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Differential Effects of Stress on Maternal and Infant Health Amongst Canadian Ethnic Minorities

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Differential Effects of Stress on Maternal and Infant Health Amongst Canadian Ethnic
Minorities

by

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A THESIS

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Abstract

The aim of the present study was to identify specific types of maternal psychosocial stress experienced by women of ethnic minority status (Asian, Arab, Other Asian, African, First Nations and Latino) in relation to pregnancy and infant health. A secondary analysis of variables that may contribute to maternal psychosocial stress was conducted using data from the All Our Babies prospective study where questionnaires were completed at less than 24 weeks of pregnancy, between 34-36 weeks of pregnancy, and at 4 months postpartum. Questionnaires included standardized measures of perceived stress, anxiety, depression, physical and emotional health, and social support. Socio-demographic data included immigration status, language proficiency in English, ethnicity, age, and socio-economic status. Findings from this study indicate that women who identify with an ethnic minority experience greater levels of psychosocial stress during pregnancy and have significantly poorer pregnancy and birth outcomes than those who identify with the dominant culture. Preterm birth, low birth weight, small or large for gestational age, extended hospital stay, and Apgar scores < 7 were used in the outcome assessment. From these findings, counselling interventions that target the most detrimental stressors faced by women of minority status in Canada are also discussed.

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Dedication

To my children, Kiah and Lincoln.

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List of Symbols, Abbreviations and Nomenclature

Abbreviations

SGA

LGA

PTB

LBW

LOS

AOB

SAI

EPDS

PSS

SF-12

MOS

Definition

Small for Gestational Age

Large for Gestational Age

Preterm Birth

Low Birth Weight < 2500 grams

Length of Stay in Hospital

All Our Babies

State Anxiety Index

Edinburgh Postnatal Depression Scale

Perceived Stress Scale

Short Form Health Survey-12

Medical Outcomes Survey of Social Support

Epigraph

“Stress in health and disease is medically, sociologically, and philosophically the most meaningful subject for humanity that I can think of.”

Hans Selye (1907-1982)

Chapter One: **Introduction**

Perhaps the most transformational experience a woman can have is becoming a mother. From the time a woman becomes pregnant, her body becomes the primary source of new life. Since humans are altricial, an infant literally cannot survive independently for the first several years of life. Thus, becoming a mother ultimately involves the ongoing responsibility for the life of another person from conception and on throughout the first several years of life. As wonderful and rewarding motherhood can be, it is not without its challenges. For women who lack access to physical resources, adequate primary care, and social support, motherhood can be an extremely stressful transition (Lukose, Satyanarayana, & Srinivasan, 2011). In Canada, the women who are least likely to have access to the aforementioned supports are minority status women, in particular, immigrant women (Stafford, Newbold, & Ross, 2011).

Maternal psychosocial stress can impact both the physical and mental health of the mother, and the early development of the fetus (Hobel, Goldstein, & Barrett, 2008). The deleterious effects of gestational stress to the fetus can continue throughout the life course (Drake & Lui, 2009). Pregnancy and birth outcomes can serve as a crude barometer of short- and long-term health outcomes (Boekelheide et al., 2012; Canadian Institute for Health Information, 2009; Edstedt Bonamy, & Parikh, 2013). Thus, understanding factors contributing to poor pregnancy and birth outcomes can help primary care providers plan interventions to reduce risks and optimize pregnancy and birth outcomes.

1.1 Study's Purpose and Aims

The purpose of this study is to learn about the prevalence of psychosocial stress amongst Canadian women during pregnancy and its relationship to pregnancy and birth outcomes. Additionally, this study seeks to identify if there are differences in the prevalence of psychosocial stress experienced between women who identify with an ethnic minority and those

from the dominant culture. The aim of this study is to contribute to the burgeoning body of research on maternal stress and pregnancy outcomes specific to a Canadian urban population. This study seeks to identify which Canadian subpopulations are at greater risk for poor physical and mental health outcomes. Findings from this study can help inform mental health and primary care providers alike in identifying at-risk populations.

1.2 Objectives

The objectives of this study are to: (a) Identify if there are significant differences in levels of psychosocial stress between women who identify with an ethnic minority and women who identify with the dominant culture; (b) explore if there are significant differences in pregnancy and birth outcomes between women who identify with an ethnic minority and women who identify with the dominant culture; (c) examine if there is a significant relationship between migration status (i.e., foreign born versus Canadian born) on pregnancy and birth outcomes; (d) identify the strongest predictors of pregnancy and birth outcomes.

1.3 Research Questions

Relevant data relating to demographics, ethnicity, standardized measures of psychosocial factors, and pregnancy and birth outcomes (collected as part of a larger study) were used to explore the following research questions: (1) Compared to women of dominant culture (White/Caucasian), do women who identify with an ethnic minority (Asian, Arab, Other Asian, African, First Nations and Latino) experience more psychosocial stress during pregnancy? (2) (a) Compared to women of dominant culture, do women who identify with an ethnic minority have poorer pregnancy outcomes? (b) Compared to infants of women of dominant culture, do infants of women who identify with an ethnic minority have poorer birth outcomes? (3) Compared to Canadian-born women who identify with an ethnic minority, do foreign-born women have poorer pregnancy and birth outcomes? (4) Of the identified determinants of pregnancy outcomes,

which independent variable(s) has/have the greatest predictive value? Various descriptive and statistical analyses were performed to answer these research questions that will be described in detail in Chapter three.

1.4 Significance

It is estimated that the consequences of poor birth outcomes alone cost the healthcare system millions of dollars each year (Public Health Agency of Canada, 2008). According to the Canadian Institute for Health Information (2009), the hospital cost for infants born preterm was approximately nine times the average cost of care for infants born full term. Despite a few recent attempts to identify maternal psychosocial stress experienced by mothers in Canada, there remains a conspicuous dearth of research. Most research conducted to date has used public health records that amalgamate ethnic subpopulations into White/non-White categories (Ahmed et al., 2005). Findings from the current study will help community and health care service providers identify which populations may be at greatest risk for poor mental and physical health outcomes in pregnancy. Identifying groups at greatest risk for poor pregnancy and birth outcomes will allow primary care and mental health providers to strategically focus intervention planning for populations at greatest risk.

1.5 Layout of the Document

This document is organized into five chapters. Chapter Two will provide background information relating to the questions of interest as well as provide a general review of the current literature on maternal stress in relation to pregnancy and birth outcomes. Chapter Three will describe the methodology used in the current study. Specifically, it will describe: the research questions and hypotheses, how data were collected, the standardized instruments used, how health outcomes were determined, and the statistical analysis used. Chapter Four provides a comprehensive report of the results and additional analysis conducted. Chapter Five concludes

with a discussion of the findings from the psychosocial inventories and pregnancy and birth outcomes measures. Implications for primary care practice and policy are explored, and counselling applications are considered. Finally, limitations of this study and possible future directions are presented.

1.6 Defining Concepts

The concept of psychosocial stress can encompass several interrelated factors. A *stressor* is generally classified as any real or perceived threat to an organism that disrupts homeostasis (Randall, Burggren, & French, 1997). *Psychosocial* can be understood as the interrelation of social and psychological factors (Medical Dictionary, n.d.). *Stress* is defined as a pattern of behavioural and physiological responses to the events that match or exceed an organism's abilities (Gazzinga & Heatherton, 2006). Although there are many types of stressors (e.g., nutritional deprivation, physical trauma, temperature deregulation) the present research seeks to explore specific types of *psychosocial stress*.

The present research considers the interaction of *psychosocial stressors* that include psychological, social, emotional, physical, and cultural aspects of health and wellness (Hobel, Goldstein, & Barret, 2008). The study includes measures to identify the presence of high levels of anxiety, perceived stress, lack of social support, poor emotional and physical health, and depression, which are considered indicative of the presence of *psychosocial stress* (Hobel et al., 2008). *Maternal stress* is understood as stress that is specific to mothers. To determine the presence of these variables, standardized self-report measures that assessed the psychosocial indicators were administered at the following three time points: less than 25 weeks; 32 weeks (± 1 week); and four months post parturition.

The Statistics Canada definition of *visible minority* is "persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour" (Statistics Canada, n.d.). The

visible minority populations of Canada consist mainly of the following groups: Chinese, South Asian, Black, Arab, West Asian, Filipino, Southeast Asian, Latin American, Japanese and Korean (Statistics Canada, n.d.). In this study, the Statistics Canada definition of *visible minority* is the criteria that we used to define *ethnic minority* (rather than *visible minority* women as it may be the case that someone is non-Caucasian, but not necessarily a visible minority). The White/Caucasian group is considered the *dominant culture*, due to the fact that the dominant culture in Canada has been historically influenced by European cultures that have dominated social, political, and economic institutions (Sue & Sue, 2003). An *immigrant woman* is a woman residing in Canada who was born outside of Canada. A *second-generation* woman is a woman who was born in Canada, but whose mother was foreign born. *Maternal health* will be understood according to the World Health Organization's definition as "referring to the health of women during pregnancy, childbirth and the postpartum period" (World Health Organization, n.d.).

Gestation is carrying of a fetus from the time of conception to birth (Canadian Perinatal Health Report, 2008). *Gestational age* was calculated from the first day of the last menstrual period. Pregnancy and birth *Health Indicators* are specific measurements of pregnancy and birth outcomes that can be compared to a standard or desired levels. A detailed description of each health indicator used will be provided in Chapter Three.

Chapter Two: **Background**

2.1 Introduction

Does stress matter in pregnancy or is the womb a mighty fortress impervious to the world beyond its walls? Are genetics alone responsible for pregnancy and birth outcomes? What factors should be considered in relation to pregnancy and birth outcomes? These are the sorts of questions that will be explored in this literature review. This chapter will begin with a review of the research on the impact of the prenatal environment on the developing fetus. Next, this chapter will provide a discussion of recent research into the interaction of prenatal stressors and their potential impact on health outcomes. Finally, this chapter will explore recent findings in the area of pregnancy and birth outcomes of individuals who may experience increased levels of psychosocial stress; specifically, women of ethnic minorities in Canada.

2.1.1 *Early Development*

Apart from an organism's genetic make-up, environmental conditions during early development are arguably the most significant influence on physiological, psychological, behavioural, and physical outcomes (Malaspina et al. 2008; Schmidt-Kastner, van Os, Steinbusch, & Schmitz, C., 2006; Smith, Seckl, Evans, Costall, & Smythe, 2004). Environmental perturbations are most potent during gestation when an organism is developing rapidly (Lesage, Blondeau, Grino, Breant, & Dupoy, 2001; Schneider, 1992). Environmental perturbations that influence developmental outcomes can be a result of such things as acute or chronic stress, early malnutrition, and environmental toxins (Goldman & Shannon, 2001; Salmanca, Fernandez, & Navarrete, 2002; Turner et al., 2008). Several studies have found that the pre- and peri-natal environment has an influence on the etiology of adult metabolic, cardiovascular, and neuroendocrine diseases (Kaati, Bygren, & Edvinsson, 2002; Koehl et al., 2001), as well as, psychological distress (Weinstock, 2008). Thus, the pre-, peri-, and post-natal

environments are of primary importance in understanding the etiology of adult disease.

2.1.2 Prenatal Stress Induces Non-Genomic Phenotypic Changes

Several experimental studies have demonstrated profound anatomical, behavioural and physiological differences resulting from manipulations of the prenatal environment (Cameron et al., 2008; Weinstock, 2008). The earliest research on the prenatal environment primarily explored the effect of nutritional deprivation in relation to fetal programming (Lumney et al., 2007). The first major study on acute nutritional deprivation was conducted by investigators looking for a possible association between prenatal exposure to famine and health outcomes at age 18 (Stein, Susser, Saenger, & Marolla, 1975). Stein and colleagues (1975) used data from what became known as the 'Hunger Winter' to analyze health outcomes of men who had been exposed to prenatal nutritional deprivation. The Hunger Winter occurred in the winter of 1944-1945 when German authorities blocked all food supplies to occupied West Netherlands. The famine ceased immediately following liberation in May 1945. The circumstance of the famine created a type of 'natural experiment' allowing future investigators to explore the specific timing of prenatal malnutrition on health outcomes. Findings from the first cohort study indicated that nutritional deprivation early and mid- gestation was associated with adult obesity in men (Stein et al., 1975).

A well-cited finding from the Hunger Winter was conducted using the Dutch psychiatric registries to compare mental health outcomes amongst persons exposed to prenatal malnutrition at specific times of gestation (Lumney et al., 2007). Findings from this analysis identified that exposure to malnutrition in the first trimester of pregnancy was associated with a substantial increase in women hospitalized for schizophrenia (Susser et al., 1996). Although in developed countries nutritional deprivation is rarely thought to be a significant contributor to poor

pregnancy outcomes (Robinson, Moore, Owens, & McMillen, 2000), these early studies helped advance the theory of the developmental origins of adult disease (Barker, 1998).

More recently, ‘natural experiment’ studies have been used to explore the timing of acute psychological stress on mental health outcomes. For example, Malaspina and colleagues (2008) conducted a cohort prospective study of 88,829 psychiatric patients prenatally exposed to ‘The Six Day War’ in Jerusalem. The initial threat of war began on May 18, 1967 and the anticipatory stress of imminent attacks would have escalated through two more weeks until the six-day bombardment ended on June 11th, 1967. Malaspina et al. found that the incidence of schizophrenia in adults increased by three times if prenatal exposure to war, including the anticipatory stress, had occurred in the first trimester of pregnancy.

The effects of psychological stress on reproductive physiology, in particular, on gestational length have also been explored (for a review see Hobel, 2004). High levels of psychological stress have been positively correlated with preterm birth (PTB; Hedegaard, Henriksen, Sabroe, & Secher, 1993), low birth weight (Nikansah-Amankra, Luchok, Hussey, Watkins, & Liu, 2010), birth complications (Roy-Matton, Moutquin, Brown, Carrier, & Bell, 2011), increased mortality (Collins & David, 2009), respiratory complications (Beijers, Jansen, Riksen-Walraven, & de Weerth, 2010), metabolic disease (Godfrey, Gluckman, & Hanson, 2010), and mental health concerns (Rice et al., 2010).

2.1.3 Stress Response

The first reference to stress found in the medical literature is in a letter to the editor of Nature written by Hans Selye in 1936 (Szabo, Tache, & Somogyi, 2012). In his brief communication, Selye (1936) described how in using rat models to study the physiological effects of hormones, he observed patterns of enlarged adrenal glands, damage to the lymphatic system, and stomach ulcers. He concluded that these physiological changes were the non-

specific adaptive responses to various kinds of stress (Selye, 1950). Selye, using the same rat model, also recognized a consistent three-stage pattern of physiological responses to stress that he referred to as the general adaptation syndrome (which he later renamed as the stress response). In the first stage, the alarm reaction, the body prepares to fight or flee. This is followed by a stage of resistance where the body prepares for sustained attack against the stressor. In this second stage, the immune response continues to increase and the body adapts to the specific stressor. For example, if the stressor is nutritional deprivation, the body may become lethargic to conserve energy while the absorption of nutrients is maximized. In the third stage, exhaustion, the system becomes exhausted and resistance to the stressor cannot be sustained. Selye's central point was that the prolonged action of stress would have a negative impact on general health.

