stress in the third trimester had a significant, positive association, meaning the greater the stress, the greater the likelihood of induced labour. Again, this association is puzzling, as the literature shows that prenatal stress is associated with preterm labour, rather than induced labour.¹²² Nevertheless, induced labour is considered a complication and this finding fits with the hypothesis that depression occurring continuously will have a stronger association with pregnancy complications than episodic depression does.

There was also an unexpected association found in the multivariate logistic regression model for swelling/edema. In this model, major depression in the second trimester was significantly associated with swelling/edema, as was summative support in third trimester, which had a positive association. This is the opposite of the relationship that I expected, as it indicates that the greater the support, the greater the likelihood of swelling/edema. Research demonstrates that increased emotional support generally helps to decrease not only the prevalence of antenatal depression, but also the prevalence of pregnancy complications.^{24,88} An explanation for this finding may be that in some cases,

women who are experiencing adverse symptoms during pregnancy have more emotional support from family and friends. It is also possible that some women find a large number of sources of support to be smothering and therefore this induces more stress than is intended.

Overall, to answer the second research question of whether major depression has a stronger association with the outcomes when it occurs episodically compared to when it occurs continuously, in this thesis it is different for each outcome. Conceivably, some outcomes are more easily influenced by a psychopathology such as depression. For example, gestational diabetes is intrinsically connected to the amount of exercise a woman receives during pregnancy and the diet she consumes.^{104,123} Research demonstrates that women who are depressed may be less apt to take care of themselves during pregnancy.⁴¹ Therefore, gestational diabetes may be more likely to be a result of antenatal depression than complications such as induced labour because the reasons for why labour is not progressing naturally are unclear, whereas the biological cause of gestational diabetes is quite straightforward.^{104,123}

5.2.3 Study Question Three: Does the association between complications and mild depression differ when mild depression occurs episodically, rather than when it occurs continuously throughout pregnancy?

The hypothesis for this question was mild depression occurring continuously would have a stronger association with complications compared to mild depression that occurred episodically. There were four outcomes that reached significance: antenatal bleeding/abruption, premature rupture of membranes (PROM), vacuum/forceps delivery, and caesarean birth. Again, mild depression was not significantly related to any neonatal

complications. Similar to research question two, there were some outcomes significantly associated with continuous mild depression and others that were associated with episodic mild depression. Additionally, the association found between caesarean birth and stress and anxiety is similar to what was found in the multivariate logistic regression model for caesarean birth with mild depression and stress.

The multivariate model for antenatal bleeding/abruption (Table 4.9) was significantly associated with episodic mild depression in the second trimester. Antenatal bleeding/abruption has been shown in the literature to be associated with major depression;⁴⁴ therefore, this finding fits with past research. However, this association does not fit with the hypothesis that continuous mild depression would have a stronger impact than episodic mild depression. Perhaps a complication such as antenatal bleeding, which generally does not occur continuously throughout pregnancy, would be more influenced by depression occurring episodically.

Table 4.10 shows the multivariate model for the association between mild depression in the second trimester and premature rupture of membranes (PROM); however, no other covariates were found to significantly contribute to the model. This finding was also different from the hypothesis, as episodic mild depression in the second trimester had a greater impact on the probability of PROM than continuous mild depression did.

The association with vacuum and forceps was strong (OR 4.82). This finding is consistent with the literature, which shows operative deliveries are associated with depression and confirms the hypothesis as it showed that continuous mild depression had a stronger association with vacuum/forceps delivery than episodic mild depression. Yet,

this finding is also somewhat unique, as there is a lack of information regarding mild depression and its association with negative delivery outcomes. This is interesting because although major depression has been recorded in the literature to be associated with operative deliveries, it appears mild depression can also significantly influence the method of delivery.

Finally, treatment for mood disorders in the second trimester had a protective effect over vacuum/forceps use in delivery. Currently in the literature there is a debate over whether the use of antidepressants during pregnancy can have a negative impact on pregnancy and neonatal outcomes.⁹⁷ However, there is an abundance of research that demonstrates that antidepressants are not harmful for use during pregnancy⁹⁹ and this finding, which shows that treatment during pregnancy is protective over vacuum/forceps use in delivery, supports this overall finding.

5.2.4 Study Question Four: Does the association between complications and anxiety differ when the anxiety occurs episodically, rather than when it occurs continuously throughout pregnancy?

I hypothesized that anxiety occurring continuously throughout pregnancy would have a stronger association with the complications compared to anxiety that occurred episodically. There were three outcomes that reached significance: swelling/edema, caesarean birth, and epidural use during delivery. No significant findings between anxiety and neonatal complications were found, contrary to the literature.⁴⁷ Similar to research question two and three, some outcomes had a stronger association with episodic anxiety, while others fit the hypothesis and were significantly associated with continuous anxiety. Anxiety occurring continuously in both trimesters was significantly associated with

swelling/edema and epidural use during delivery. Anxiety that occurred episodically in the second trimester was significantly associated with caesarean birth.

The finding that anxiety was related to swelling/edema is consistent with the literature as anxiety is significantly related to hypertension and preeclampsia¹²⁴ and swelling/edema is a symptom of these issues.³³ This finding is also consistent with the hypothesis; anxiety occurring continuously throughout pregnancy had a stronger association with swelling/edema compared to episodic anxiety.

When answering this research question, there was a strange association between anxiety and caesarean birth. Referring to Table 4.14, participants experiencing anxiety within the second trimester were 48% less likely to have a caesarean birth. Past research has found that women who experience anxiety and depression during pregnancy are significantly more likely to have a caesarean birth.²¹ A possible explanation for this is that women with higher sociodemographic factors, such as high income,¹²⁵ and higher education¹²⁶ are more likely to give birth at an advanced age. Women who give birth at a higher maternal age are at a significantly increased risk for complications that result a caesarean birth.¹¹⁹

Also, an association was found between the more stress a woman experienced in the third trimester and the likelihood of an unplanned caesarean birth. This may offer another possible explanation for the strange association between anxiety and caesarean birth. It is possible that there is a desirability bias present here. Since stress and anxiety are interconnected concepts,¹²⁷ perhaps participants were more comfortable responding to stressors than they were answering the screening tool for anxiety, because they did not wish to reveal they were having difficulty coping. Therefore, it is possible that the

association between caesarean birth and stress is more indicative of the way the participants felt.

This research question also contains the only significant interaction found within this analysis. This was in the multivariate logistic regression model for epidural use during delivery, where there was a significant interaction between age and anxiety in both trimesters. Participants were significantly more likely to use an epidural if they were both in the younger age category and also had anxiety in both trimesters. This fits with the literature because younger women are at a greater risk of experiencing anxiety during pregnancy¹⁰ and therefore may be more likely to use an epidural as well, since epidural use is associated with anxiety.²¹ Women may also be having anxiety issues due to fear of childbirth, therefore it makes theoretical sense that women experiencing anxiety continuously throughout pregnancy are significantly more likely to request an epidural during delivery. Overall, continuous anxiety during pregnancy was significantly related to swelling/edema and epidural use during delivery, which was consistent with my hypothesis.

There were several covariates that were significantly associated with the complications and outcomes along with major depression, mild depression, and anxiety. For example, marital status and support were often significant covariates in models for outcomes like swelling/edema, antenatal bleeding/abruption, and gestational diabetes. Although, as discussed before, there were times when these covariates had an association that was unexpected, there were several situations where the findings were congruent with current literature. There is an abundance of past literature which demonstrates that participants who are married or have increased emotional support are significantly less

likely to have depression and anxiety during pregnancy,^{24,25} as well as significantly less likely to experience pregnancy complications.^{88,89,128}

Exercise also had a significant impact on pregnancy complications, particularly swelling/edema. Participants who exercised on a regular basis were significantly less likely to experience swelling/edema during pregnancy compared to participants who rarely or never exercised. Although research on exercise in pregnancy has produced differing results, the overall opinion is that it has beneficial attributes.¹⁰³ In relation to swelling/edema, evidence shows moderate-intensity exercise during pregnancy reduces the occurrence of edema.¹⁰³ Further studies report that exercise may reduce the rate of preeclampsia, of which edema is a symptom.¹⁰⁴

Finally, the risk behaviours of smoking and drinking were significantly associated with pregnancy complications. Smoking was significantly associated with gestational diabetes and drinking was significantly associated with epidural use during pregnancy. These associations were expected since women who drink during pregnancy are more likely to be anxious or depressed.⁴¹ Also, smoking during pregnancy is known to influence gestational diabetes since women who smoke have increased blood glucose levels, which contributes to the development of gestational diabetes.¹²⁹

Many outcomes that were significantly associated with major depression, anxiety, or mild depression were associated with an episodic mood disorder rather than continuous mood disorder. Of the twelve multivariate models that had a significant association between depression or anxiety and a complication, seven of them were significant with episodic depression or anxiety, rather than continuous depression or

anxiety. Of these seven, six of the outcomes had a significant association with depression or anxiety that occurred episodically in the second trimester.

This may mean that episodic depression and anxiety occurring in the second trimester have a more detrimental impact on pregnancy complications and adverse outcomes than depression and anxiety occurring in the third trimester, or anxiety and depression occurring continuously throughout pregnancy. A study by Andersson et al.²¹ found that participants who had anxiety in the second trimester were more likely to have a range of complications including nausea and vomiting, caesarean birth, and epidural use during delivery. Dayan et al.¹²¹ screened participants for depression and anxiety in the second trimester and found that participants who screened positively for depression and anxiety were significantly more likely to have a spontaneous preterm birth. Finally, Kurki et al.¹²⁴ found that participants with depression in the second trimester were significantly more likely to have preeclampsia. However, Chung et al.⁴³ found that participants with depression in the third trimester were more likely to have an epidural and a caesarean birth. Furthermore, Rahman et al.¹³⁰ explored complications in 143 depressed mothers compared to 147 non-depressed mothers, and found that participants experiencing depression in the third trimester had infants born with significantly lower birthweight compared to non-depressed participants.

These results show that depression and anxiety in the second trimester had a more detrimental impact on the pregnancy and its outcomes compared to episodic depression and anxiety in the third trimester. The other five models had an outcome that was significant with depression or anxiety that occurred continuously throughout pregnancy, which is consistent with the initial hypotheses. Perhaps this means that some outcomes

are more influenced by depression and anxiety than others or that there is a time during pregnancy that is more susceptible to negative influences such as depression and anxiety. Finally, it is important to emphasize that even mild depression can influence complications and negative outcomes.

5.3 Study Biases and Limitations

5.3.1 Biases and Limitations in the Study Sample

It is important to note that the results from this thesis may present some biases and limitations. First, there are some aspects about the study sample that may have biased the results. Second, there are some limitations present in the thesis as a result of the methods and analysis undertaken.

Since the study sample has much higher socio-demographic factors than the general population, the external validity of the thesis may not be as accurate as would be optimal if they were the same. The findings may not be generalizable to the entire population; however, this does not nullify the results or reduce their importance as many women who fit the profile in this thesis become pregnant. It is possible that the results under-represent the general population. Indeed, based on the existing literature, if a group more representative of the general population was recruited, there would likely be a higher prevalence of mood disorders and complications. This may also result in more associations between mood disorders and complications.

The women who participated in this study may have a participation bias. People who are healthier, more highly educated, and who have a higher income status, are more likely to participate in studies.¹³¹ As well, it is reasonable to assume that a woman who is feeling depressed or anxious would be less likely to complete a study that requires her to

complete lengthy questionnaires, twice throughout pregnancy, and again in the early postpartum

5.3.2 Biases and Limitations in the Prevalence of Complications

It is possible that there was a bias in the complications and outcomes reported. On this questionnaire, participants were asked about any pregnancy complications they may have experienced throughout their whole pregnancy. They were also asked to report their labour and delivery outcomes, as well as their birth outcomes and any neonatal complications. The medical charts of the participants were not referenced to determine whether they accurately reported the presence of complications, or if some had been omitted or forgotten. The participants completed the last questionnaire at four to six weeks postpartum, and would have been adjusting to life with a newborn baby and therefore likely would have been very tired. This could have caused the participants to potentially forget some of the pregnancy complications they experienced in the earlier part of their pregnancy. Research has demonstrated that memory capacity can decrease throughout pregnancy and into the postpartum, particularly recall memory.¹³² Furthermore, a study by Pio de Almeida,¹³³ found that participants who are suffering from postpartum depression have more memory problems compared to participants without postpartum depression.

Finally, it is possible that a desirability bias could be present in the complications reported. Women may not want others to know that they struggled with issues during pregnancy and chose not to report them. Therefore, if the participants either forgot about complications or did not to report them, the complications and outcomes may have been underreported. This means it is possible that the association between depression and/or

anxiety and the complications and birth outcomes may also be underreported or inaccurate.

5.3.3 Biases and Limitations in the Study Design or Analysis

First, while the sample size was quite large at 649; there was a substantial decrease in participation by the early postpartum, as demonstrated by the total of 586 who completed questionnaires at all three times. Of the 63 participants who did not complete all three questionnaires, 61 of these participants had a miscarriage, stillbirth, or neonatal death. It can be speculated that some of the lost participants were either depressed, anxious, or were experiencing medical conditions related to their pregnancy. This could potentially bias the prevalence of depression, anxiety, and complications to be lower than they should be.

Another significant limitation of this study is that participants were not recruited in the first trimester and did not complete screening tools for depression and anxiety in the first trimester. Therefore, the impact that depression and anxiety in the first trimester can have on pregnancy, labour and delivery, and neonatal complications and outcomes is not known. Additionally, participants were screened for depression with the EPDS and although it has high reliability⁷⁵, it is not a diagnostic tool. Therefore, it is assumed that the EPDS score, as a proxy for depression and anxiety, is related to pregnancy and neonatal outcomes. Finally, it would have been useful to check the medical records of the participants participating to know whether they had omitted or forgot any possible pregnancy complications and neonatal outcomes.

4.4 Practical Implications of Results and Future Research

Since this thesis and the previous literature demonstrate that there are several pregnancy complications and neonatal outcomes associated with antenatal depression and anxiety, it is imperative that healthcare professionals be cognizant of possible signs of depression and anxiety in their patients. Further, this thesis also demonstrates that mild depression can have a significant impact on complications and outcomes; therefore it is important to be aware that even symptoms of depression can have a negative impact on the pregnancy. Given the research, universal screening of women for depression and anxiety during pregnancy by their family doctor or obstetrician would be ideal. If this were in place, it would potentially allow doctors to prescribe adequate treatment and prevent possible pregnancy complications and neonatal outcomes.

It is important to compare mild depression to major depression to determine whether mild depression can impact pregnancy complications and neonatal outcomes when major depression does not appear to increase complications, and to further understand the underlying associated mechanisms. Further research on the impact of episodic and continuous depression and anxiety on a child's emotional, social, cognitive, and intellectual development is needed, since treatment for depression and anxiety could prevent these possible adverse outcomes. It would also be important to employ quantitative and qualitative research methods to examine what sort of barriers and stigma women face when they reach out for help with antenatal depression and anxiety. If women are able to access appropriate treatment without feeling guilty or ashamed, this

may help to prevent antenatal depression and anxiety and in turn prevent the complications associated with it.

Finally, this thesis identified some instances where increased support also increased the likelihood of experiencing a pregnancy complication. This is opposite of what is generally found in the literature,¹⁰ therefore, it would be interesting to understand the relationship of various levels of support during pregnancy and determine if there is an optimal level of support and if too much support becomes smothering and stressful.

CHAPTER SIX: CONCLUSIONS

The purpose of this thesis was to determine whether major depression, mild depression, and anxiety had a negative impact on pregnancy complications and neonatal outcomes. This was done by using data from a CIHR-funded, longitudinal study of pregnant participants from the Saskatoon and surrounding area. Participants completed three comprehensive questionnaires. Time One was completed in the second trimester, Time Two was completed in the third trimester, and Time Three was completed in the early postpartum. These questionnaires contained scales to measure for depression and anxiety, as well as to collect information on socio-demographic factors, current stressors, emotional support, and risk behaviours. Additionally, at Time Three participants reported pregnancy complications, labour and delivery complications, birth outcomes, and neonatal complications.

The analysis carried out for this thesis included descriptive statistics and multivariate logistic regression. Eleven multivariate models showed a significant relationship with between major depression, mild depression, or anxiety and a pregnancy, labour, or birth complication/outcome.

The complications/outcomes significantly influenced by major depression include:

- gestational diabetes,
- induced labour,
- swelling/edema, and
- bleeding/abruption.

The complications/outcomes that were significantly influenced by mild depression include:

- antenatal bleeding/abruption,
- premature rupture of membranes (PROM),
- swelling/edema,
- caesarean birth, and
- vacuum/forceps

The complications/outcomes significantly influenced by anxiety were as follows:

- swelling/edema,
- caesarean birth , and
- epidural use

This study demonstrates that major depression, mild depression, and anxiety can have a negative impact on the pregnancy and delivery outcomes. While there were less significant associations than expected, and no significant associations with neonatal outcomes, this study compliments the existing literature by demonstrating at what stage in the pregnancy depression and anxiety may have an impact on the outcomes.