Selye was also able to isolate and identify several specific hormones involved in the stress response, in particular, glucocorticoids (Selye, 1943). One of his PhD students, Roger Guillemin, even received a Nobel prize for isolating the hypothalamic releasing factors/hormones (Szabo, Tache, & Somogyi, 2012). With the identification of specific stress hormones and a better understanding of the hypothalamic-pituitary-adrenal (HPA) axis, we are now able to research the multiple ways that the body responds to stress, rather than the one general adaptation. Although Selye's theories have been significantly elaborated upon from the time of their inception, his seminal works laid the foundation for the study of the deleterious effects of prolonged stress on health outcomes.

A stressor is generally classified as any real or perceived threat to an organism that disrupts homeostasis (Randall et al., 1997). In response to a stressor, two main hormones are released: adrenaline, from the adrenal medulla, and glucocorticoids via the activation of

hypothalamic-pituitary-adrenal (HPA) axis. In response to an aversive stimulus, the hypothalamus activates the production of corticotrophin releasing hormone (CRH). The pituitary responds to CRH by producing adrenocorticotrophic hormone (ACTH), which enters the bloodstream and acts on the adrenal cortex to release glucocorticoids into the circulatory system (Kemney, 2003).

Circulating glucocorticoids act to inhibit energetically costly events such as protein synthesis and collagen production. Consequently, systems that are not essential for immediate survival such as digestion, reproductive functions, and the immune system, are reduced in the presence of high levels of circulating cortisol. Circulating cortisol also reduces insulin production, making glucose more readily available from the liver. In addition, the adrenal medulla stimulates the response of the sympathetic division of the autonomic nervous system by the release of adrenaline and noradrenaline, which causes an increase in blood pressure, redirection of blood to skeletal muscles, coronary arteries, liver and brain, as well as bronchial and pupil dilation. Together, these responses contribute to preparing the body for the ‘fight-or-flight’ response or the “tend and befriend” response where individuals seek affiliation (Smeets, Dziobek, & Wolf, 2009; p. 507). Although activation of the sympathetic nervous system has proven to be effective in enabling the body to respond transiently to acute stressors, exposure to chronic stress can cause enduring alterations in physiology and brain function (Bosch, Musch, Remco, Slattey, & Neumann, 2007; Maccari & Morley-Fletcher, 2007).

2.1.4 Psychosocial Stress

Early research on stress focused primarily on physical stressors (e.g., nutritional deprivation, noxious substances, temperature deregulation). Novel research conducted by Robert Sapolsky (2004) identified that animals living in complex social systems develop specific health problems related to psychosocial stress. By studying primates, he identified that lack of social

support and social resources are directly correlated with stress-related health problems. Sapolsky found that low-ranking individuals exhibited higher levels of basal cortisol and had a slower down regulation of stress hormones once the stressor was no longer present.

The concept of psychosocial stress shifts the emphasis of stress from a purely physiological response to a psychological appraisal. For example, an individual can physically exert herself by jogging, but would not consider the activity as stressful. Alternatively, if the activity is appraised as pleasurable, the physical exertion may serve as a distraction from psychological stress and help the individual regain homeostasis post-activity by the release of endorphins and dopamine (Esch & Stefano, 2010). It is also possible that even in the absence of a physical perturbation or threat, an individual can perceive a situation as beyond their physical or psychological resources to handle, and a stress response can be engaged (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). This highlights the importance of the role of stress appraisal as one individual may interpret an environmental situation as innocuous while another may perceive the same situation as stressful.

Although stress response is highly adaptive in the face of a physical stressor, humans and other cognitively sophisticated species are arguably unique in that they can activate a stress response for purely psychological or social reasons (Sapolsky, 2004). For individuals that generate chronic stress due to psychological reasons, stress can become pathogenic. Thus, exploring the social, emotional, and cultural aspects of health and wellness may help in understanding the impact of adaptive and maladaptive stress responses specific to humans.

2.1.5 Prenatal Stress

There is an ever-expanding body of research exploring the interaction of psychosocial stress and pregnancy outcomes (Hobel, Goldstein, & Barret, 2008). Normally, stress hormones are produced endogenously as a result of an organism's genetic coding and programmed stress

responsiveness. In humans, hormones produced by the mother can cross the placenta and influence the phenotype of the fetus, including the expression of glucocorticoid and mineralocorticoid receptors. In order to protect the fetus from exposure to maternal hormones, the human placenta contains an enzyme, 11 β -hydroxysteroid dehydrogenase type 2 (11 β -HSD2), which binds to circulating glucocorticoids and converts them to inactive 11-keto products. However, during times of excessive levels of circulating glucocorticoids from maternal origin, the availability 11 β -HSD2 can become saturated, exposing the fetus to increasing levels of maternal glucocorticoids (Kossintseva et al., 2005; Lesage et al., 2001). Early exposure of the fetus to glucocorticoid hormones has been shown to cause permanent phenotypic changes to the neuroendocrine system of the fetus that is not genetically regulated (Maccari & Morley-Fletcher, 2007).

While difficult to study in humans, in animal models these stress induced non-genomic changes have been correlated with (a) reduced neonatal stress reactivity (Leung et al., 2010); (b) changes in reproductive behaviour (Frye & Orecki, 2002); (c) changes in the HPA axis (Maccari & Morley-Fletcher, 2007); (d) deleterious metabolic outcomes (Schneider, 1992); and (e) age-related impairments in cognitive function (Meaney et al., 1998). Thus, it is important to consider environmental factors that contribute to high levels of maternal psychological stress and subsequently, prenatal exposure to maternal glucocorticoids. Both animal models and ‘natural experiments’ confirm the deleterious effects of stress on pregnancy outcomes.

2.1.6 Non-Genomic Inheritance

Humans evolved in an extremely hostile (i.e., stressful) environment. In the face of a predator such as a sabre-toothed cat, a fast-acting stress response helped ensure survival. As the environmental demands changed, humans acquired more complex adaptations to help navigate complex social organizations and new physical challenges (Kirkwood, Kapahi, & Shanley,

2000). For centuries, evolutionary biologists have observed that physical and behavioural traits are often passed on to subsequent generations (Gould, 2002; Wilson, 1978). However, traits that are adaptive in one environment can be deleterious or maladaptive in the next (Dawkins, 1976). In 1962, James V. Neel first introduced the ‘thrifty genotype’ hypothesis in an attempt to explain the deleterious metabolic outcomes of offspring when rapid environmental conditions changed in the parental generation. According to Neel, this thrifty genotype ensured survival in times of famine by increasing metabolic function. This metabolic adaptation allowed the “thrifty genes” (p. 354) to be passed on to the next generation. However, according to Neel, this adaptation becomes maladaptive when there is an abundant supply of nutrients. Although Neel could correlate environmental changes with metabolic changes in subsequent generations, the mechanisms of gene expression were poorly understood at that time and his theory lacked the sophistication necessary to explain how these thrifty genes were passed on to subsequent generations.

Over the past three decades, advances in the understanding of genetics, including the use of the Polymerase Chain Reaction (PCR), have helped scientists study gene expression. By the late 1980’s, scientists were better able to understand how gene expression produced phenotypic changes. This understanding was a catalyst for Hales and Barker to develop the “thrifty phenotype” hypothesis (which is sometimes referred to as the ‘Barker Hypothesis’; Hoy, Rees, Kile, Mathews, & Wang, 1999) as a potential explanation for the association between poor fetal and infant growth and increased risk of developing impaired glucose tolerance and metabolic syndrome in adult life (Hales & Barker, 1992; p. 595). The thrifty phenotype hypothesis proposes that poor fetal and infant growth, resulting from the effects of poor maternal uterine conditions, can produce permanent deleterious phenotypic changes (Hales & Barker, 2001).

This theory suggests that the maternal environment acts as a non-genomic factor involved in an organism's phenotype.

Recently, non-genomic inheritance has been gaining considerable attention. In particular, the field of epigenetics has introduced a profound shift in our basic understanding of disease inheritance (Bird, 2007). Epigenetic changes are heritable changes in gene expression within the genome that do not directly change genomic DNA (Anway & Skinner, 2008). Epigenetic research explores mechanisms involved in the heritable changes in gene expression and subsequent phenotypic changes. Epidemiological studies have identified several patterns of non-genomic disease inheritance such as cardiovascular disease, diabetes mellitus, and hypertension (Drake & Walker, 2004; Kaati et al., 2002). There is a growing body of research in perinatal epidemiology exploring the transgenerational epigenetic effect of maternal psychosocial stress on health outcomes (Drake & Lui, 2009; Emanuel et al., 1999). By identifying health outcomes that are strongly correlated with an environmental factor such as psychosocial stress, researchers can target potential diseases that may be linked to non-genomic disease inheritance.

2.2 Women of Ethnic Minority and Psychosocial Risk Factors

2.2.1 Minority Status

It is well established in health research that visible minorities have poorer physical and mental health outcomes than those from the dominant culture (Drake & Lui, 2009). Previous studies have found a correlation between minority status and poor infant health (e.g., Beijers et al., 2010; Patrick & Bryan, 2005). Perhaps the most cited, but least understood explanation for these phenomena is that minority status increases the levels of psychosocial stress experienced during pregnancy (Dominguez, Schetter, Mancuso, Rini, & Hobel, 2005; Pestronk & Franks, 2003).

The effects of maternal psychosocial stress on health outcomes are not limited to the

perinatal period. An intergenerational study of four ethnic groups in Washington found that mothers born with low birth weight (one of the risk factors for poorer long-term health outcomes) were at a greater risk for PTB and experiencing other perinatal complications, even after maternal environmental conditions were controlled for (Emanuel et al., 1999).

Interestingly, Emanuel and colleagues (1999) also found significant differences in birth weight between White and African American infants. Hennessy and Alberman (1998) also observed an intergenerational effect of hypertension in the maternal grandmother and PTB in the second generation.

2.2.2 Marginalization of Immigrant Women: Double Jeopardy

Throughout history, women have experienced various forms of sexual discrimination, oppression, and subjection. Women from visible minorities may experience compounding effects of racial discrimination. Institutionalized racism against minority status women has perpetuated the structural barriers that prevent women from accessing medical, psychological and financial resources (Patrick & Bryan, 2005). Racism can also contribute to social isolation during pregnancy (Moutquin, 2003) and throughout motherhood (Stern & Bitsko, 2003). Added to the stress of minority status is the fact that many women who have migrated from another country often find themselves without the support of their family and community (Zelkowitz et al., 2008).

Women who have immigrated may also face systemic barriers that limit access to resources or opportunities in society such as employment, education, and health care. For example, policies that prevent educational credentials from being recognized create both educational and employment barriers. Accessing primary care may also be a challenge if services are not offered in a culturally sensitive way. For example, researchers Reitmanova and Gutafson (2008) identified systemic barriers that women who identified as Islamic faced when

accessing prenatal care. Specifically, lack of culturally and linguistically appropriate information was identified as barriers to accessing maternal health services. They also found that women in this subpopulation experienced discrimination and insensitivity from service providers. Considering the systemic marginalization of visible minorities, it is hardly surprising that visible minorities have poorer physical and mental health outcomes than those from the dominant culture (Drake & Lui, 2009).

2.2.3 Language Barriers

One reason that women who have immigrated do not access psychological services and/or community supports is due to language barriers (Ding & Hargraves, 2008). An American study that examined the relationship between parental proficiency in English and health outcomes of their children found that children of parents with limited fluency in English had triple the odds of the child having fair/poor health status outcomes (Flores, Abreu, & Tomany-Korman, 2005). Women who are not proficient in English often rely on their husbands, children, or extended family as translators. Needless to say, this presents an obvious barrier in the case of accessing medical care, community resources, reporting abuse, or seeking counselling services for family concerns, because family members who serve as interpreters may withhold or alter incriminating information (Amodeo, Grigg-Saito, & Robb, 1997).

2.2.4 Socioeconomic Status

Socioeconomic indicators such as poverty, lack of education, and lack of access to resources are associated with poor birth outcomes (for a review see Barclay, Braveman, Blumenshine, Cubbin, & Egerter, 2010). The interaction of poverty and minority status is further associated with poor pregnancy outcomes (Savitz et al., 2004). Disparities in socioeconomic status amongst Canadians are associated with the greatest risk for perinatal and

infant mortality, low birth weight, and PTB (Kramer, Seguin, Lydon, & Goulet, 2000). Visible minorities in Canada have higher rates of unemployment, lower rates of educational attainment, and lower socioeconomic status; however, these disparities are not always captured in Canadian health reviews due to the aggregation of racial groups (Rodney & Copeland, 2009).

The effects of minority status and poverty seem to endure across generations. For example, in a study that investigated minority status early in development in relation to birth outcomes, it was found that grandmother poverty and minority status increased the risk of low birth weight in subsequent generations (Collins, David, Rankin, & Desireddi, 2008). Perhaps the most interesting finding from the above study was that even if socioeconomic status of the *granddaughter* had improved, she was still at a greater risk for having a low birth weight child. The above finding suggests that birth outcomes may be epigenetically influenced very early in development.

2.2.5 Psychological Health

Research has shown that Canadians of visible minority status are less likely to access psychological services than those from the dominant culture (Bemback, Chung, & Pedersen, 2003). Those who do access services terminate earlier than most, and are differentially treated in comparison to other Canadians (Sue, 2001). In addition to increased risk for poor birth outcomes, women of minority status may be at an increased risk for mental health problems. Researchers Xu and McDonald (2010) found that first generation immigrants generally experience significantly better mental health than their Canadian-born peers. However, over time there was a significant deterioration in mental health outcomes (Xu & McDonald, 2010).

As already discussed, women of minority status may be at greater risk for not having access to resources to help them meet the demands of motherhood, which may contribute to psychological maternal stress. However, despite the physical, mental, and social consequences

of elevated stress in motherhood, little research has been devoted to identifying or understanding the specific stressors that minority status mothers in Canada experience. A qualitative study conducted in Toronto, Ontario, explored the experiences of immigrant mothers with symptoms of depression (Ahmed, Stewart, Teng, Wahoush, & Gagnon, 2008). This study identified lack of proximity to informal support systems (family) and barriers to formal support (community services) due to lack of knowledge or language proficiency as contributing to postpartum depressive symptoms.

In another qualitative study conducted by Reitmanova and Gutafson (2008), barriers to maternity health services amongst immigrant Muslim women living in St. John's, Newfoundland were explored. Utilizing content analysis, specific barriers to maternal health services were identified such as a lack of culturally and linguistically appropriate information. They also found that women in this subpopulation experienced discrimination and insensitivity from service providers. Findings from these studies suggest that minority status women face additional barriers to accessing parenting supports that in turn, contribute to an increase in maternal stress.

2.2.6 Healthy Migrant Paradox

Research on pregnancy outcomes of immigrant populations have found paradoxically that despite the stress of leaving one's native land and assuming a minority status, women who migrated tended to have healthier birth outcomes than non-mobile women of minority status (Wingate, Swaminathan, & Alexander, 2007). This perplexing observation of the birth outcomes of migrant women is called the "healthy migrant effect" (for a review see Lassetter & Callister, 2009). This effect has been documented in Canada (McDonald & Kennedy, 2004), the United Kingdom (Smith, Kelly, & Nazroo, 2009), Australia (Anikeeva et al., 2010), and the United States (Brown, Chireau, Jallah, & Howard, 2007).