It was expected that continuous depression or anxiety would have a greater impact on the pregnancy and delivery outcomes than episodic symptoms. Although there were some outcomes significantly influenced by continuous depression and anxiety, this thesis demonstrates depression and anxiety in the second trimester to be most influential. This thesis also found that mild depression could have an impact on the pregnancy and delivery complications and outcomes.

This study had several strengths, including the large sample size, the comprehensive questionnaires completed by the participants, the use of the EPDS as a valid and reliable screening tool, and the fact that it was a prospective, cohort study. This

thesis clearly demonstrates that both mild and major depression, as well as anxiety, can seriously impact the pregnancy and delivery outcomes. It also shows that depression and anxiety that occur in the second trimester may have a greater influence on pregnancy complications and delivery outcomes. Currently, the FIP team is completing a follow-up on the development of the children born of the participants who took part in this study at three and five years.

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APPENDICES

Appendix A FIP Questionnaires

Questionnaire One- Second Trimester

PRESENT PREGNANCY

How would you rate your overall health today? Excellent Very Good Good Fair
Poor

Date of first pregnancy check-up_____ Who did you see? Doctor_____

Were you using birth control when you became pregnant? yes no
If yes, what birth control did you use? condom BCP Mirena/IUD Depoprovera
other_____

Did you plan this pregnancy? Yes No sort of

Do you plan to keep the baby? Yes No unsure

How do you feel about the pregnancy? happy scared overwhelmed not happy
other_____

How does your family feel about the pregnancy? happy unsure overwhelmed not happy

In the past two weeks:

Have you felt down, depressed or hopeless?

not at all several days more than ½ the days nearly every day

Have you felt little interest or pleasure in doing things?

not at all several days more than ½ the days nearly every day

Do you plan to breastfeed? Yes No Undecided

Are you interested in Prenatal Classes? Yes No Undecided

CURRENT PREGNANCY-please check those that apply

<input type="checkbox"/> severe nausea/vomiting	<input type="checkbox"/> incompetent cervix	<input type="checkbox"/> anemia
<input type="checkbox"/> spotting/bleeding	<input type="checkbox"/> premature labour	<input type="checkbox"/> Rh factor
<input type="checkbox"/> cramps	<input type="checkbox"/> Hypertension (high blood pressure)/swelling	<input type="checkbox"/> Diabetes
<input type="checkbox"/> headaches	<input type="checkbox"/> Urinary Tract Infection	<input type="checkbox"/> dental problems
<input type="checkbox"/> multiple pregnancy	<input type="checkbox"/> vaginal infection	<input type="checkbox"/> other
<input type="checkbox"/> placenta previa	<input type="checkbox"/> StrepB infection	

Medication	Reason	Amount	Frequency

MARITAL STATUS Are you? single CL married divorced/separated widowed

CURRENT RELATIONSHIP WITH BABY'S FATHER? Yes No

HOW SATISFIED ARE YOU WITH THE RELATIONSHIP? very somewhat not satisfied

EDUCATION: What grade did you finish? Grade 8 or less Grade 9 – 11 Grade 12 Some post-secondary Post-secondary Some University University

ETHNIC BACKGROUND

Are you? Caucasian Treaty –Status Non-Status Métis Other

Interviewer

PAST BIRTHS/ PREGNANCIES: G_____ P_____ T_____ P_____ A_____ L_____								
NAME	DOB	M F	Birth Wt	Gest	Complications/Comments	Anomalies or problems with child	Breastfed	Lives with

--	--	--	--	--	--	--	--	--

G=all pregnancies; P=20 weeks on; T=Term; P=Preterm <37weeks; A=miscarriage<20wks/abortions; L=living
 Complications – breech, fetal distress, infections, APH/PPH, mastitis, postdates
 Problem with child – Down’s syndrome, cleft palate, heart problems, NICU, severe jaundice, blood transfusion

HEALTH HISTORY-check which things you have experienced problems with

<input type="checkbox"/> severe nausea/vomiting	<input type="checkbox"/> HIV	<input type="checkbox"/> thyroid
<input type="checkbox"/> spotting/bleeding	<input type="checkbox"/> Strep B Infection	<input type="checkbox"/> heart disease
<input type="checkbox"/> headaches	<input type="checkbox"/> anemia	<input type="checkbox"/> allergies
<input type="checkbox"/> Urinary Tract Infection	<input type="checkbox"/> Rh factor	<input type="checkbox"/> surgeries
<input type="checkbox"/> vaginal infection	<input type="checkbox"/> diabetes	<input type="checkbox"/> Hepatitis
<input type="checkbox"/> Sexually Transmitted Infections	<input type="checkbox"/> seizures	<input type="checkbox"/> other

HOUSING Do you? own rent parents room & board YWCA other
 # of adults in household_____ # of children under 18_____

Is it Adequate/suitable? yes no unknown Plan to move: yes no when? _____

EMPLOYMENT Do you work outside the home? Yes No
 If yes, What is your occupation?_____ how many hours/week do you work?_____

FINANCES Do you have any financial concerns: Yes No
 Are you getting? DCRE/social services Employment Supplement Band funding Student loan PTA
 parents partner _____

In the past 12 months, did you or anyone else in your house.
 Not have enough food to eat? Yes No
 Worry that there would not be enough to eat because of a lack of money? Yes No

Do you have a history of PMS? Yes No When did it start? ____age before or after pregnancies

Treated Yes No Medication Yes No

Do you have a history of depression? Yes No when?
 Treated Yes No Medication Yes No

Interviewer

Did you have depression in previous pregnancy? Yes No when?
Treated Yes No Medication Yes No

Have you had postpartum depression? Yes No when?
Treated Yes No Medication Yes No

In the past two weeks:

Do your moods go up and down? not at all several days more than 1/2 the days nearly every day

Do you have mood swings that occur for no reason? not at all several days more than 1/2 the days nearly every day

Now some questions about your family...

Is your mother alive? Yes No If no, how old were you when she died? _____

Did your mother or any of your sisters have depression before or after giving birth? unknown
Mother Yes No sister: 1. Yes No 2. Yes No 3. Yes No

What things are causing you the most stress right now? nothing right now
 being pregnant partner/relationship not enough money children family
 where I live health of my baby birth of my baby health work
 school Other _____

Do you have someone to turn to for emotional support? Yes No *If yes, who gives you support?*
 Partner Mother (*don't ask if mother not alive*) Friend Female relatives Other _____

Who of these gives you the most support? _____
Can you count on that person to care about you no matter what? Yes No

During the past year, from yesterday to one year ago yesterday...
Have you had a drink alcoholic beverages (beer, wine, coolers) at all? Yes No *If yes,*

Did you drink alcohol?
Less than once a month once a month 2 to 3 times/month
once a week 2 to 3 times a week 4-6 times a week every day

How often did you have more than 5 drinks at one time?
Never less than once a month once a month
2 to 3 times/month once a week more than once a week

During the past week, did you drink alcohol? Yes No

The next three questions relate to any type of abuse you may be experiencing or have experienced.

Has anyone ever hit, slap, restrained, punch, pinch, kick, beat you? Yes No
Has anyone ever yell, belittle, berate, blame, neglect? Yes No
Has anyone touched you against your will, raped you? Yes No

Have you had counseling in the past? Yes No
If yes, what for? depression relationship addiction eating disorder abuse
 other _____

Are you seeing a counselor right now? Yes No
If yes, why? depression relationship addiction eating disorder abuse

Do you have any legal problems? Yes No

Date: _____ Interviewer: _____ person/telephone

Please underline the answer, which comes closest to how you have felt in the past 7 days, not just how you feel today:

I have felt happy:

Yes, most of the time

Yes, some of the time

No, not very often

No, not at all

In the past 7 days:

1. I have been able to laugh and see the funny side of things:
As much as I always could
Not quite so much now
Definitely not so much now
Not at all
2. I have looked forward with enjoyment to things:
As much as I ever did
Rather less than I used to
Definitely less than I used to
Hardly at all
3. I have blamed myself unnecessarily when things went wrong:
Yes, most of the time
Yes, some of the time
Not very often
No, never
4. I have been anxious or worried for no good reason:
No, not at all
Hardly ever
Yes, sometimes
Yes, very often
5. I have felt scared or panicky for no very good reason:
Yes, quite a lot
Yes, sometimes
No, not much
No, not at all
6. Things have been getting on top of me:
Yes, most of the time I haven't been able to cope at all
Yes, sometimes I haven't been coping as well as usual
No, most of the time I have coped quite well
No, I have been coping as well as ever

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

Circle the response that fits closest to your experience during the past 7 days.