Interestingly, the longer a woman who has immigrated lives in Canada prior to pregnancy, the greater her risk for poor birth outcomes (Zelkowitz et al., 2008). In a population-based study of birth outcomes in metropolitan areas of Ontario, researchers Urquia, Frank, Moineddin, and Glazier (2010) found disparities in birth outcomes increased with duration of residence in Canada. Perhaps the most interesting finding was that recent immigrants (<5 years) had the lowest risk of PTB, while those with ≥ 15 years of stay in Canada were at the greatest risk of PTB.

One theory to explain this effect is that the Canadian immigration policy implements a health screening process ensuring that the healthiest, most viable applicants are granted permission to immigrate (Ahmed, 2005). However, over time the reported health status of immigrant women deteriorates (McDonald & Kennedy, 2004). A possible explanation for this well documented phenomenon is that upon immigrating, minority status women may experience a decrease in their quality of life, changes in lifestyle, changes in diet and nutrition, and decreased access to resources.

The healthy migrant effect has also been observed in relation to depression whereby immigrants to Canada are less likely to report depression than the non-immigrant population (Stafford, Newbold, & Ross, 2011). However, this effect may not endure through pregnancy. A recent longitudinal study of foreign-born Canadian mothers conducted by Zelkowitz and colleagues (2008) found that 38% of pregnant immigrant women surveyed ($n = 119$) met the criteria for Postpartum Depression (PPD) two months post parturition on the Edinburgh Postnatal Depression Scale (Cox, Holden, & Sagovsky, 1987).

2.3 From Far and Wide: Immigration

In Canada, immigration is part of a critical strategy for social and economic development. In 2011, foreign-born Canadians represented approximately 21% of the total population

(Statistics Canada, 2013a) and immigration accounts for just over 60% of the country's population growth (Statistics Canada, 2010), which represents a significant portion of live births in Canada by daughters of foreign-born parents. In 2011, nearly 20% of Canada's total population identified themselves as a member of a visible minority (Statistics Canada, 2013a).

A recent study commissioned by Statistics Canada compared immigrant child health outcomes of all Canadian, European, American, and Asian born children (Ahmed, 2005). The general health status of school-aged children was measured by using a self-report by the person most knowledgeable (PMK) of the child's health (typically the biological mother). The PMK was asked to rate the health of the child as excellent, very good, good, fair, or poor. As may be expected, the study found that PMK's of Asian children reported poorer health outcomes. However, this study did not specifically differentiate (nor describe how they categorized) European or Asian populations, nor did it include populations from Africa, Central, or South America in the analysis.

In a more recent Statistics Canada study, Roterman (2011) found that considering birthplace in the analysis of immigrant populations provided important health information specific to immigrant subpopulations. In particular, by combining the cycles of the Canadian Community Health Survey from 2003, 2005, and 2007/2008, Roterman was able to identify birthplace and years of stay in Canada as a determinant of health outcomes in adults. Roterman's study in context of the increasing diversity in Canada suggests that ethnic specific investigation and immigrant status are important considerations when researching health determinants.

2.4 Rationale for Current Study

Despite a few recent attempts at identifying specific maternal experiences of minority status mothers in Canada, there remains a conspicuous dearth of research that studies pregnancy

and birth outcomes of specific ethnic groups in Canada. Most research conducted has used public health records that do not include psychosocial measures and tend to amalgamate populations into White and non-White categories. The few Canadian population studies that have disaggregated immigrant populations have found significant differences in health outcomes by place of origin (Rotermann, 2011). The aim of the proposed study is to identify if women in Calgary who identify with an ethnic minority are at an increased risk for psychosocial stress during pregnancy. In addition, the relationship between minority status and pregnancy and birth outcomes will be explored.

Chapter Three: **Methods**

This chapter will explain the research questions and hypotheses of the present study, provide a brief overview of the data source (All Our Babies [AOB] study) and data collection, describe the AOB sample, and describe the research design. A brief description of the independent and dependent variables selected will be provided, and the procedure and data analysis methods that were implemented will be outlined.

3.1 Research Questions and Hypotheses

3.1.1 *Research Questions*

The aim of this study is to identify specific types of maternal psychosocial stress experienced by Canadian women who identify with an ethnic minority in relation to pregnancy and birth outcomes. The four questions to be explored are:

- 1) Compared to women of dominant culture (White/Caucasian), do women who identify with an ethnic minority (Asian, Arab, Other Asian, African, First Nations and Latino) experience more psychosocial stress during pregnancy?
- 2) a) Compared to women of dominant culture, do women who identify with an ethnic minority have poorer pregnancy outcomes?
b) Compared to infants of women of dominant culture, do infants of women who identify with an ethnic minority have poorer birth outcomes?
- 3) a) Compared to Canadian-born women who identify with an ethnic minority, do those who are foreign-born have poorer pregnancy and birth outcomes?
b) Do Canadian-born women whose mothers are foreign-born (second generation Canadians) have poorer pregnancy and birth outcomes?
- 4) Of the identified determinants of pregnancy outcomes, which independent variable(s) has/have the greatest predictive value?

3.1.2 Hypotheses

1. Compared to women of dominant culture (White), it is expected that women who identify with an ethnic minority (Asian, Arab, Other Asian, African, First Nations and Latino) will experience more psychosocial stress during pregnancy.
2. a) Compared to women of dominant culture, it is expected that women who identify with an ethnic minority will have poorer pregnancy outcomes.

b) Compared to infants of women of dominant culture, it is expected that infants of women who identify with an ethnic minority will have poorer birth outcomes.
3. a) Relating to the healthy migrant paradox, it is expected that Canadian-born women who identify with an ethnic minority will have poorer pregnancy and birth outcomes than women who are foreign-born.

b) It is expected that second generation Canadians will have poorer pregnancy and birth outcomes.
4. Of the identified determinants of pregnancy outcomes, it is predicted that the independent variable that will have the greatest predictive value will be social support.

3.2 Research Design

In this comparative descriptive analysis, the data for this study were collected for the All Our Babies (AOB) prospective cohort. The All Our Babies Cohort study is a community based prospective study designed to explore the environmental and genetic risk factors for preterm birth (Gracie et al., 2010). The original research objectives of the AOB study were to (a) understand women's pregnancy experiences, and (b) to predict preterm birth. The questionnaires used in the AOB study were developed according to the guidelines for conducting genetic epidemiology studies of preterm birth (Pennell et al., 2007). These guidelines outline minimum phenotypic dataset requirements. Beyond the minimum dataset requirements, additional

opportunistic information was collected on environmental factors that included validated measures of psychosocial, environmental and health outcome data. Although the questions for this present study were not the original questions of the AOB study, the additional opportunistic data collected provided sufficient information for a secondary analysis of the dataset in relation to ethnicity, migration status, psychosocial measures, and broader pregnancy and birth outcome information.

There is an ever-expanding body of research exploring psychosocial stress and pregnancy outcomes (Hobel, Goldstein, & Barret, 2008). When assessing psychosocial stress, a multilevel approach that considers social relationships, sociocultural, and individual levels of analysis is necessary (Dunkel Schetter & Lobel, 2010). Hobel and colleagues (2008) identified several psychometric instruments recognized for their continued use and validity in assessing psychosocial stress in pregnancy. Of the instruments listed by Hobel et al., three were also in the AOB questionnaire package and included for the analysis of psychosocial stress. These included the State-Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983), and the Edinburgh Postnatal Depression Scale (Cox et al., 1987). To assess multiple dimensions of social relationships, the Medical Outcomes Study (MOS) Social Support Survey (Sherbourne & Stewart, 1991) was also included as well as a global measure of emotional and physical health, the Short Form Health Survey-12 (Ware, Kosinski, & Keller, 1997).

A convenience sample of participants ($N = 3,552$) was recruited from primary health care clinics ($n = 573$), through community posters and word of mouth ($n = 675$), and through Calgary Laboratory Services ($n = 2,763$). In total, 4,011 women indicated interest in participating in the study and were assessed for eligibility. Of those, 3,552 completed at least one survey and 123

discontinued after the first survey. Eight women were deemed ineligible due to language barriers. A total of 2,969 women completed all three questionnaires of interest. Recruitment began in May 2008 and was completed in December 2010. To be eligible to participate, the women had to be less than 7 weeks and six days of gestation at the time of recruitment, be at least 18 years of age, receiving prenatal care in Calgary, and be sufficiently proficient in English to complete the questionnaire packages. Women were excluded if they planned to move outside the greater Calgary area during their pregnancy or were known to be carrying multiples at the time of recruitment.

3.3 Procedure

Questionnaires were sent by mail to the participant's home address at < 25 weeks gestation, between 34-36 weeks gestation, and at 4 months postpartum. The questionnaires included an information letter, an informed consent form, contact information, the questionnaire, and a postage pre-paid self-return envelope. If the questionnaire was not returned within 3 weeks, a research assistant attempted to contact the participant by phone and/or email to a maximum of three follow-up phone calls to remind the participants to complete the questionnaire. Each questionnaire package took approximately 25 minutes to complete. Upon completion, participants were offered a bookstore or grocery gift card in the amount of \$10 to recognize the time they took to participate.

Trained research assistants checked the returned questionnaires for completeness and identified any contradictory answers (e.g., difference in number of pregnancies and number of reported children). Participants who returned questionnaires with incomplete or contradictory answers were contacted by a trained research assistant (either by email or phone) to clarify and/or complete the questionnaire. Missing data were added before the questionnaire was entered into the database. If the research assistants were unable to contact the participant, only

the completed sections were entered. Because each variable of interest was independent of the other (e.g., social support measure was independent of the anxiety measure), if a participant completed one measure, but not another, her data was still included in the analysis if the measures of interest were completed. Each participant was assigned a research identification number to ensure confidentiality. Questionnaires were scanned into Teleform (Version 10.1) and verified to improve accuracy. Questionnaires from the three time points were deterministically linked using the participant identifier.

3.4 Independent Variable Measures

3.4.1 *Ethnicity*

As a part of the demographic information collected at < 25 weeks, participants were asked to select one of the following 15 ethnic categories that they most identified with: White/Caucasian, Black/African, North American First Nations person registered (under Indian Act of Canada), Inuit, Metis, Chinese, South Asian, Filipino, Latin American, Southeast Asian, Arab, West Asian, Korean, Japanese, as well as a mixed/other option. For the sake of analysis, the groups were further collapsed into the following seven groups: White, Black/African, North American, First Nations (that included registered, unregistered, and Metis), Asian (including Chinese, Japanese and Korean), Other Asian (including South Asian, Filipino, Southeast Asian, and West Asian), Arab, Latin American, and Mixed/Other. For the sake of this study, White was considered the dominant culture and women who identified with an ethnicity other than White were considered to be an ethnic minority.

To determine generational status (e.g., first or second generation) and ethnicity the participant's ethnicity was categorized along with their place of birth. Participants were sorted into one of the following four groups: Canadian-born and White; foreign-born and White; Canadian-born and non-White; foreign –born and non-White. Included in the demographic

information was a question that asked participants to identify their mother's place of birth. To explore a generational effect, information on the participant's mother's place of birth was also categorised. In total, 603 geographic locations were identified. All countries and cities identified were inputted into an excel spreadsheet. Using the World Atlas Map, the participant's mother's place of birth was located and sorted into the following 10 geographic regions: North America, Africa, Asia, South and South East Asia, Middle and Greater Middle East, Eastern Europe, Europe, Central and South America and Caribbean, Australia and New Zealand. Participants were also asked whether they were born in Canada (yes/no). If a participant indicated that she was Canadian born, but her mother was foreign born, she was considered a second generation Canadian.

3.4.2 State-Trait Anxiety Inventory

To assess the presence of anxiety symptoms in pregnancy, the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) administered at 32 weeks gestation (± 1 week) was included. The STAI is the most widely used measure of anxiety in adults (Groth-Marnet, 2005) and clearly differentiates between the temporary condition of 'state anxiety' and the more general and long-standing quality of 'trait anxiety'. State anxiety is an emotional state that can fluctuate depending upon the circumstances and for the purposes of this study, only the State Anxiety Index (SAI) was used. Grant, McMahon, and Austin (2008) reported the SAI yielded optimal sensitivity (80.95%), specificity (79.75%), positive predictive value (51.50%) and negative predictive value (94%) to determine cases of anxiety in the third trimester of pregnancy when a cut-off score of < 40 was used. The reported Cronbach's alpha value of the SAI was 0.92 for females (Grant et al., 2008).

The SAI is a self-report instrument that consists of 20 items rated on a 4-point Likert scale that asks participants to identify how they are feeling in the moment. Responses were

scored from 1 (*not at all*) to 4 (*very much so*), for a possible range of scores of 20-80. Scores greater than 40 indicated the presence of state anxiety. Scores from the SAI administered at 32 weeks (± 1 week) were included in the analysis.

3.4.3 Perceived Stress Scale

The Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) was used to measure the extent that one's situations in life were perceived as stressful. The PSS was administered at < 24 weeks and at 32 weeks gestation (± 1 week). Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives. Because psychological stress involves appraisal of one's situation (Stawski, Sliwinski, Almeida, & Smyth, 2008), this measure provides valuable information regarding perceived stress levels. The PSS was designed for use with community samples and as such, the questions are quite general and relatively free of content specific to any one subpopulation (Cohen et al., 1983). The PSS is one of the most widely used psychological instruments for measuring the perception of stress (Lee, 2012). Coefficient alpha reliability for the PSS ranges between $\alpha = .84$ and $.86$ (Cohen et al., 1983). A more recent test of the PSS psychometric properties reported Cronbach's alpha reliability of $\alpha = .89$ (Roberti, Harrington, & Storch, 2006). PSS was shown to have high convergent validity with the STAI ($r = .87$) and good discriminant validity from non-related factors such as the Sensation Seeking Scale ($r = -.04$) and the Adult Overt Aggression Scale ($r = .03$; Roberti et al., 2006).

The PSS-10 is a 10-item scale that asks individuals to identify feelings and thoughts they have had in the last month by rating their experience on a 5-point Likert scale (Cohen & Janicki-Deverts, 2012). With each item, respondents are asked how often they have felt a certain way with responses ranging from 1 (*never*) to 5 (*often*). Scores were calculated by reversing all positively stated items and summing the scores across all 10 items with total scores ranging from

10-50. The PSS is not a diagnostic instrument and as such, there are no clinical cut-offs.

Although there is not a cut-off score, the authors suggest that scores in the top 20th percentile of the sample population are problematic.

3.4.4 Medical Outcomes Study (MOS) Social Support Survey

In order to measure the multiple dimensions of social support, the Medical Outcomes Study (MOS) Social Support Survey (Sherbourne & Stewart, 1991) was also included in the analysis. The MOS was administered at < 24 weeks and at 32 weeks gestation (± 1 week). The MOS measures perceived levels of emotional support, tangible/functional support, informational support, and positive social interactions. The MOS Social Support Scale has been used extensively for over two decades to explore the interaction of social support and health outcomes (Moser, Stuck, Silliman, Ganz, & Clough-Gorr, 2012). The internal consistency of the overall support scale and all subscales was found to be high with Cronbach's alpha scores ranging from 0.91-0.97, while 1-year test retest correlations ranged from 0.72 - 0.78 (Sherbourne & Stewart, 1991). Moser and colleagues (2004) found the MOS to have good divergent validity by ethnicity (-0.03 to 0.08) and education (-0.08 to 0.05), moderate statistically significant correlations with associated constructs, and non-significant correlations with unrelated constructs.

The MOS Social support scale is a 19-item self-report scale that asks respondents to indicate their perception of the availability of different forms of functional support (i.e., the degree to which interpersonal relationships serve particular functions). Respondents indicated the frequency of their experience of support using a 5-point likert scale with choices from 1 (*none of the time*) to 5 (*all of the time*), with higher scores indicating more functional social support. The MOS provides a social support scale for each subcategory, as well as, an overall score for the general perception of social support. The overall social support index was calculated by averaging scores for all the subscales as well as the score for the one additional

item (the last item in the survey). Overall social support scores range from 19 - 100 with higher values indicating greater levels of social support. Women with scores less than or equal to 69 were considered to have poor social support. If a participant scored less than or equal to 69 at either time point, she was considered to have had inadequate social support.

3.4.5 Short Form Health Survey-12

In keeping with the belief that individuals are the best judges of their own physical and emotional health, the Short Form Health Survey-12 (SF-12; Ware, Kosinski, & Keller, 1997) was used. The SF-12 was administered at 32 weeks gestation (± 1 week). The SF-12 was designed to allow respondents to self-assess their physical and emotional health. The SF-12 was adapted from the Medical Outcomes Study 36-Item Short-Form Health Survey (Ware & Sherbourne, 1992) to reproduce the Physical Component Summary and Mental Component Summary scales. When cross-validated with the Medical Outcomes 36-Item Short-Form (SF-36), it achieved multiple *R* squares of 0.911 and 0.918 in prediction of the SF-36 (Ware et al., 1997). Relative validity estimates of the SF-12 from six tests involving mental health criteria ranged from 0.60 to 1.07 (median = 0.97).

The health component scale measures eight health concepts that include respondent's functional physical health, mental health, social functioning and subjective appraisal of one's health status. The SF-12 uses a Likert scale from 1 to 3 for the physical function items; a scale of 1 to 5 for somatic symptoms, social function and health perceptions; 1 to 6 for mental health and vitality; and a dichotomous scale (yes/no) for functional health. Each item is coded to range from 0 – 100 (e.g., on a scale of 1-5: 1 is coded to 0; 2 to 25; 3 to 50; 4 to 75; 5 to 100).

3.4.6 Edinburgh Postnatal Depression Scale

Edinburgh Postnatal Depression Scale (EPDS) is a 10-item self-report scale developed by Cox et al. (1987). The EPDS was administered at < 24 weeks and at 32 weeks gestation (± 1

week). Each of the 10 items on the EPDS were scored on a 4-point Likert scale ranging from 0 - 3 for a maximum score of 30, with higher scores indicating greater depressive symptoms. Response options vary by item. Scores of 13 or greater are considered problematic. If an individual scored greater than 13 at either time point, she was considered to have experienced symptoms of depression in pregnancy.

The EPDS was chosen as a more appropriate measure for pregnant and postnatal women as it excludes somatic symptoms of depression such as fatigue and change in appetite as these changes are likely to occur in pregnancy and could possibly confound the scores. The EPDS is considered to be a better measure to detect depressive symptoms amongst postnatal as well as pregnant women than other standardized measures such as the Beck Depression Inventory (Murray & Cox, 2007). In a review of 18 EPDS validity and reliability studies, Eberhard-Gran and colleagues (2001) found the EPDS to have good reliability and validity. The sensitivity estimates ranged from 65 to 100% and specificity estimates from 49 to 100%. The internal consistency of the EPDS was 0.87. When the EPDS was administered to a sample of 100 non-postnatal women, its sensitivity was accurate at predicting 88% of depressions (Cox, Chapman, Murray, & Jones, 1995).

3.5 Pregnancy and Birth Outcome Measures

The Public Health Agency of Canada's Canadian Perinatal Surveillance System (CPSS) identifies several perinatal health outcome indicators (Public Health Agency of Canada, 2008). Perinatal health indicators are specific measurements of pregnancy and birth outcomes that can be compared to standard or desired levels of achievement. The perinatal health indicators selected for the current study are: gestational length, hospital length of stay, Apgar score, and birth weight. Each of the aforementioned will be described in section 3.5.1. These health indicators provide important information related to health determinants (Public Health Agency of

Canada, 2011). In the current study, perinatal health indicators were used as pregnancy and birth outcome measures.

Pregnancy and birth outcome data were collected at time of delivery and at 4 months post parturition. Outcome information was collected from the 4-month postpartum questionnaire packages as well as the hospital records. Of the AOB sample, 2,858 participants gave informed consent for the release of their medical information.

3.5.1 Pregnancy Health Outcome Measures

3.5.1.1 Hospital Length of Stay

The hospital length of stay (LOS) was used as a proxy measure of delivery complications. The type of delivery (vaginal/caesarean section) was compared to expected LOS (in hours). If the hospital LOS was longer than expected according to type of delivery, the participant was scored as having a delivery complication. If the hospital LOS was greater than 48 hours for vaginal delivery, the participant was considered to have had perinatal complications. If the hospital LOS was greater than 96 hours for caesarean section births, the participant was considered to have had perinatal complications.

3.5.1.2 Gestational Length

Gestational length was used as a pregnancy outcome measure. Gestational length was calculated in weeks. Women who gave birth at 36 weeks and 6 days or less gestation were considered to have had a PTB. There are several known causes for PTB such as infection (Gracei et al., 2010; Klien & Gibbs, 2005), maternal bleeding (Lykke & Langhoff-Ross, 2012), short cervix (Slager & Lynne, 2012), carrying multiples (Suneet, Chauhan, Scardo, Alfred, & Abuhamad, 2010), and hypertension (Catov, Nohr, Olsen, Ness, 2008), but known causes account for less than half of all PTB's (Goldenberg, Culhane, Iams, Romero, 2008). Although the mechanisms involved in the signalling of labour are not fully understood (i.e., it has not been

determined if the fetus or the mother signals the induction of labour), gestational length was chosen as a pregnancy outcome because of the known causes of PTB, maternal complications are the most common reason. Furthermore, it is ultimately the mother's responsibility for the termination of gestation (i.e., giving birth).

3.5.2 Birth Outcome Measures

There are several infant perinatal health measures that are predictive of long-term health outcomes. For the purpose of this study, an infant was considered to have a poor outcome if s/he had one or more of the following: a 5-minute Apgar score of <7, was small for gestational age, was large for gestational age, had a birth weight < 2500 grams, had health complications, and hospital LOS that exceeded standard length of hospital stay in relation to type of delivery.

3.5.2.1 Apgar Score

In 1953, Virginia Apgar first proposed a standardized clinical assessment of newborns (Apgar, 1953). The Apgar scoring system has been used for over 50 years to assess overall health and vitality of the newborn immediately after birth (Bregman, 2006). The Apgar test is administered at 1 minute and 5 minutes post parturition, and is sometimes repeated at 10 minutes. The Apgar assesses five easily identifiable functional domains – muscle tone and reflex, heart rate, respiratory effort, irritability, and colour and is scored between 0 - 2. Muscle tone of the infant is assessed from 0 (*no movement*) to 2 (*tone, movement and flexion*). The heart rate of the infant is assessed measuring the pulse of the infant from 0 (*not present*) to 2 (*greater than 100 beats per minute*). Irritability is assessed from 0 (*non-responsive*) to 2 (*irritable, grimace, and/or crying*). Note that in newborns, irritability is considered a sign of good health. Respiratory effort is scored from 0 (*absence of breath*) to 2 (*regular with crying*). Colour is assessed from 0 (*blue/grey in appearance*) to 2 (*pink, normal*). A 5-minute Apgar score of 8-10 is considered in the normal range, and an Apgar score of 7 at 5-minutes may indicate a

complication, but is not considered to be at high risk (Casey, McIntire, & Leveno, 2001). Infants with Apgar scores lower than 7 are considered to be at an increased risk for morbidity and mortality. In this study, 5-minute Apgar scores of 7-10 were considered a good outcome and scores less than or equal to 6 were considered to have complications.

3.5.2.2 Birth Weight

Birth weight (measured in grams) was also used as a birth outcome measure. Infants who fell below the 10 percentile of sex-specific birth weight by gestational age were considered small for gestational age (SGA). Infants were considered large for gestational age (LGA) if their birth weight was above the 90th percentile of sex-specific birth weight for gestational age. The percentiles for SGA and LGA were based on the Canadian Perinatal Health Report (Public Health Agency of Canada, 2008). Infants who weighed less than 2500 grams were considered low birth weight (LBW).

3.5.2.3 Hospital Length of Stay

As a proxy for infant health complications, the mother's hospital LOS was compared with her infant's. Hospital LOS was measured in hours. If the total number of hours the infant spent in hospital was greater than the mother's total number of hours spent in the hospital (i.e., the infant was not discharged with the mother), then the infant was assumed to have had birth complications.

3.6 Data Analysis

Various statistical analyses were utilized to test the hypotheses previously outlined. Analysis was performed using SPSS version 21. Analyses consisted of descriptive statistics (means/standard deviations and frequencies/percentages) for ethnicity, income, marital status, parity, and age. Multiple chi-square tests were performed as well as a forward step logistic regression analysis. For measures of pregnancy and birth outcomes, only singleton pregnancies

were used. First Nations outcomes were included in the psychosocial measures and excluded from the analysis of pregnancy and birth outcomes as foreign-born to Canadian-born ethnic minorities were compared.

3.6.1 Analysis of Question 1

To compare the levels of psychosocial stress during pregnancy between women of dominant culture and women who identified with an ethnic minority, ethnicity data as well as psychosocial measures from questionnaires administered before 25 weeks gestation and between 34-36 weeks gestation were analyzed. The psychosocial measures used to answer the first question were the: (a) State Anxiety Index (Spielberger et al., 1983); (b) Perceived Stress Scale (Cohen et al., 1983); (c) Medical Outcomes Study (MOS) Social Support Survey (Sherbourne & Stewart, 1991); (d) Short Form Health Survey -12 (Ware et al., 1996); and (e) Edinburgh Postnatal Depression Scale (Cox et al., 1987). Each of the above inventories was scored and the established cut-off scores or percentiles were used to create categorical variables.

Scores from each psychosocial measure were compared to ethnicity using a chi-square test for independence. A chi-square test was chosen because it is a non-parametric statistical test appropriate to use when exploring the association between two categorical variables (Field, 2009). All psychosocial measures were categorized into “good” or “poor” outcomes using established cut-off scores or percentiles. Chi square tests for independence were performed to compare the psychosocial measures of women who self-identified with as White with women who identified with an ethnic minority. A second chi square analysis was performed to compare the outcomes of psychosocial measures between all ethnic groups (White, Black/African, First Nations, Asian, Other Asian/Arab, Latin American, and Mixed/Other) to determine if there was a significant difference between groups.

3.6.2 Analysis of Question 2

In order to compare if women who identify with an ethnic minority women have poorer pregnancy outcomes than women from the dominant culture, a chi-square analysis was performed. Poor pregnancy outcomes were categorized as one or more complications of pregnancy. Complications were categorized by indicating the presence or absence of adverse outcomes (e.g., preterm birth and/or perinatal complications). First, a chi-square test was performed to compare the differences in pregnancy outcomes between women who identified with an ethnic minority and women who identified as White. An additional chi-squared analysis was run to compare the pregnancy outcomes between all ethnic groups (White, Black/African, Asian, Other Asian, Arab, Latin American, and Mixed/Other) to determine if there was a significant difference between groups.

To compare birth outcomes of the infants whose mother's identified with an ethnic minority to the birth outcomes of infants whose mother's identified with the dominant culture (White) another chi-square analysis was performed. An additional chi-squared analysis was run to compare the birth outcomes between all ethnic groups (White, Black/African, Asian, Other Asian, Arab, Latin American, and Mixed/Other) to determine if there was a significant difference between groups.

3.6.3 Analysis of Question 3

To compare if Canadian-born women who identify with an ethnic minority have better pregnancy and birth outcomes than foreign-born women who identify with an ethnic minority, a series of chi-square analysis were performed.

To explore the possibility of a generational effect, the outcomes of women who were born in Canada, but who indicated that their mother was foreign born (i.e., second generation) were compared. Using a chi-square analysis, pregnancy and birth outcomes of second-

generation women who identified as White were compared to second-generation women who identified with an ethnic minority.

3.6.4 Analysis of Question 4

Lastly, to identify which independent variable had the greatest predictive value in relation to pregnancy outcomes, a forward stepwise multiple logistic regression analysis was run. Because there are a number of potential predictors in this model, a stepwise logistic regression was used to find the most parsimonious set of predictors in relation to pregnancy outcomes. The stepwise logistic regression procedure considers a number of possible multiple regression models, and selects subsets of parameters to test for possible addition to the model or elimination from the model.

3.7 Additional Analysis

3.7.1 Missing Variables

Due to attrition rates, incomplete measures, and sampling method, not all participants had complete data. To understand the differences between complete and incomplete data, a chi square analysis was performed to compare missing and complete independent and dependent variables.

3.7.2 Household Income and Health Outcomes

To determine if there was an independent relationship between household income and health outcomes, pregnancy and birth outcomes were compared to the following household income levels: < \$20,000, \$20,000 to <\$40,000, \$40,000 to <\$70,000, \$70,000 to < \$100,000 and >\$100,000.

Chapter Four: **Results**

4.1 Demographic Data

Participant age ranged from 19 to over 40 with the majority of participants (40%) between 30-34 years of age followed by participants between 25-29 years of age (31%). Most of the participants indicated that they were married or living common law (94%). Forty-seven percent of participants indicated having a yearly household income greater than \$100,000 per year, 36% reported an income between \$40,000 and \$99,999, and only 9% reported an income of less than \$40,000. Seventy-three percent had completed at least some university or college and an additional 16% had attended or completed graduate school (see Table 1).

Table 1. Demographic Characteristics of Participants

Characteristic	<i>n</i> (%)
Maternal Age (<i>n</i> = 3,283)	
18-24	296(9)
25-29	1,018 (31)
30-34	1,327 (40.4)
35-39	552 (17.1)
40+	80 (2.4)
Marital Status (<i>n</i> = 3,354)	
Married/Common Law	3,165 (94.4)
Other	189 (5.6)
Education (<i>n</i> = 3,356)	
High School or Less	370 (11)

Some or completed University or College	2,458 (73.2)
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Some or completed graduate school	528 (15.7)
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Income ($n = 3,252$)

< \$20,000	105 (3)
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\$20,000-40,000	194 (5.5)
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\$40,000-70,000	484 (13.6)
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\$70,000-99,999	797 (22.4)
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$\geq 100,000$	1,672 (47.1)
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Language ($n = 3,359$)

English	2,967 (83.5)
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French	23 (.6)
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Other	369 (10.4)
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4.2 Ethnic Identity

Of the 3,552 questionnaires completed at the first time point, 3,354 women identified an ethnicity and 198 participants did not complete this question. The majority of participants ($N = 2,636$) identified as Caucasian and 718 participants identified with an ethnic minority (Table 2).