1. How often have you felt like being sick (nauseated) in the past week?

All the time More than once a day Daily 3-6 days during the week Occasionally Not at all

2. How often have you retched/dry heaved (but without actually being sick) in the past week?

All the time More than once a day Daily 3-6 days during the week Occasionally Not at all

3. How often have you been physically sick (vomited) during the past week?

All the time More than once a day Daily 3-6 days during the week Occasionally Not at all

Please circle a number for each one to show how much of a worry it is to you now, from 1 if it is not a worry to 5 if it is something that you are extremely worried about:

	Not a worry	Major worry			
Your housing	1	2	3	4	5
Money problems	1	2	3	4	5
Problems with the law	1	2	3	4	5
Your relationship with your partner/husband	1	2	3	4	5
Your relationship with your family and friends	1	2	3	4	5
Your own health	1	2	3	4	5
The health of someone close to you	1	2	3	4	5
Employment problems	1	2	3	4	5
The possibility of something being wrong with baby	1	2	3	4	5
Going to hospital	1	2	3	4	5
Internal examinations	1	2	3	4	5
Giving birth	1	2	3	4	5
Coping with the new baby	1	2	3	4	5
Giving up work (if applicable)	1	2	3	4	5
Whether your partner will be with you for the birth	1	2	3	4	5
Possibility of miscarriage	1	2	3	4	5

If there is anything else that is worrying you or you would like to say anything more about any of the above, please use this space to tell us about it:

How many drinks can you hold? ____

Have close friends or relatives worried or complained about your drinking in the last year? Yes No

Do you sometimes take a drink in the morning when you first get up? Yes No

Has a friend or family member ever told you about things you said or did while you were drinking that you could not remember? Yes No

Do you sometimes feel the need to cut down on your drinking? Yes No

In the last month...

How much do you exercise? (walking for 20 minutes, swimming etc.)

- Every day
- 2-3 times a week
- Occasionally
- Never

How much do you smoke? (✓ **one**)

- More than a pack/day
- 5-20/day
- Less than 5 a day
- Quit since pregnant
- Quit before pregnant
- I never smoked

Does anyone else smoke inside your home? Yes No

If you do/did smoke cigarettes, how old were you when you started smoking? _____

How often did you drink beer or other alcohol? (✓ **all that apply**)

- Occasional drink or 2
- 1-2 drinks a day
- 5+ drinks at one time
- Quit since pregnant
- Quit before pregnant
- I never drank alcohol

If you do/did drink alcohol, how old were you when you started drinking? _____

How often did you use drugs such as marijuana, crystal meth. cocaine? (✓ **one**)

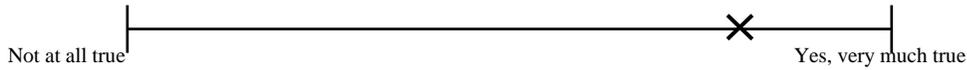
- Regular (every day)
- Occasionally
- Quit since pregnancy
- Quit before pregnant
- I never use such drugs

If you do/did use drugs, how old were you when you started using drugs? _____

Your family income: (✓ **one only**)

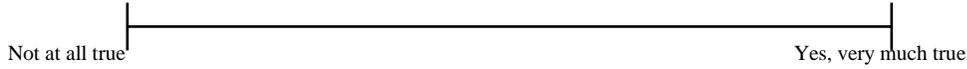
- Social/Band Assistance:
- Less than \$20,000./yr
- \$20-40,000./yr
- \$40-60,000./yr
- More than \$60,000./yr

I have frequent hiccups. (Place an 'X' on the line as below)

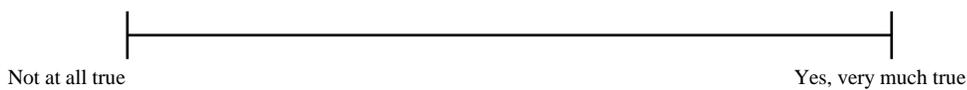


In the last month how much have the following statements been true for you?

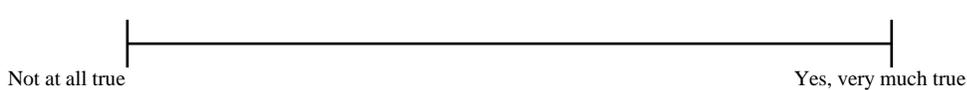
1. I have frequent ups and downs of moods.



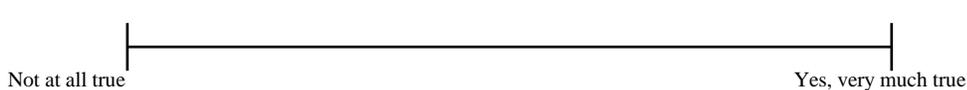
2. I have mood swings that occur for no reason.



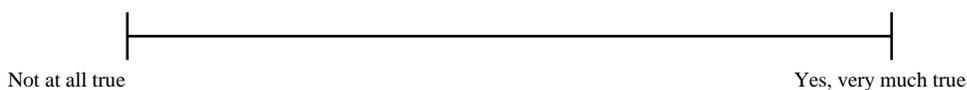
3. Other people complain about my mood swings.



4. Because of my moods, I have trouble following through with my plans.



5. I don't like to make commitments because my moods might change.



Your postal code _____

Please circle the number to indicate whether you strongly agree, agree, disagree or strongly disagree to the following statements about your community	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
This is a close knit neighbourhood	1	2	3	4
People in this neighbourhood can be trusted	1	2	3	4
People around here are willing to help their neighbours	1	2	3	4
People in this neighbourhood do not share the same values	1	2	3	4
People in this neighbourhood generally do not get along with each other	1	2	3	4
It is safe to walk alone in this neighbourhood after dark	1	2	3	4
It is safe for children to play outside during the day	1	2	3	4
There are good parks, playgrounds and play spaces in this neighbourhood	1	2	3	4

How do you feel about your neighbourhood as a place to bring up child? Is it...

Excellent Good Average Poor Very poor

1.	I have been able to laugh and see the funny side of things:		
	As much as I always could	0	
	Not quite so much now	1	
	Definitely not so much now	2	
	Not at all	3	
2.	I have looked forward with enjoyment to things:		
	As much as I ever did	0	
	Rather less than I used to	1	
	Definitely less than I used to	2	
	Hardly at all	3	
3.	I have blamed myself unnecessarily when things went wrong:		
	Yes, most of the time	3	
	Yes, some of the time	2	
	Not very often	1	
	No, never	0	
4.	I have been anxious or worried for no good reason:		
	No, not at all	0	
	Hardly ever	1	
	Yes, sometimes	2	
	Yes, very often	3	
5.	I have felt scared or panicky for no very good reason:		
	Yes, quite a lot	3	
	Yes, sometimes	2	
	No, not much	1	
	No, not at all	0	
6.	Things have been getting on top of me:		
	Yes, most of the time I haven't been able to cope at all	3	
	Yes, sometimes I haven't been coping as well as usual	2	
	No, most of the time I have coped quite well	1	
	No, I have been coping as well as ever	0	
7.	I have been so unhappy that I have had difficulty sleeping:		
	Yes, most of the time	3	
	Yes, sometimes	2	
	Not very often	1	
	No, not at all	0	
8.	I have felt sad or miserable:		
	Yes, most of the time	3	
	Yes, quite often	2	
	Not very often	1	
	No, not at all	0	
9.	I have been so unhappy that I have been crying:		
	Yes, most of the time	3	
	Yes, quite often	2	
	Only occasionally	1	
	No, never	0	
10.	The thought of harming myself has occurred to me:		
	Yes, quite often	3	
	Sometimes	2	
	Hardly ever	1	
	Never	0	
		SCORE	Gestation _____ wks

REFERRAL Refused reason _____

Family Physician
 KidsFirst
 Community Clinic
 Crisis
 Emergency
 Mental Health Services
 Counselor
 Other _____

Comments: _____

Interviewer _____ Person/Telephone _____ Date _____

Questionnaire Two- Second Trimester

Please underline the answer, which comes closest to how you have felt in the past 7 days, not just how you feel today:

I have felt happy:

Yes, most of the time

Yes, some of the time

No, not very often

No, not at all

In the past 7 days:

11. I have been able to laugh and see the funny side of things:
As much as I always could
Not quite so much now
Definitely not so much now
Not at all
12. I have looked forward with enjoyment to things:
As much as I ever did
Rather less than I used to
Definitely less than I used to
Hardly at all
13. I have blamed myself unnecessarily when things went wrong:
Yes, most of the time
Yes, some of the time
Not very often
No, never
14. I have been anxious or worried for no good reason:
No, not at all
Hardly ever
Yes, sometimes
Yes, very often
15. I have felt scared or panicky for no very good reason:
Yes, quite a lot
Yes, sometimes
No, not much
No, not at all
16. Things have been getting on top of me:
Yes, most of the time I haven't been able to cope at all
Yes, sometimes I haven't been coping as well as usual
No, most of the time I have coped quite well
No, I have been coping as well as ever
17. I have been so unhappy that I have had difficulty sleeping:
Yes, most of the time
Yes, sometimes
Not very often
No, not at all
18. I have felt sad or miserable:
Yes, most of the time
Yes, quite often
Not very often
No, not at all
19. I have been so unhappy that I have been crying:
Yes, most of the time
Yes, quite often
Only occasionally
No, never
20. The thought of harming myself has occurred to me:
Yes, quite often
Sometimes
Hardly ever
Never

Since we last met...have you been prescribed or taken medications? Yes No

Or taken any over the counter medications? Yes No

WHEN	How many weeks pregnant?	WHAT medication	WHAT FOR

Are you taking any medications now? Yes No
 if yes, What? Why?