Table 2. Ethnic Identity

Ethnic Identity	<i>n</i> (%)
White	2,636 (74.2)
Black/ African	50 (1.4)
First Nations	32 (.9)
Asian	164 (4.6)
Other Asian	232 (6.5)
Arab	43 (1.2)
Latin American	79 (2.2)
Mixed/Other	118 (3.3)
Did Not Answer	198 (5.6)
Total	3,552

Of the total sample, 732 women indicated that they were foreign-born. After excluding participants with multiples, First Nations, and those missing outcome data, 624 foreign born participants and 2,347 Canadian born participants were included in analyses related to place of birth (Table 3). Of those, 586 participants identified with an ethnic minority, 69% were foreign born ($N = 405$). Percentages of foreign born were calculated by dividing the total number of women who identified with a specific ethnic minority by the total number of those from the identified ethnic minority who indicated being foreign born.

Table 3. Ethnic Identity and Birthplace (N = 2,995)

Ethnic Identity	Born in Canada <i>n</i> (%)	Foreign Born <i>n</i> (%)
White	2,166 (91)	219 (9)
Black	11 (26)	31(74)
Asian	49 (32)	105 (68)
Other Asian	35 (19)	154 (81)
Arab	9 (26)	26 (74)
Latin American	7 (11)	58 (89)
Mixed/Other	70 (69)	31 (31)
Total	2,347 (79)	624 (21)

The characteristics of the sample are representative of the fertility trends of Canadian women of childbearing age. The majority of women in the study were between 30 and 34 years of age at the time of delivery. For the first time in Canadian history, more women in their thirties were having children than women in their twenties and women between 30 and 34 had the highest fertility rates (Statistics Canada, 2013b). Recent data released from Statistics Canada reported fertility rates of women in their twenties reached a record low in 2011 (Statistics Canada, 2013e).

Socioeconomic indicators in this sample (e.g., household income, level of education) suggest that this sample may be slightly above Canadian averages. For example, the average Canadian household income for two parent families with children (under 18 years living at home) is \$93,700 (Statistics Canada, 2013c) and only represents 8.5% of the AOB participants.

In Calgary, the median income for all census families with children was \$97,070 in 2010 and the median household income for two parent families in Alberta was \$93,820 (Statistics Canada, 2013d). A high percentage of participants (47%) reported household incomes greater than \$100,000, but detailed information was not collected past \$100,000 making it impossible to know the range of income in this group. When income was compared to psychosocial measures or pregnancy outcomes, no significant relationship was found. Thus, findings from the present study are unique in that socioeconomic status did not play a significant role in outcomes.

The sample in the present study is representative of the diversity of the general population in Canada. The percentage of mothers who identified with an ethnic minority (21%) is representative of the percentage of foreign-born people living in Canada (20.6%) and similar to the percentage of Canadians who identify as a visible minority (19.1%; Statistics Canada, 2013a). Interestingly, the majority of women who identified with a visible minority were also foreign born. The sub-analysis of birthplace and ethnic identity demonstrated that 91 % of women who identified with an ethnic minority had either immigrated to Canada or were second generation Canadians. Therefore, this sample is representative of immigrant populations and second-generation Canadian women.

4.3 Psychosocial Stress

A series of chi square tests were performed to compare the levels of psychosocial stress during pregnancy between women of the dominant culture and women who identified with an ethnic minority.

4.3.1 Social Support

Inadequate levels of social support during pregnancy were more prevalent amongst women of an ethnic minority (28.8%) than amongst White women (9.8%). A chi square analysis showed a significant association between groups, $\chi^2 (1, N = 3,318) = 167.37, p < .001$ (Figure

1). A second chi square analysis was run to determine if there was a difference in levels of social support during pregnancy between ethnicities. Chi square analysis revealed a significant association between ethnic identity and levels of social support, $\chi^2 (7, N = 3,318) = 184.53, p < .001$ with less than 10% of White women reporting inadequate levels of social support (9.8%) while over a third of the Arab (35.7%) and Other Asian (33.9%) group reported having inadequate social support. Over a quarter of all Black African/American (28.6%), Latin American (28.2%), First Nations (28.1%), and Asian (27.5%) participants reported inadequate levels of social support and 18.4% of the Mixed/Other group.

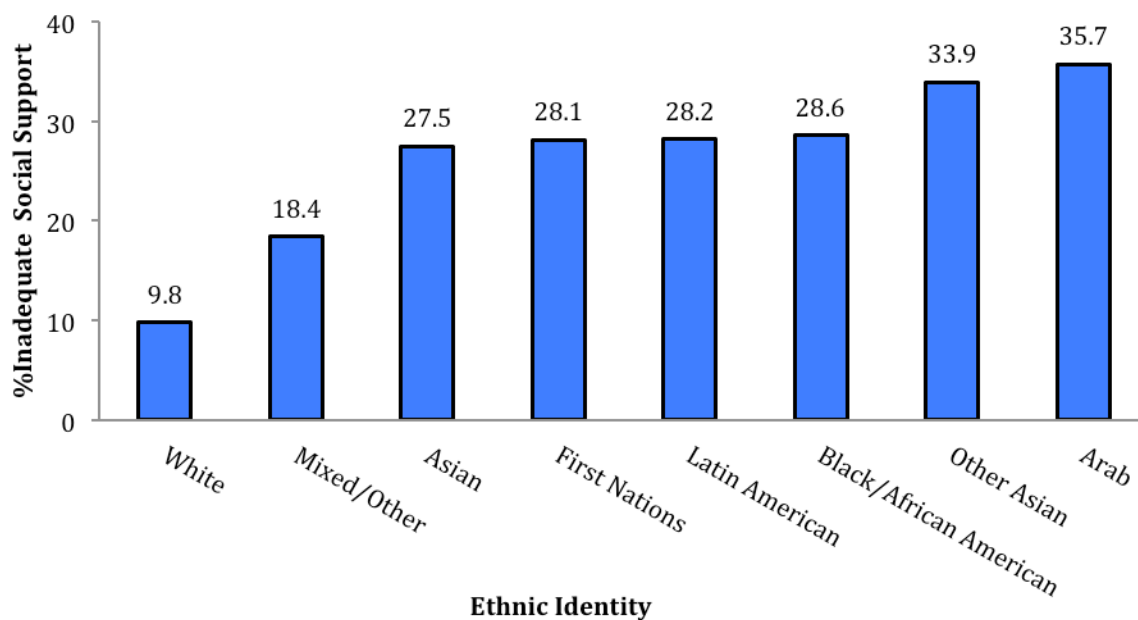


Figure 1. Self-reported levels of inadequate social support as measured by the MOS scale of social support.

4.3.2 Depression

Six percent of the women in this study reported having depressive symptoms. Depressive symptoms were more prevalent amongst women of an ethnic minority (9.8%) than amongst White women (5.9%). A chi square analysis showed a significant difference between groups, $\chi^2(1, N = 3,141) = 12.39, p < .001$. A second chi square analysis was run to determine if there was an association between depressive symptoms during pregnancy and ethnicities. Differences were found between groups, $\chi^2(7, N = 3,141) = 21.116, p \leq .01$ (see Figure 2). White women were least likely to report symptoms of depression (5.9%) while over twice as many Arab (15.4%) and Other Asian (12.9%) women reported symptoms of depression during pregnancy followed by Mixed/Other (9.4%), First Nations (7.7%), Latin American (7.2%), Asian (7%), and Black African/American (6.8%).

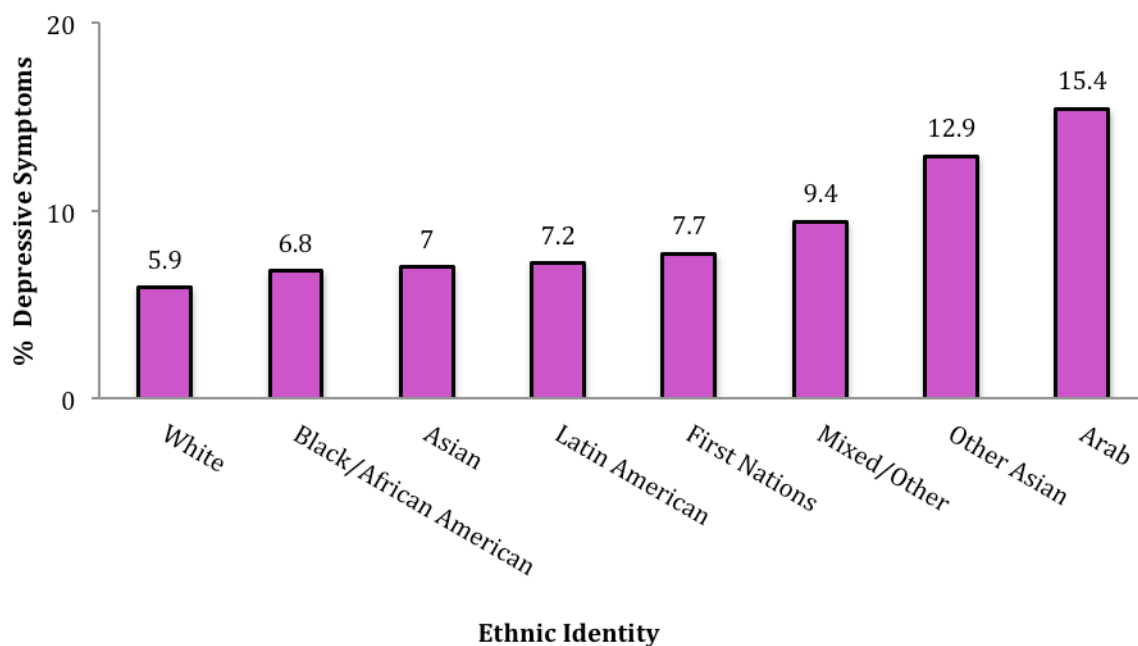


Figure 2. Percent of women who reported high levels of depressive symptoms as measured by the EPDS.

4.3.3 Anxiety

The overall prevalence of state anxiety symptoms was 18.3%. The prevalence of anxiety symptoms during pregnancy was higher amongst women of an ethnic minority (22.9%) than amongst White women (17%). A chi square analysis showed a significant association between groups, $\chi^2 (1, N = 3,080) = 11.299, p \leq .001$ (Figure 3). A second chi square analysis was performed to determine if there was a difference in the presence of anxiety during pregnancy between ethnicities. Indeed, differences were found between groups, $\chi^2 (7, N = 3,080) = 35.966, p \leq .002$ with Asian and White women reporting the lowest levels of anxiety (16% and 17%, respectively), while half of all Arab women (50%) indicated experiencing anxiety during pregnancy followed by First Nations (29.2%), Latin American (27.2%), Other Asian (22.6%), Black/African (26.2%), and Mixed/Other (18.9%).

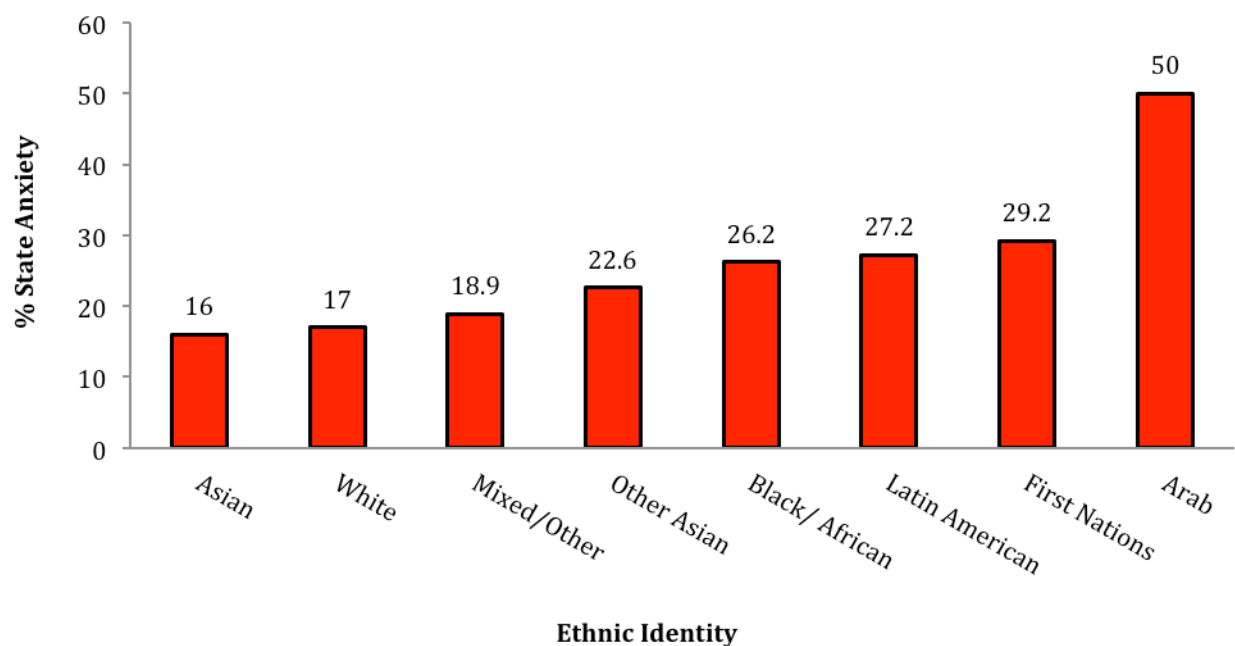


Figure 3. Percent of women reporting trait anxiety during pregnancy.

4.3.4 Perceived Stress

4.3.4.1 Second Trimester

In the second trimester of pregnancy (< 25 weeks gestation), more women of an ethnic minority perceived their life situation as stressful (28.9%) than White women (19.7%), $\chi^2 (1, N = 3,311) = 27.989, p < .001$. An additional chi square analysis performed to determine if there were significant differences in perceived stress during pregnancy found significant differences between groups, $\chi^2 (7, N = 3,311) = 39.867, p < .001$ (Figure 4). White women were least likely to perceive their situation in life as stressful (19.7%) and Arab women reported the highest levels of perceived stress (39.5%) followed by First Nations (37.5%), Other Asian (32.9%), Latin American (28.9%), Black (28.6%), Asian (24.1%) and Mixed/Other (22%).

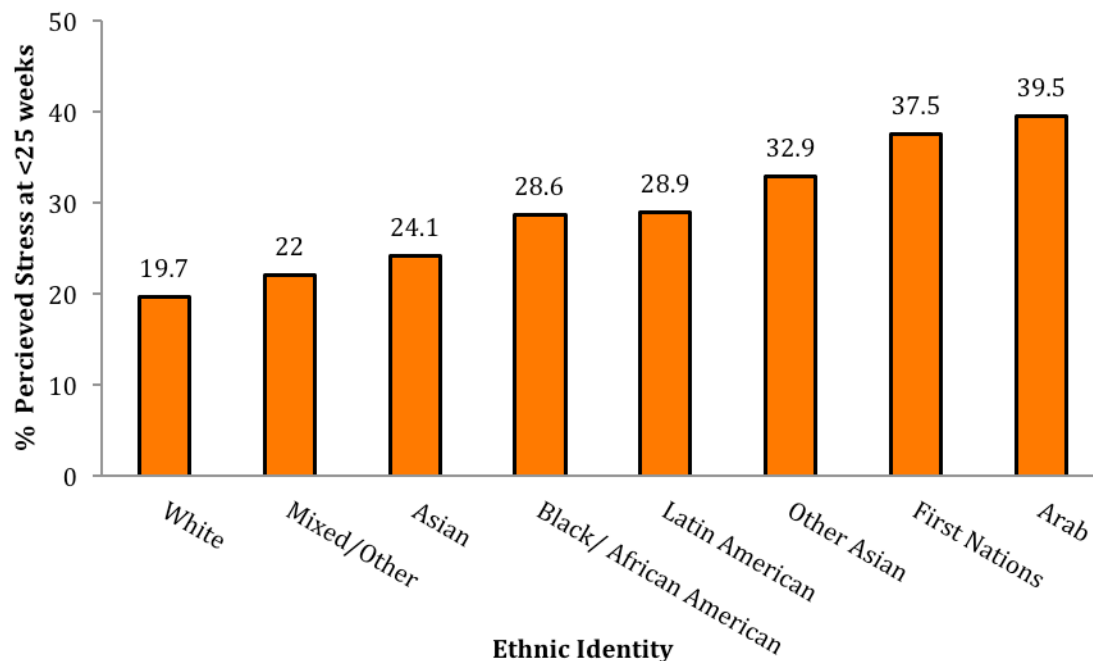


Figure 4. Percentage of women who perceived their life situation as stressful at < 25 weeks gestation.

4.3.4.2 Third Trimester

In the last trimester of pregnancy (32 weeks gestation ± 1 week), similar differences between groups were observed with 28.1% of ethnic and 21.2% of White women perceiving their situations in life as stressful, $\chi^2 (1, N = 2,899) = 12.871, p < .001$. The perception of stress was slightly increased in the third trimester with a total of 22.7% reporting perceived stress versus 21.7% in the second trimester. As shown in Figure 5, there were also significant differences between ethnic groups, $\chi^2 (7, N = 2,899) = 28.283, p < .001$. The White group was least likely to perceive their life situation as stressful (21.2%) and First Nations and Arab women reported the highest levels of perceived stress (45% and 44.4% respectively), followed by Other Asian (31.8%), Black/African (26.2%), Mixed/ Other (25%), Latin American (23.1%), and Asian (21.4%).

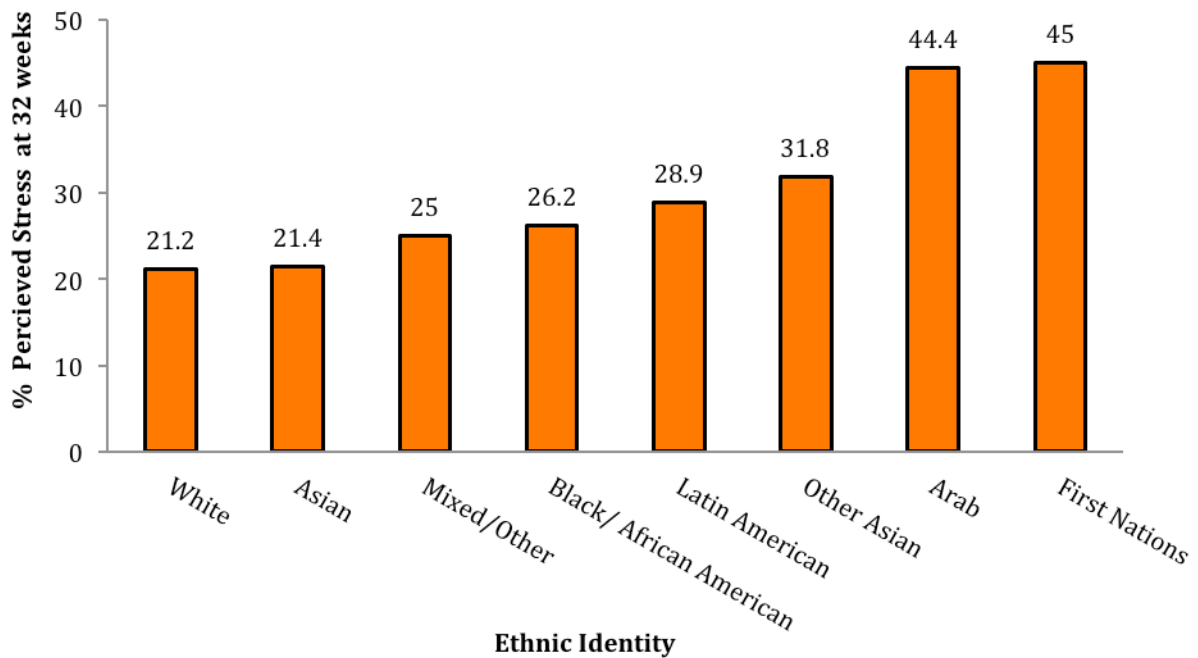


Figure 5. Percent of women who perceived their life situation as stressful at 32 weeks (± 1 week) gestation.

4.3.5 Physical Health

The majority of women reported their prenatal physical health as good (84.3%) on the physical health component. White women reported better physical health over the course of their pregnancy (85.9%) than women of an ethnic minority (78.6%). Chi square analysis revealed a significant difference between groups, $\chi^2 (1, N = 3,353) = 23.200, p < .001$. An additional chi square analysis was performed to determine if there was a difference in physical health between ethnic groups. Results revealed significant differences between groups, $\chi^2 (7, N = 3,353) = 32.429, p < .001$. As shown in in Figure 6, Black/African, Arab, and White women reported similar levels of good physical health (86%, 86% and 85.9% respectively) followed by Latin American (83.5%), Mixed/Other (80.5%), Asian (76.2%), Other Asian (75.4%), and First Nation (71.9%).

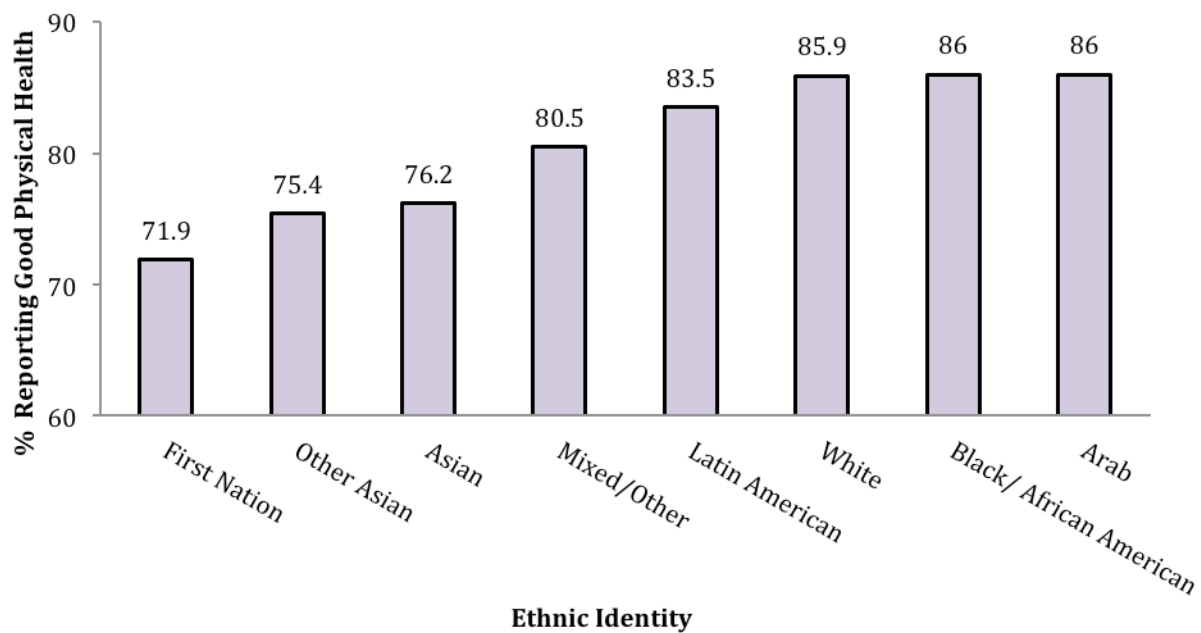


Figure 6. Percent of women who reported having good physical health throughout pregnancy.

4.3.6 Emotional Health

The majority of respondents reported having good emotional health throughout pregnancy (88.2%) on the emotional health component. White women reported better emotional health over the course of their pregnancy (89.6%) than women of an ethnic minority (78.6%). Chi square analysis revealed a significant difference between groups, $\chi^2 (1, N = 3,353) = 22.300$, $p < .001$. An additional chi square analysis was performed to determine if there was a difference in emotional health between ethnic groups. Emotional health was reported as being good by 89.5% of White, 89% of Mixed/Other, and 88.6% Latin American women followed by Asian (82.3%), Other Asian (81.5%), Arab (81.4%), Black/African (80%), and markedly less often reported by First Nations women (71.9%). Chi square analysis revealed significant differences between groups, $\chi^2 (7, N = 3,353) = 33.665$, $p < .001$ (Figure 7).

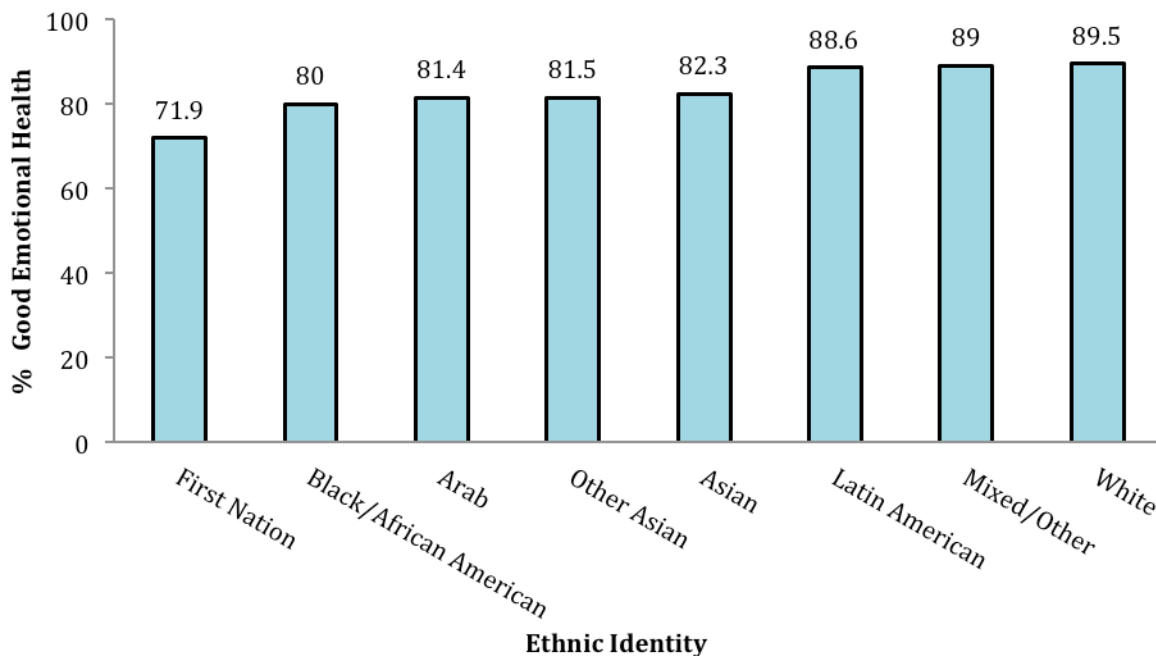


Figure 7. Percent of women who reported having good emotional health throughout pregnancy

4.4 Pregnancy and Birth Outcomes

Of the 2,912 women who had complete pregnancy outcome records, 234 were preterm births (6.6%) and 347 women (11.8%) had perinatal/postnatal complications. A total of 473 women (16.6%) had the presence of one or more sub-optimal pregnancy outcome (see Table 4). Of the 3,008 complete birth outcome records, there were 300 infants considered small for gestational age (8.4%), 250 infants considered large for gestational age (7%), 171 infants who weighed less than 2500g (4.8%), 44 infants with Apgar scores less than seven (1.2%), and 227 infants (6.4%) with postnatal complications.

Table 4. Health Outcomes

Characteristic	n (%)
Pregnancy Outcomes (<i>n</i> = 2,912)	
Preterm birth rate <37 weeks	234 (6.6)
Perinatal/Postnatal Complication	347 (11.8)
Total With Poor Pregnancy Outcome	473 (16.6)
Birth Outcomes (<i>n</i> = 3008)	
Small for Gestational Age	300 (8.4)
Large for Gestational Age	250 (7)
Less than 2500g (Low Birth Weight)	171 (4.8)
Apgar < 7	44 (3.1)
Postnatal Complication	227 (6.4)
Total with Poor Birth Outcome	638 (22.6)

4.4.1 *Pregnancy Outcomes by Ethnicity*

A chi-square analysis was used to compare whether women who identified with an ethnic minority had poorer pregnancy outcomes (i.e., preterm birth and/ or perinatal/postnatal complications) than women from the White reference group. Indeed, women who identified with an ethnic minority had poorer pregnancy outcomes (23.9%) than women who identified as White (14.8%) and the difference between the groups was significant, $\chi^2 (1, N = 2,831) = 26.800$, $p < .001$ (Figure 8). An additional analysis was performed to explore the association between various ethnic identities and pregnancy outcomes that was also significant, $\chi^2 (7, N = 2,831) = 34.071$, $p < .001$. As shown in Figure 9, women who identified as Mixed/Other had the poorest pregnancy outcomes (27.1%) followed by Other Asian (26.7%), Latin American (24.6%), Black/African (22%), and Asian (21.7%). Women who identified as Arab had the lowest occurrence of poor pregnancy outcomes (11.4%) followed by women who identified as White (14.8%). .

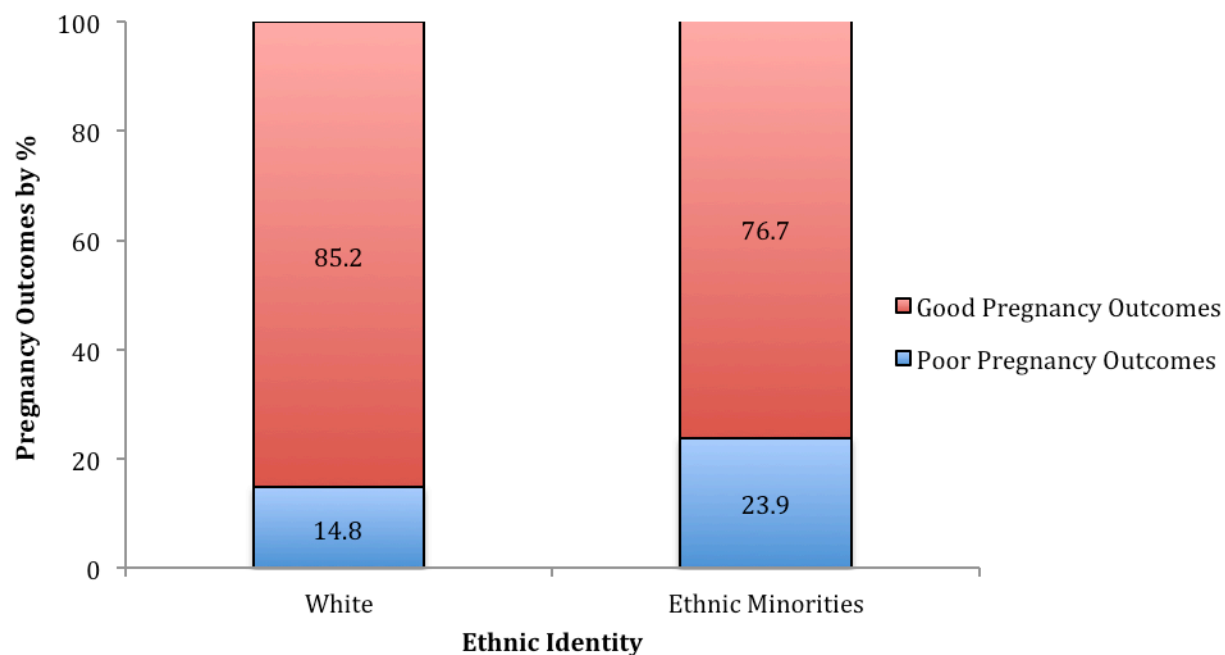


Figure 8. Proportion of poor pregnancy outcomes comparing the White reference group to women who identify with an ethnic minority.