Since we last met...

Have you had a drink alcoholic beverages (beer, wine, coolers) at all? Yes No *if yes,*

Did you drink alcohol?

Less than once a month once a month 2 to 3 times/month
 once a week 2 to 3 times a week 4-6 times a week every day

how often did you have more than 5 drinks at one time?

Never less than once a month once a month
 2 to 3 times/month once a week more than once a week

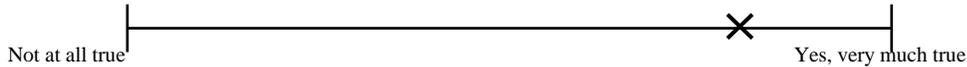
During the past week, did you drink alcohol? Yes No

Please circle a number for each one to show how much of a worry it is to you now, from 1 if it is not a worry to 5 if it is something that you are extremely worried about:

	Not a worry		Major worry		
Your housing	1	2	3	4	5
Money problems	1	2	3	4	5
Problems with the law	1	2	3	4	5
Your relationship with your partner/husband	1	2	3	4	5
Your relationship with your family and friends	1	2	3	4	5
Your own health	1	2	3	4	5
The health of someone close to you	1	2	3	4	5
Employment problems	1	2	3	4	5
The possibility of something being wrong with baby	1	2	3	4	5
Going to hospital	1	2	3	4	5
Internal examinations	1	2	3	4	5
Giving birth	1	2	3	4	5
Coping with the new baby	1	2	3	4	5
Giving up work (if applicable)	1	2	3	4	5
Whether your partner will be with you for the birth	1	2	3	4	5
Labour too early	1	2	3	4	5

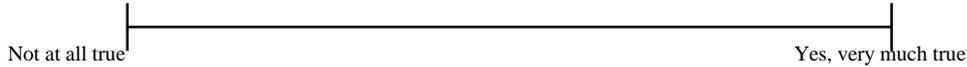
If there is anything else that is worrying you or you would like to say anything more about any of the above, **please use this space to tell us about it:**

I have frequent hiccups. (Place an 'X' on the line as below)

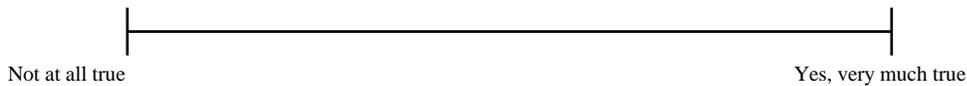


In the last month how much have the following statements been true for you?

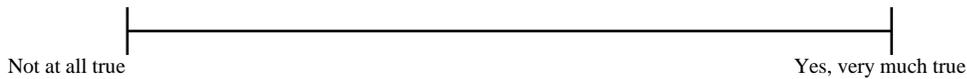
1. I have frequent ups and downs of moods.



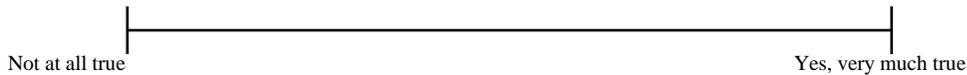
2. I have mood swings that occur for no reason.



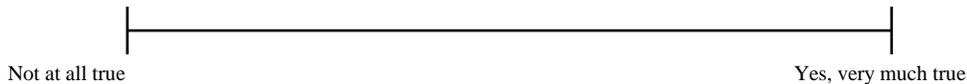
3. Other people complain about my mood swings.



4. Because of my moods, I have trouble following through with my plans.



5. I don't like to make commitments because my moods might change.



Circle the response that fits closest to your experience during the past 7 days.

1. How often have you felt like being sick (nauseated) in the past week?

All the time More than once a day Daily 3-6 days during the week Occasionally Not at all

3. How often have you retched/dry heaved (but without actually being sick) in the past week?

All the time More than once a day Daily 3-6 days during the week Occasionally Not at all

3. How often have you been physically sick (vomited) during the past week?

All the time More than once a day Daily 3-6 days during the week Occasionally Not at all

	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
Please circle the number to indicate whether you strongly agree, agree, disagree or strongly disagree to the following statements about your community				
This is a close knit neighbourhood	1	2	3	4
People in this neighbourhood can be trusted	1	2	3	4
People around here are willing to help their neighbours	1	2	3	4
People in this neighbourhood do not share the same values	1	2	3	4
People in this neighbourhood generally do not get along with each other	1	2	3	4
It is safe to walk alone in this neighbourhood after dark	1	2	3	4
It is safe for children to play outside during the day	1	2	3	4
There are good parks, playgrounds and play spaces in this neighbourhood	1	2	3	4

How do you feel about your neighbourhood as a place to bring up child? Is it...
Excellent Good Average Poor Very poor your postal code _____

How would you rate your overall health today? Excellent Very Good Good Fair Poor

What things are causing you the most stress right now? nothing right now
 being pregnant partner/relationship not enough money children family
 where I live health of my baby birth of my baby health work
 school Other _____

Do you have someone to turn to for emotional support? Yes No
if yes, who gives you support? Partner Mother Friend _____ Female relatives
Other who? _____
Who of these gives you the most support? _____

Can you count on that person to care about you no matter what? Yes No

In the past two weeks:

Have you felt down, depressed or hopeless?
 not at all several days more than 1/2 the days nearly every day

Have you felt little interest or pleasure in doing things?
 not at all several days more than 1/2 the days nearly every day

Are you in a relationship now? Yes No
If yes, How satisfied are you with the relationship? very somewhat not satisfied

Since we last talked to you...

Have you been hit, kicked, pushed, pinched, restrained or otherwise physically hurt? Yes No

Are you seeing a counsellor right now? Yes No
If yes, for what? Depression Stress Relationship Alcohol
Other please specify _____

In the last month...

How much do you exercise? (walking for 20 minutes, swimming etc.)
Every day
2-3 times a week
Occasionally
Never

How much do you smoke? (one)
More than a pack/day
5-20/day
Less than 5 a day
Quit since pregnant
Quit before pregnant
I never smoked

Does anyone else smoke inside your home? Yes No

How often did you drink beer or other alcohol? (ALL that apply)
Occasional drink or 2
1-2 drinks a day
5+ drinks at one time
Quit since pregnant
Quit before pregnant
I never drank alcohol

How often did you use drugs such as marijuana, crystal meth. cocaine? (one)
Regular (every day)
Occasionally
Quit since pregnancy
Quit before pregnant
I never use such drugs

Interviewer

1.	I have been able to laugh and see the funny side of things:		
	As much as I always could	0	
	Not quite so much now	1	
	Definitely not so much now	2	
	Not at all	3	
11.	I have looked forward with enjoyment to things:		
	As much as I ever did	0	
	Rather less than I used to		1
	Definitely less than I used to	2	
	Hardly at all		3
12.	I have blamed myself unnecessarily when things went wrong:		
	Yes, most of the time	3	
	Yes, some of the time	2	
	Not very often		1
	No, never	0	
13.	I have been anxious or worried for no good reason:		
	No, not at all		0
	Hardly ever		1
	Yes, sometimes		2
	Yes, very often		3
14.	I have felt scared or panicky for no very good reason:		
	Yes, quite a lot		3
	Yes, sometimes		2
	No, not much		1
	No, not at all		0
15.	Things have been getting on top of me:		
	Yes, most of the time I haven't been able to cope at all	3	
	Yes, sometimes I haven't been coping as well as usual		2
	No, most of the time I have coped quite well		1
	No, I have been coping as well as ever		0
16.	I have been so unhappy that I have had difficulty sleeping:		
	Yes, most of the time	3	
	Yes, sometimes		2
	Not very often		1
	No, not at all		0
17.	I have felt sad or miserable:		
	Yes, most of the time	3	
	Yes, quite often		2
	Not very often		1
	No, not at all		0
18.	I have been so unhappy that I have been crying:		
	Yes, most of the time	3	
	Yes, quite often		2
	Only occasionally		1
	No, never	0	
19.	The thought of harming myself has occurred to me:		
	Yes, quite often		3
	Sometimes	2	
	Hardly ever		1
	Never		0
			SCORE_____ Gestation_____wks

REFERRAL Refused reason _____

- Family Physician
 KidsFirst
 Community Clinic
 Crisis
 Emergency
 Mental Health Services
 Counselor
 Other _____

Comments: _____

Please underline the answer, which comes closest to how you have felt in the past 7 days, not just how you feel today:

I have felt happy:

- Yes, most of the time
- Yes, some of the time
- No, not very often
- No, not at all

In the past 7 days:

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

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

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

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

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

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

27. I have been so unhappy that I have had difficulty sleeping:
 - Yes, most of the time
 - Yes, sometimes
 - Not very often
 - No, not at all

28. I have felt sad or miserable:
 - Yes, most of the time
 - Yes, quite often
 - Not very often
 - No, not at all

29. I have been so unhappy that I have been crying:
 - Yes, most of the time
 - Yes, quite often
 - Only occasionally
 - No, never

30. The thought of harming myself has occurred to me:
 - Yes, quite often
 - Sometimes
 - Hardly ever
 - Never

Circle the response that fits closest to your experience during the past 7 days.

1. How often have you felt like being sick (nauseated) in the past week?

All the time More than once a day Daily 3-6 days during the week Occasionally Not at all

4. How often have you retched/dry heaved (but without actually being sick) in the past week?

All the time More than once a day Daily 3-6 days during the week Occasionally Not at all

3. How often have you been physically sick (vomited) during the past week?

All the time More than once a day Daily 3-6 days during the week Occasionally Not at all

Since we last met...

Have you had a drink alcoholic beverages (beer, wine, coolers) at all? Yes No *if yes,*

Since we last met, did you drink alcohol?

Less than once a month once a month 2 to 3 times/month
 once a week 2 to 3 times a week 4-6 times a week every day

Since we last met, how often did you have more than 5 drinks at one time?

Never 1 less than once a month once a month
 2 to 3 times/month once a week more than once a week

During the past week, did you drink alcohol? Yes No

Please circle a number for each one to show how much of a worry it is to you now, from 1 if it is not a worry to 5 if it is something that you are extremely worried about:

	Not a worry		Major worry		
Your housing	1	2	3	4	5
Money problems	1	2	3	4	5
Problems with the law	1	2	3	4	5
Your relationship with your partner/husband	1	2	3	4	5
Your relationship with your family and friends	1	2	3	4	5
Your own health	1	2	3	4	5
The health of someone close to you	1	2	3	4	5
Employment problems	1	2	3	4	5
The possibility of something being wrong with baby	1	2	3	4	5
Coping with the new baby	1	2	3	4	5
Giving up work (if applicable)	1	2	3	4	5

If there is anything else that is worrying you or you would like to say anything more about the above,

Please use this space to tell us about it:

How would you rate your overall health today? Excellent Very Good Good Fair Poor

What things are causing you the most stress right now? nothing right now *if yes, what*
 partner/relationship not enough money children family
 where I live health of my baby birth of my baby health work
 school Other _____

In the past two weeks:

Have you felt down, depressed or hopeless?
 not at all several days more than ½ the days nearly every day

Have you felt little interest or pleasure in doing things?
 not at all several days more than ½ the days nearly every day

Do you have someone to turn to for emotional support? Yes No
If yes, who gives you support? Partner Mother Friend _____ Female relatives
Other who? _____ Who of these gives you the most support? _____

Can you count on that person to care about you no matter what? Yes No

Are you in a relationship now? Yes No
If yes, How satisfied are you with the relationship? very somewhat not satisfied

Since we last met...

Have you been hit, kicked, pushed, pinched, restrained, or otherwise physically hurt, since becoming pregnant? Yes No

Are you seeing a counsellor right now? Yes No
If yes, for what? Depression Stress Relationship Alcohol
Other please specify _____

In the last month...

How much do you exercise? (walking for 20 minutes, swimming etc.)
Every day
2-3 times a week
Occasionally
Never

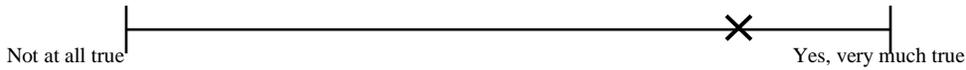
How much do you smoke? (one)
More than a pack/day
5-20/day
Less than 5 a day
Quit since pregnant
Quit before pregnant
I never smoked

Does anyone else smoke inside your home? Yes No

How often did you drink beer or other alcohol? (ALL that apply)
Occasional drink or 2
1-2 drinks a day
5+ drinks at one time
Quit since pregnant
Quit before pregnant
I never drank alcohol

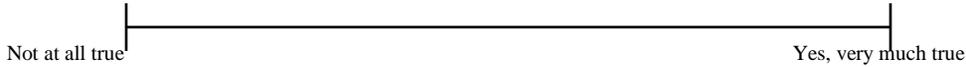
How often did you use drugs such as marijuana, crystal meth. cocaine? (one)
Regular (every day)
Occasionally
Quit since pregnancy
Quit before pregnant
I never use such drugs

I have frequent hiccups. (Place an 'X' on the line as below)

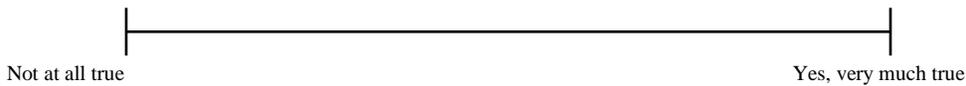


In the last month how much have the following statements been true for you?

1. **I have frequent ups and downs of moods.**



2. **I have mood swings that occur for no reason.**



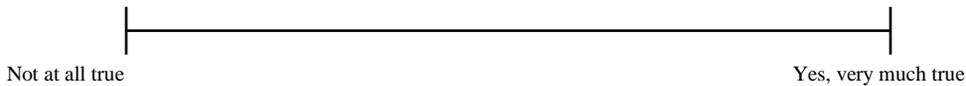
3. **Other people complain about my mood swings.**



4. **Because of my moods, I have trouble following through with my plans.**



5. **I don't like to make commitments because my moods might change.**



Your postal code _____

Please circle the number to indicate whether you strongly agree, agree, disagree or strongly disagree to the following statements about your community	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
This is a close knit neighbourhood	1	2	3	4
People in this neighbourhood can be trusted	1	2	3	4
People around here are willing to help their neighbours	1	2	3	4
People in this neighbourhood do not share the same values	1	2	3	4
People in this neighbourhood generally do not get along with each other	1	2	3	4
It is safe to walk alone in this neighbourhood after dark	1	2	3	4
It is safe for children to play outside during the day	1	2	3	4
There are good parks, playgrounds and play spaces in this neighbourhood	1	2	3	4

How do you feel about your neighbourhood as a place to bring up child? Is it...

Excellent Good Average Poor Very poor

Interviewer

- | | | | |
|-----|---|---|--|
| 1. | I have been able to laugh and see the funny side of things: | | |
| | As much as I always could | 0 | |
| | Not quite so much now | 1 | |
| | Definitely not so much now | 2 | |
| | Not at all | 3 | |
| 20. | I have looked forward with enjoyment to things: | | |
| | As much as I ever did | 0 | |
| | Rather less than I used to | 1 | |
| | Definitely less than I used to | 2 | |
| | Hardly at all | 3 | |
| 21. | I have blamed myself unnecessarily when things went wrong: | | |
| | Yes, most of the time | 3 | |
| | Yes, some of the time | 2 | |
| | Not very often | 1 | |
| | No, never | 0 | |
| 22. | I have been anxious or worried for no good reason: | | |
| | No, not at all | 0 | |
| | Hardly ever | 1 | |
| | Yes, sometimes | 2 | |
| | Yes, very often | 3 | |
| 23. | I have felt scared or panicky for no very good reason: | | |
| | Yes, quite a lot | 3 | |
| | Yes, sometimes | 2 | |
| | No, not much | 1 | |
| | No, not at all | 0 | |
| 24. | Things have been getting on top of me: | | |
| | Yes, most of the time I haven't been able to cope at all | 3 | |
| | Yes, sometimes I haven't been coping as well as usual | 2 | |
| | No, most of the time I have coped quite well | 1 | |
| | No, I have been coping as well as ever | 0 | |
| 25. | I have been so unhappy that I have had difficulty sleeping: | | |
| | Yes, most of the time | 3 | |
| | Yes, sometimes | 2 | |
| | Not very often | 1 | |
| | No, not at all | 0 | |
| 26. | I have felt sad or miserable: | | |
| | Yes, most of the time | 3 | |
| | Yes, quite often | 2 | |
| | Not very often | 1 | |
| | No, not at all | 0 | |
| 27. | I have been so unhappy that I have been crying: | | |
| | Yes, most of the time | 3 | |
| | Yes, quite often | 2 | |
| | Only occasionally | 1 | |
| | No, never | 0 | |
| 28. | The thought of harming myself has occurred to me: | | |
| | Yes, quite often | 3 | |
| | Sometimes | 2 | |
| | Hardly ever | 1 | |
| | Never | 0 | |