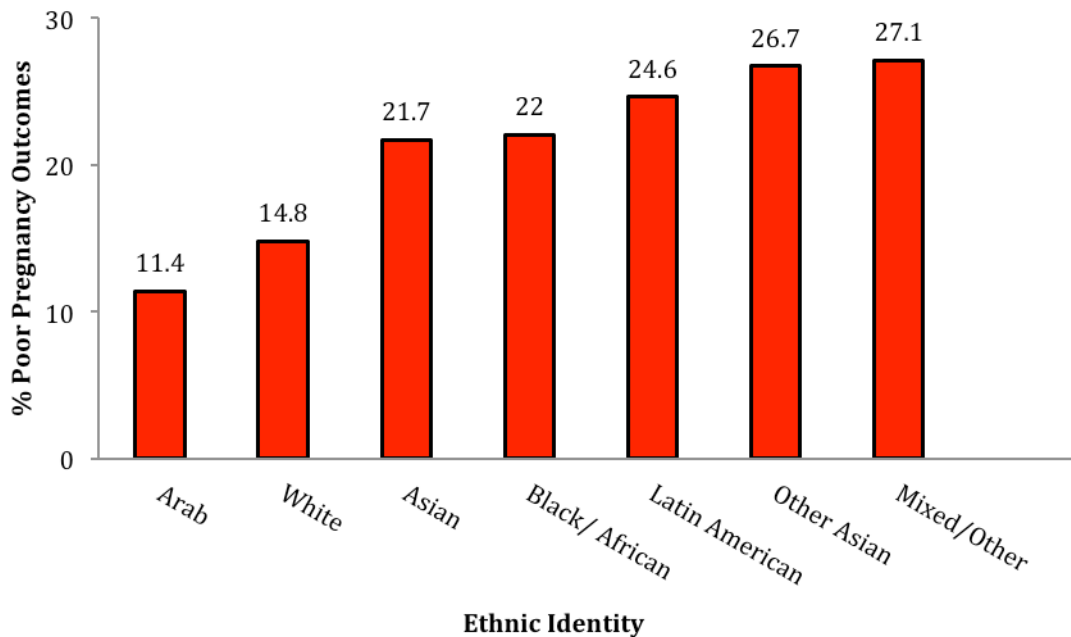


Figure 9. Proportions of poor pregnancy outcomes by ethnic identity.

4.4.2 Birth Outcomes by Ethnicity

One quarter of the AOB infants had suboptimal birth outcomes. A chi-square analysis was used to compare whether infants of women who identified with an ethnic minority had poorer birth outcomes than infants of women from the dominant culture (Figure 10). Infants of women who identified with an ethnic minority had poorer birth outcomes (28.7%) than women who identified as White (24.1%) and the difference between the groups was significant, $\chi^2 (1, N = 2,967) = 5.346, p < .05$. Figure 11 shows infants of women who identified as Black/African had the poorest birth outcomes (40.5%) followed by Latin American (30.8%), Mixed/Other (29.7%), Other Asian (29.3%), and followed by Arab (25.7%) infants. The infants of Asian and White women had the lowest proportions of poor birth outcomes, 24% and 24.1 %, respectively. However, an additional analysis performed to explore the association between maternal ethnic identities and birth outcomes did not show significant differences between ethnic groups, $\chi^2 (6, N$

$= 2,967) = 10.646, p = .100$.

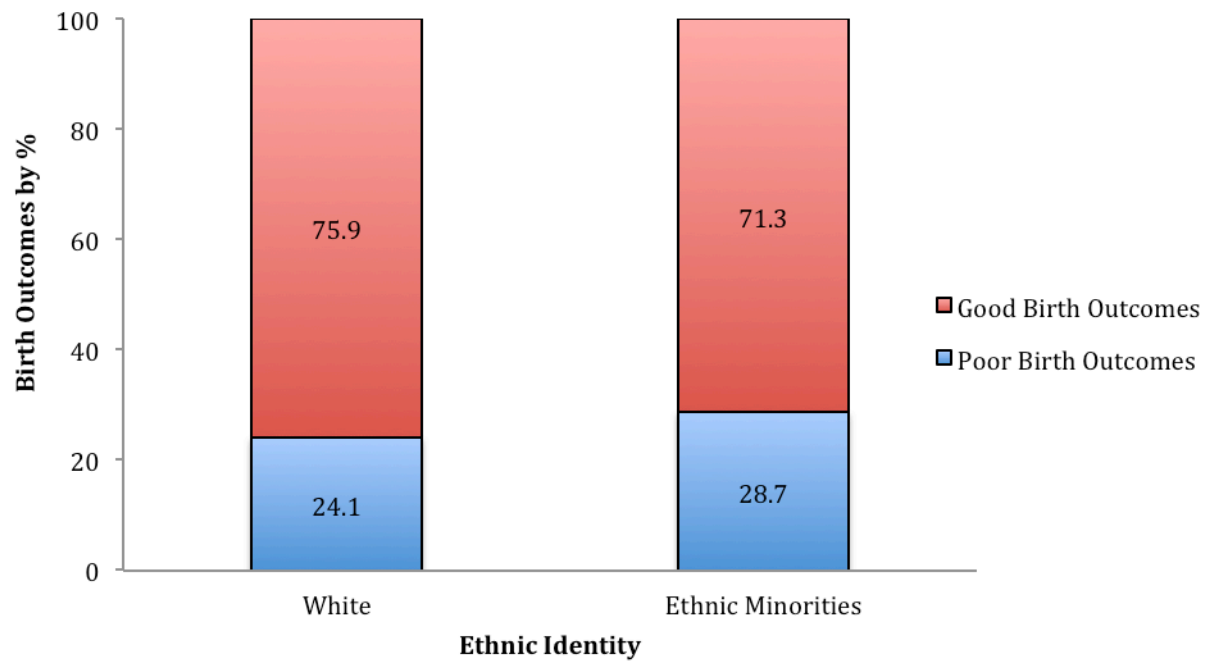


Figure 10. Proportions of good and poor birth outcomes of infants whose mothers identify with an ethnic minority compared to the White reference group.

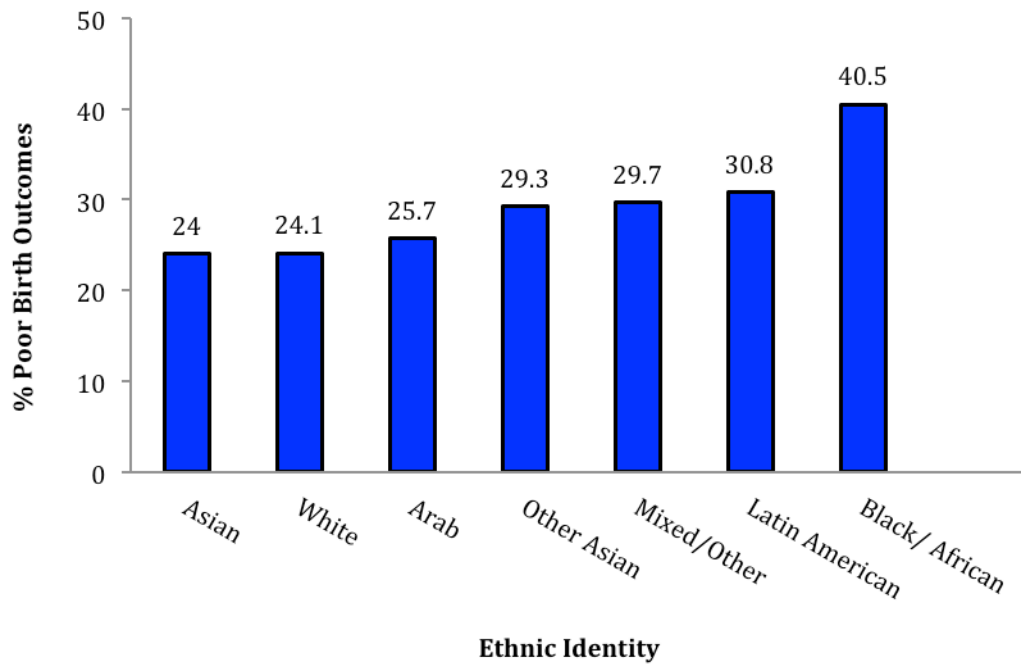


Figure 11. Proportion of poor birth outcomes by ethnic identity.

4.4.3 Pregnancy Outcomes by Birthplace and Ethnicity

A chi square analysis comparing pregnancy outcomes of foreign-born and Canadian-born women found the association between ethnic group and place of birth to be significant, $\chi^2 (3, N = 2,853) = 24.673, p < .001$. Interestingly, foreign-born women who identified as White had the lowest proportion of poor pregnancy outcomes (13.6%) followed by Canadian-born women identifying as White (15%). As shown in in Figure 12, Canadian-born and foreign-born women who identified with an ethnic minority had higher proportions of poor pregnancy outcomes, 23.5% and 23.3%, respectively.

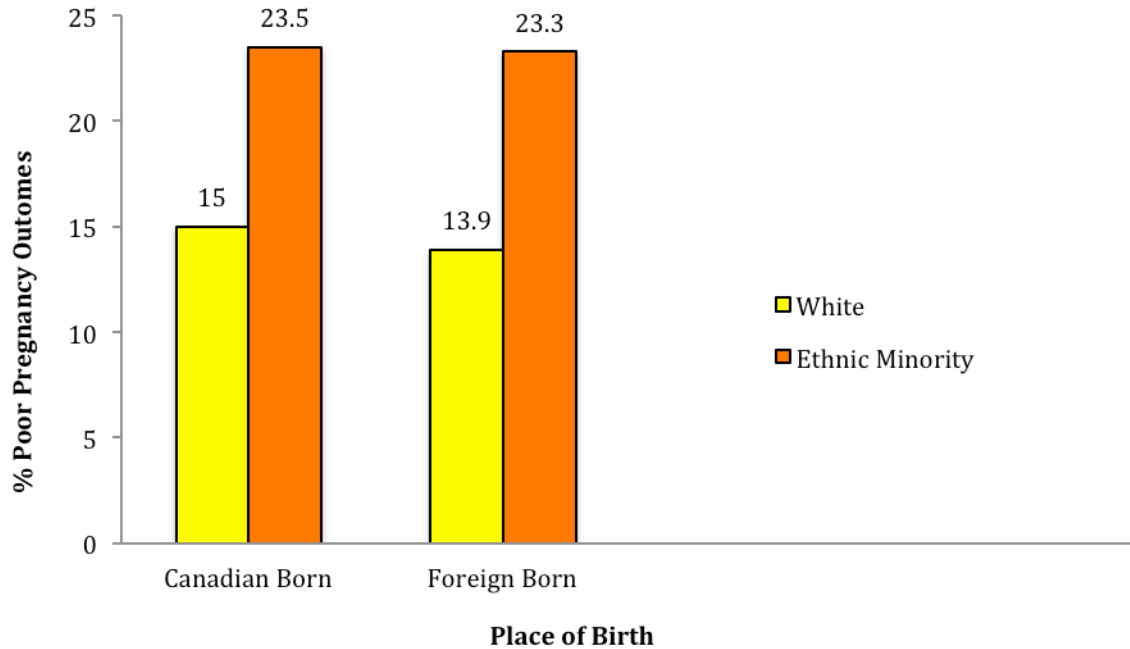


Figure 12. Proportions of poor pregnancy outcomes by place of birth and ethnic identity.

4.4.4 Birth Outcomes by Birthplace and Ethnicity

Infants of Canadian-born women who identified with an ethnic minority had the highest proportion of poor birth outcomes (31.4%) followed by infants of foreign-born women who identified with an ethnic minority (27.4%). Infants of Canadian-born women who identified as White had lower proportions of poor birth outcomes (24.3%) than infants of Canadian-born women who identified with an ethnic minority (31.4%). As shown in Figure 13, infants of foreign-born mothers who identified as White had a lower proportion of poor outcomes (22.4%) than infants of foreign-born mothers who identified with an ethnic minority (27.4%). There was a trend towards significance between ethnicity and birth outcomes of foreign-born and Canadian-born infants, $\chi^2 (3, N = 2,991) = 7.076, p = .07$.

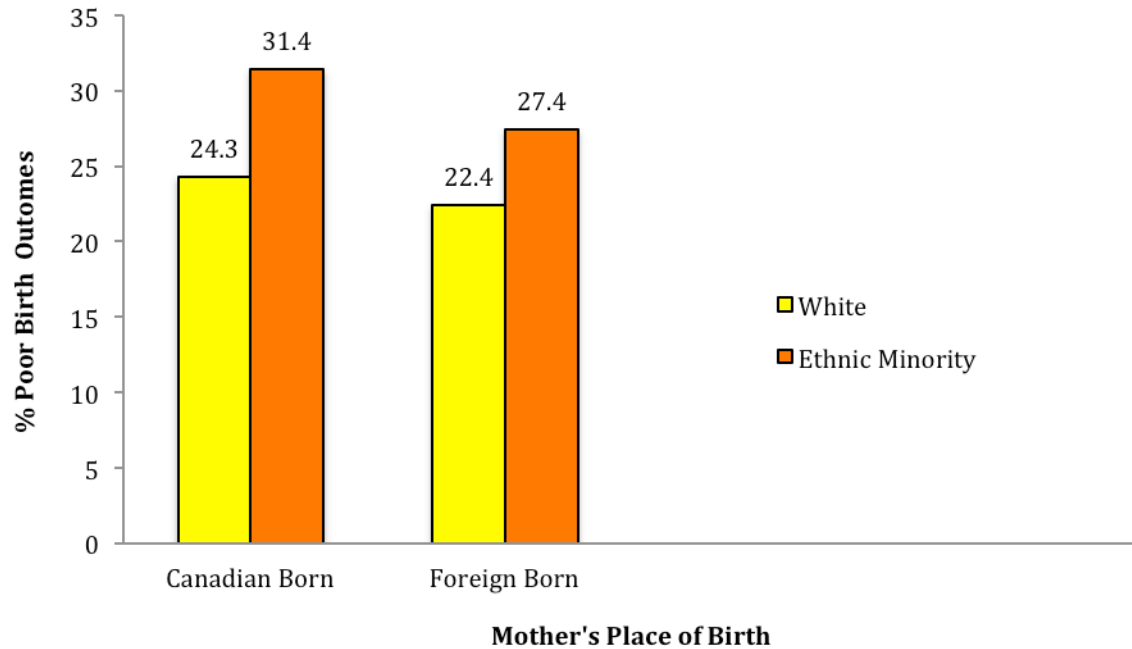


Figure 13. Proportions of poor infant birth outcomes by mother’s place of birth and ethnic identity.