SCORE _____ pp _____ wks

REFERRAL Refused reason _____
 Family Physician KidsFirst Community Clinic Crisis Emergency
 Mental Health Services Counselor Other _____

All three study Times complete yes no, if no, why not
 Miscarriage Abortion Stillbirth Baby up for adoption
 Moved refused Unable to reach other

Comment

Appendix B Outcomes not significant with major depression

Logistic Regression Model for Hypertension

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	0.506(0.378)	0.181	1.659	0.790-3.482
3 rd Trimester ^a	0.218(0.505)	0.666	1.244	0.462-3.347
Both Trimesters ^a	0.717(0.527)	0.174	2.049	0.729-5.761

^a Reference category is No Depression

Although the *p*-value for the 2nd trimester and both trimesters reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates it did not reach significance

Logistic Regression Model for Postpartum Hemorrhage

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	0.360(0.505)	0.476	1.433	0.533-3.854
3 rd Trimester ^a	-0.074(0.754)	0.922	0.929	0.212-4.069
Both Trimesters ^a	-0.395(1.041)	0.704	0.673	0.088-5.180

^a Reference category is No Depression

Logistic Regression Model for PROM

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	0.429(0.507)	0.398	1.535	0.569-4.147
3 rd Trimester ^a	-0.732(1.034)	0.479	0.481	0.063-3.650
Both Trimesters ^a	-0.326(1.042)	0.754	0.722	0.094-5.562

^a Reference category is No Depression

Logistic Regression Model for Infection in Mother

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	0.429(0.507)	0.398	1.535	0.569-4.147
3 rd Trimester ^a	-0.732(1.034)	0.479	0.481	0.063-3.650
Both Trimesters ^a	-0.326(1.042)	0.754	0.722	0.094-5.562

^a Reference category is No Depression

Logistic Regression Model for Preterm Labour

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
--	---------------	-----------------	------------	------------------

				OR
Depression ^a				
2 nd Trimester ^a	-0.305(1.051)	0.772	0.737	0.094-5.784
3 rd Trimester ^a	0.952(0.787)	0.226	2.592	0.554-12.131
Both Trimesters ^a	-17.576(8770)	0.998	0.000	0.000*

^a Reference category is No Depression

Although the *p*-value for the 3rd trimester and both trimesters reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates it did not reach significance

The number of women with preterm labour and depression in both trimesters was too small for an association to be made.

Logistic Regression Model for Epidural Use

	β(S.E)	<i>p</i>-value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	0.014(0.298)	0.961	1.015	0.566-1.819
3 rd Trimester ^a	-0.107(0.380)	0.779	0.899	0.426-1.894
Both Trimesters ^a	0.110(0.459)	0.810	1.117	0.454-2.747

^a Reference category is No Depression

Logistic Regression Model for Spinal Anesthetic

	β(S.E)	<i>p</i>-value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	-0.065(0.370)	0.861	0.937	0.454-1.937
3 rd Trimester ^a	-0.239(0.504)	0.635	0.787	0.294-2.111
Both Trimesters ^a	-0.077(0.568)	0.892	0.926	0.304-2.817

^a Reference category is No Depression

Logistic Regression Model for Vacuum/Forceps (Operative Delivery)

	β(S.E)	<i>p</i>-value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	-1.012(0.609)	0.097	0.364	0.110-1.201
3 rd Trimester ^a	-0.469(0.446)	0.293	1.599	0.667-3.834
Both Trimesters ^a	-0.470(0.775)	0.534	0.625	0.142-2.747

^a Reference category is No Depression

Although depression in the second trimester is approaching significance, once a model was built, it was no longer significant indicating that other covariates were accounting for the vacuum/forceps delivery.

Logistic Regression Model for Preterm Birth

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	0.201(0.462)	0.662	1.223	0.459-3.022
3 rd Trimester ^a	-0.086(0.625)	0.890	0.917	0.269-3.124
Both Trimesters ^a	0.769(0.577)	0.182	2.159	0.697-6.688

^a Reference category is No Depression

Logistic Regression Model for SGA

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	-0.178(0.545)	0.744	0.837	0.288-2.436
3 rd Trimester ^a	-0.016(0.626)	0.979	0.984	0.288-3.357
Both Trimesters ^a	0.552(0.646)	0.393	1.736	0.489-6.162

^a Reference category is No Depression

Logistic Regression Model for LGA

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	0.132(0.431)	0.759	1.142	0.491-2.656
3 rd Trimester ^a	0.248(0.506)	0.624	1.281	0.476-3.452
Both Trimesters ^a	-0.227(0.759)	0.765	0.797	0.180-3.527

^a Reference category is No Depression

Logistic Regression Model for Meconium

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	-0.833(0.740)	0.260	0.435	0.102-1.854
3 rd Trimester ^a	0.385(0.558)	0.491	1.469	0.492-4.389
Both Trimesters ^a	0.520(0.643)	0.419	1.682	1.682-5.929

^a Reference category is No Depression

Logistic Regression Model for Jaundice

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	-0.373(0.312)	0.231	0.689	0.374-1.268
3 rd Trimester ^a	-0.239(0.374)	0.522	0.787	0.378-1.638
Both Trimesters ^a	-0.442(0.467)	0.344	0.643	0.257-1.606

^a Reference category is No Depression

Although the p -value for the 2nd trimester reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates it did not reach significance

Logistic Regression Model for Admittance to the NICU

	β (S.E)	p -value	Odds Ratio	CI at 95% for OR
Depression ^a				
2 nd Trimester ^a	0.203(0.408)	0.619	1.225	0.551-2.726
3 rd Trimester ^a	-0.395(0.621)	0.525	0.674	0.200-2.275
Both Trimesters ^a	0.684(0.527)	0.194	1.982	0.706-5.566

^a Reference category is No Depression

Although the p -value for both trimesters reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates it did not reach significance

Appendix C: Outcomes not significant with Mild Depression

Logistic Regression Model for Gestational Diabetes

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	0.511(0.559)	0.361	1.667	0.557-4.988

^a Reference category is No Mild Depression

Logistic Regression Model for Swelling/Edema

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	0.469(0.302)	0.120	1.599	0.885-2.888
3 rd Trimester ^a	0.311(0.319)	0.329	1.365	0.731-2.549
Both Trimesters ^a	0.041(0.677)	0.951	1.042	0.276-3.930

^a Reference category is No Mild Depression

Although the *p*-value for the 2nd trimester reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates it did not reach significance.

Logistic Regression Model for Hypertension

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	-0.118(0.456)	0.796	0.889	0.364-2.171
3 rd Trimester ^a	0.522(0.398)	0.189	1.686	0.773-3.677
Both Trimesters ^a	-19.351(13397)	0.999	0.000	0.000

^a Reference category is No Mild Depression

Although the *p*-value for the 3rd trimester reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates it did not reach significance. The number of women with hypertension and mild depression in both trimesters was too small for an association to be made.

Logistic Regression Model for UTI

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	0.177(0.390)	0.650	1.193	0.556-2.560
3 rd Trimester ^a	0.192(0.411)	0.640	1.212	0.541-2.714
Both Trimesters ^a	-19.535(13397)	0.999	0.000	0.000

^a Reference category is No Mild Depression

The number of women with urinary tract infection and mild depression in both trimesters was too small for an association to be made.

Logistic Regression Model for Postpartum Hemorrhage

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	0.615(0.743)	0.408	0.540	0.126-2.320
3 rd Trimester ^a	-0.500(0.745)	0.502	0.606	0.141-2.612
Both Trimesters ^a	0.441(0.1075)	0.682	1.554	0.189-12.778

^a Reference category is No Mild Depression

Logistic Regression Model for Preterm Labour

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	0.852(0.669)	0.196	2.344	0.644-8.532
3 rd Trimester ^a	-17.643(6129)	0.998	0.000	0.000
Both Trimesters ^a	1.480(1.097)	0.177	4.394	0.511-37.751

^a Reference category is No Mild Depression

Although the *p*-values for the 2nd trimester and both trimesters reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates both did not reach significance

The number of women with preterm labour and mild depression in 3rd trimester was too small for an association to be made.

Logistic Regression Model for Induced Labour

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	-0.153(0.302)	0.613	0.858	0.475-1.552
3 rd Trimester ^a	0.479(0.345)	0.165	1.614	0.821-3.173
Both Trimesters ^a	-0.581(0.677)	0.391	0.559	0.148-2.110

^a Reference category is No Mild Depression

Although the *p*-value for the 3rd trimester reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates it did not reach significance

Logistic Regression Model for Preterm Birth

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	0.178(0.461)	0.700	1.194	0.484-2.947
3 rd Trimester ^a	-0.078(0.547)	0.887	0.925	0.317-2.704

Both Trimesters ^a	0.201(1.079)	0.852	1.223	0.147-10.144
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^a Reference category is No Mild Depression

Logistic Regression for Spinal Anesthetic

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	0.198(0.362)	0.584	1.219	0.600-2.478
3 rd Trimester ^a	0.244(0.362)	0.521	1.276	0.606-2.685
Both Trimesters ^a	0.745(0.717)	0.299	2.106	0.517-8.580

^a Reference category is No Mild Depression

Logistic Regression Model for Meconium

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	-1.617(1.022)	0.114	0.198	0.027-1.427
3 rd Trimester ^a	-1.526(1.023)	0.136	0.217	0.029-1.615
Both Trimesters ^a	-18.992(13397)	0.999	0.000	0.000

^a Reference category is No Mild Depression

Although the *p*-values for the 2nd and 3rd trimesters reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates both did not reach significance

The number of women with meconium and mild depression in both trimesters was too small for an association to be made.

Logistic Regression Model for Jaundice

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	0.358(0.306)	0.243	1.430	0.784-2.607
3 rd Trimester ^a	0.072(0.323)	0.824	1.074	0.570-2.023
Both Trimesters ^a	-0.853(0.807)	0.291	0.426	0.088-2.074

^a Reference category is No Mild Depression

Although the *p*-value for the 2nd trimester reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates it did not reach significance

Logistic Regression Model for Admittance to the NICU

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	-0.171(0.455)	0.706	0.843	0.346-2.054
3 rd Trimester ^a	0.029(0.460)	0.949	1.030	0.418-2.538

Both Trimesters ^a	-19.382(13397)	0.999	0.000	0.000
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^a Reference category is No Mild Depression

The number of women with NICU and mild depression in both trimesters was too small for an association to be made.

Logistic Regression Model for SGA

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	0.364(0.465)	0.434	1.439	0.578-3.577
3 rd Trimester ^a	0.108(0.551)	0.844	1.115	0.379-3.279
Both Trimesters ^a	0.387(1.081)	0.720	1.473	0.177-12.259

^a Reference category is No Mild Depression

Logistic Regression Model for LGA

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Mild Depression ^a				
2 nd Trimester ^a	-0.260(0.491)	0.597	0.771	0.294-2.021
3 rd Trimester ^a	-0.310(0.544)	0.569	0.734	0.253-2.131
Both Trimesters ^a	-0.031(1.078)	0.977	0.970	0.117-8.017

^a Reference category is No Mild Depression

Appendix D Outcomes not significant with anxiety

Logistic Regression Model for Anxiety

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	0.260(0.320)	0.416	1.298	0.693-2.431
3 rd Trimester ^a	0.027(0.424)	0.949	1.028	0.447-2.360
Both Trimesters ^a	0.208(0.296)	0.483	1.231	0.688-2.201

^a Reference category is No Anxiety

Logistic Regression Model for Antenatal Bleeding/Abruption

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	-0.190(0.311)	0.541	0.827	0.449-1.522
3 rd Trimester ^a	0.018(0.372)	0.961	1/018	0.491-2.110
Both Trimesters ^a	0.225(0.260)	0.386	1.252	0.753-2.084

^a Reference category is No Anxiety

Logistic Regression Model for Gestational Diabetes

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	0.307(0.384)	0.424	1.359	0.641-2.884

^a Reference category is No Anxiety

Logistic Regression Model for UTI

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	-0.050(0.324)	0.877	0.951	0.504-1.795
3 rd Trimester ^a	0.530(0.353)	0.133	1.698	0.851-3.389
Both Trimesters ^a	0.270(0.276)	0.327	1.311	0.763-2.250

^a Reference category is No Anxiety

Although the *p*-value for the 3rd trimester reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates it did not reach significance

Logistic Regression Model for PROM

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for
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				OR
Anxiety ^a				
2 nd Trimester ^a	0.010(0.421)	0.981	1.010	0.442-2.307
3 rd Trimester ^a	-0.925(0.757)	0.222	0.396	0.090-1.750
Both Trimesters ^a	-0.290(0.419)	0.489	0.749	0.330-1.700

^a Reference category is No Anxiety

Although the *p*-value for the 3rd trimester reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates it did not reach significance

Logistic Regression Model for Postpartum Hemorrhage

	β(S.E)	<i>p</i>-value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	0.125(0.408)	0.760	1.133	0.509-2.521
3 rd Trimester ^a	-0.503(0.638)	0.431	0.605	0.173-2.113
Both Trimesters ^a	-0.290(0.419)	0.489	0.749	0.330-1.700

^a Reference category is No Anxiety

Logistic Regression Model for Induced Labour

	β(S.E)	<i>p</i>-value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	0.030(0.268)	0.909	1.031	0.610-1.742
3 rd Trimester ^a	0.418(0.315)	0.185	1.518	0.819-2.816
Both Trimesters ^a	0.295(0.236)	0.212	1.343	0.845-2.134

^a Reference category is No Anxiety

Although the *p*-value for both trimesters reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates it did not reach significance

Logistic Regression Model for Preterm Labour

	β(S.E)	<i>p</i>-value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	0.203(0.637)	0.750	1.225	0.351-4.272
3 rd Trimester ^a	-0.585(1.079)	0.588	0.557	0.067-4.616
Both Trimesters ^a	0.145(0.595)	0.807	1.156	0.360-3.711

^a Reference category is No Anxiety

Logistic Regression Model for Vacuum/Forceps (Operative Delivery)

	β(S.E)	<i>p</i>-value	Odds Ratio	CI at 95% for OR
Anxiety ^a				

2 nd Trimester ^a	0.146(0.326)	0.653	1.158	0.612-2.191
3 rd Trimester ^a	0.581(0.367)	0.113	1.789	0.872-3.669
Both Trimesters ^a	-0.107(0.316)	0.736	0.899	0.484-1.671

^a Reference category is No Anxiety

Logistic Regression Model for Spinal Anesthetic

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	-0.605(0.326)	0.064	0.546	0.288-1.035
3 rd Trimester ^a	-0.036(0.359)	0.921	0.965	0.478-1.950
Both Trimesters ^a	0.316(0.244)	0.195	1.372	0.850-2.214

^a Reference category is No Anxiety

Although the *p*-value for the 2nd trimester is approaching significance and the *p*-value for both trimesters reached the initial 0.25 cut-off point, after the variables were placed in the model with other covariates they did not reach significance

Logistic Regression Model for Preterm Labour

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	0.021(0.369)	0.954	1.022	0.496-2.104
3 rd Trimester ^a	0.471(0.416)	0.316	1.518	0.671-3.431
Both Trimesters ^a	0.046(0.336)	0.891	1.047	0.542-2.022

^a Reference category is No Anxiety

Logistic Regression Model for Meconium

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	-0.224(0.408)	0.584	0.800	0.359-1.780
3 rd Trimester ^a	0.009(0.480)	0.985	1.009	0.394-2.586
Both Trimesters ^a	-0.411(0.294)	0.294	0.663	0.308-1.428

^a Reference category is No Anxiety

Logistic Regression Model for Jaundice

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	0.112(0.227)	0.622	1.119	0.716-1.747
3 rd Trimester ^a	-0.053(0.289)	0.855	0.949	0.538-1.671
Both Trimesters ^a	-0.172(0.211)	0.416	0.842	0.557-1.274

^a Reference category is No Anxiety

Logistic Regression Model for LGA

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	-0.005(0.334)	0.989	0.995	0.517-1.916
3 rd Trimester ^a	-0.151(0.443)	0.734	0.860	0.361-2.050
Both Trimesters ^a	-0.157(0.318)	0.622	0.855	0.458-1.595

^a Reference category is No Anxiety

Logistic Regression Model for Admittance to the NICU

	β (S.E)	<i>p</i> -value	Odds Ratio	CI at 95% for OR
Anxiety ^a				
2 nd Trimester ^a	0.361(0.317)	0.255	1.435	0.770-2.672
3 rd Trimester ^a	0.353(0.793)	0.373	1.423	0.654-3.094
Both Trimesters ^a	0.148(0.305)	0.627	1.160	0.638-2.108

^a Reference category is No Anxiety