4.5 Generational Effect

To test for generational effects, Canadian born mothers who indicated that their mother was foreign-born (i.e., second generation Canadian) were analyzed separately. Second generation Canadians who identified with an ethnic minority had almost double the occurrences of poor pregnancy outcomes (26%) as compared to second generation Canadians who identified as White (13.9%) with a significant difference between groups, $\chi^2 (1, N = 329) = 7.587, p < .01$ (Figure 14).

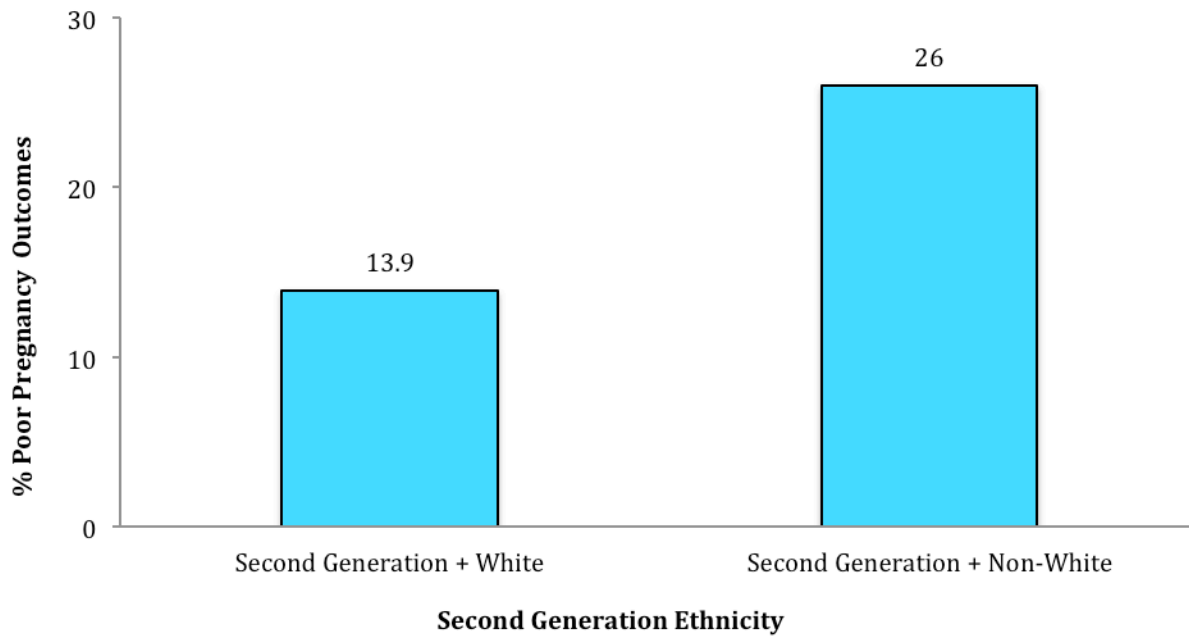


Figure 14. Pregnancy outcomes of second-generation Canadian women.

As shown in in Figure 15, more infants of second-generation Canadian mothers who identified with an ethnic minority had poor birth outcomes (32.6%) than did infants of second-generation Canadian mothers who identified as White (24.5%). However, chi square analysis indicated no significant association between birth outcomes and ethnicity, $\chi^2 (1, N = 348) = 2.650, p = .104$

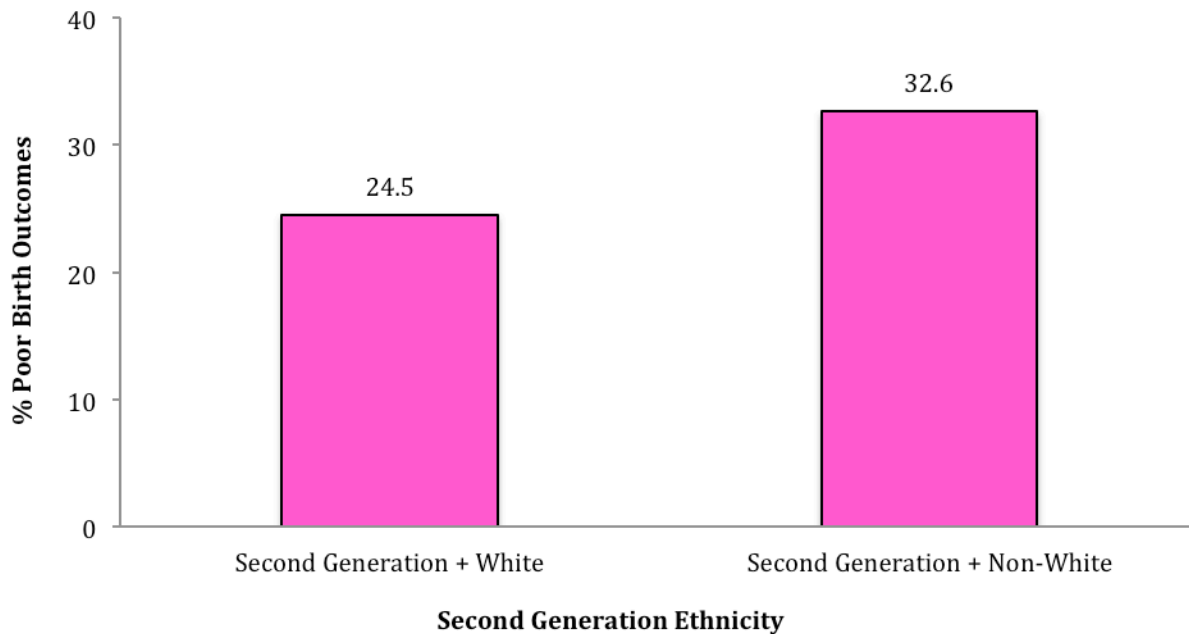


Figure 15. Infant birth outcomes of second-generation Canadian women.

4.6 Predictive Modeling

Finally, to identify which independent variables have the greatest predictive value in relation to pregnancy outcomes, a forward stepwise logistic regression analysis was performed with pregnancy outcomes as the dependent variable and eight predictor variables: ethnicity, depression, prenatal emotional health, prenatal physical health, anxiety, perceived stress at < 25 weeks gestation and at 32 weeks (± 1 week) gestation, and social support. In total, 2,474 participants had a complete set of predictor variables and pregnancy outcome data.

Eight potential predictors were entered into the stepwise logistic regression. Only two out of these eight potential predictors were statistically significant in predicting pregnancy outcomes. Omnibus tests of model coefficients of the final model is $\chi^2(2, N = 2,474) = 37.12, p < .001$. The classification accuracy rate computed by SPSS was 84.2%, which was greater than the proportional by chance

accuracy criteria of 62.5% ($1.25 \times 50.0\% = 62.5\%$). The value of $\text{Exp}(B)$ for the White group was 1.78 which implies an increase in the odds of 78% ($1.78 - 1 = .78$) of having a good pregnancy outcome and the $\text{Exp}(B)$ value that women in their last trimester of pregnancy (32 weeks ± 1 week) who do not perceive their life situation as stressful was 1.65 which implies a 65% ($1.65 - 1 = .65$) increase in the odds of having a good pregnancy outcome (Table 5). The Variance Inflation Factor (VIF) test for multicollinearity of predictor variables ranged between 1 to 1.4, indicating that the variables were not collinear (Allison, 1999).

Table 5. Predictive Modeling

	B (SE)	Wald	Odds Ratio	<i>p</i> value
Constant	.85 (.14)	38.33	1.35	.000
Ethnicity	.58 (.13)	20.56	0.78	.000
PSS (3rd trimester)	.5 (.12)	16.19	0.65	.000

4.7 Missing Data

Due to the type of sampling and data collection, not all participants had complete data sets. In order to understand the association between complete and incomplete data, the data sets with missing and complete values for each variable of interest were compared. Results from chi square analysis show that women whose first language was not English were more likely to have missing data (18%) than participants for whom English or French was their first language (13.4% and 9% respectively). The difference between groups was significant, $\chi^2 (2, N = 3,359) = 7.41, p < .01$. Significant differences between ethnic groups were also found between the

missing and non-missing health outcomes by ethnicity $\chi^2 (6, N = 3,354) = 30.018, p < .001$.

Missing outcome data was highest amongst First Nations participants (31%), followed by Other Asian, Arab, and Latin (20%), Mixed/ Other (19%), Black (14%), while White (7.6%) and Asian (7%) had the lowest proportions of missing outcome data.

Significant differences by ethnicity were also found between missing and non-missing measures of anxiety, $\chi^2 (6, N = 3,354) = 62.784, p < .001$, as well as measures of depression, $\chi^2 (6, N = 3,354) = 29.614, p < .001$. Women who perceived their life situation as stressful at < 25 weeks gestation were more likely to have missing health outcome data with significant differences between the missing and non-missing groups, $\chi^2 (1, N = 3,319) = 28.277, p < .001$. These differences were found at 32 weeks (± 1 week) gestation also, $\chi^2 (1, N = 2,962) = 4.225, p < .05$.

4.8 Socioeconomic Status and Health Outcomes

No significant differences were found between income levels and pregnancy outcomes, $\chi^2 (4, N = 2,768) = 3.354, p = .500$, nor were there significant differences between income levels and birth outcomes, $\chi^2 (4, N = 2,892) = 7.792, p = .100$

Chapter Five: **Discussion**

5.1 Introduction

In this chapter, I explain the meaning of the findings in relation to the physical and mental health indicators that serve as predictors of pregnancy and birth outcomes. Specifically, findings from the psychosocial inventories and pregnancy and birth outcomes measures will be discussed in detail. Additionally, implications for primary care policy, practice and counselling applications are considered. Finally, limitations of this study and possible directions for future research will be discussed.

5.1.1 *Hypothesis Support*

5.1.1.1 Hypothesis 1.

The hypothesis that women who identify with an ethnic minority will experience higher proportions of psychosocial stress was fully supported in that women who identified with an ethnic minority experienced significantly higher proportions of psychosocial stress during pregnancy than the White/Caucasian reference group.

5.1.1.2 Hypothesis 2.

The hypothesis that women who identify with an ethnic minority would have poorer pregnancy outcomes was also fully supported in that women who identified with an ethnic minority had significantly poorer pregnancy outcomes than the White/Caucasian reference group. The hypothesis that infants of women who identified with an ethnic minority would have poorer birth outcomes was also supported in that infants of women who identified with an ethnic minority had significantly poorer birth outcomes

5.1.1.3 Hypothesis 3.

The hypothesis that Canadian born women from the dominant culture will have better pregnancy and birth outcomes than foreign born women was not supported, nor was the

hypothesis that Canadian born women who identify with an ethnic minority will have poorer pregnancy and birth outcomes than foreign-born women who identify with an ethnic minority.

5.1.1.4 Hypothesis 4.

The hypothesis that of the identified determinants of pregnancy outcomes, social support would have the greatest predictive value was not supported.

5.2 Introduction

Calgary represents one of the most ethnically diverse populations in Canada. Ethnic minorities comprise 28.1% of the total population, with the three most populous visible minorities in Calgary being South Asian, Chinese, and Filipino (Statistics Canada, 2013a). Calgary also has the fourth highest immigrant population in Canada representing 26.2% of its total population. Last year alone, Calgary became home to 70,700 newcomers to Canada. Calgary depends on immigration to sustain its rapidly growing economy (Azmi, Huynh & Molin, 2004). Findings from this study have identified that while ethnic minority populations are growing in Calgary, so is the health disparity amongst ethnic minorities.

5.3 Psychosocial Stress

Findings from the present study supported the hypothesis that women who identify with an ethnic minority experience greater levels of psychosocial stress during pregnancy than women who identify with the White reference group. There is a substantial body of research that has identified psychosocial factors such as low social support, depression, poor mental or physical health, stress, and anxiety put women at increased risk for poor pregnancy and birth outcomes (e.g., Grote et al., 2010; Hobel, 2004; Rice et al., 2010; Roy-Matton, Moutquin, Brown, Carrier, & Bell, 2011; Witt et al., 2010). In the following section, findings from each of the psychosocial indicators selected are discussed.

5.3.1 Social Support

The analysis of social support indicates that women from ethnic minorities experience less social support than women who identify as White. Social support can be understood as the material and emotional resources provided to an individual through interpersonal interactions (Baheiraie et al., 2010). Perhaps it is not surprising that the women in the present study who identified with an ethnic minority reported inadequate social support in significantly higher percentages than women who identified with the White reference group. As previously mentioned, women who have migrated from another country often find themselves without the support of their family and community (Zelkowitz et al., 2008). As Falicov (2007) argues, “migration always involves a loss of social capital” (p. 164). This may be especially true for women who have migrated from collectivist cultures such as Asia, Africa, South Asia, and Latin America where there may be greater levels of familial and culturally relevant support.

Curiously, the vast majority of women (90%) who identified with the White reference group (which I used as a proxy for Western/individualistic orientation) reported having adequate levels of social support. Conversely, all the ethnic minority subgroups reported significantly lower levels of social support. Although collectivist and individualist cultures differ in the extent to which cooperation, competition, or individualism are emphasized (Mead, 1967), inadequate social support may not be a function of the culture of origin (Owe et al., 2013). In other words, it should not be assumed that women who identify with individualistic cultures experience lower levels of social support, nor that women from collectivist cultures experience greater levels of social support. In the present study, the issue of inadequate support seems to be a function of immigration and/or minority status and not Canadian culture, as the majority of women from Western/individualistic cultural orientation report experiencing adequate support.

In the present study, over a third of participants who identified as Arab (35.7%) and Other/ Asian (33.9%) reported having inadequate social support. It ought to be noted that many of the countries that were categorized into the Other Asian group could also be identified as Arab countries (Kridli, 2002) thus, there may be overlap between the two cultural identities. Baheiraei and colleagues (2010) argue that it should not be assumed that women who identify with Arab or Other Asian ethnicity experience lower levels of social support as a function of Arab culture. According to Kridli (2002), pregnancy is highly valued in Arab culture, and pregnant women typically receive considerable support from their husband and family throughout pregnancy. In their recent population-based study exploring levels of social support amongst Iranian women, Baheiraei et al. (2012) found that the majority of women reported levels of social support similar to their Western counterparts. However, women in the present study who identified with Arab or Other Asian ethnicity reported the highest levels of *inadequate* support. Again, rather than inadequate support being a function of ethnic identity (i.e., that Arab women receive less social support) or Canadian culture, it is more likely that many of the women in the present study who migrated to Canada lost the proximal support of their extended family who remained in their country of origin.

Women who identified with Latin American ethnicity were also identified as having significantly poorer levels of social support. Again, considering the loss of familial supports often inherent with migration, it is hardly surprising. The collectivist orientation of Latino culture is especially influenced by *familism*, which places extended family at the centre of social life (Sagrestano, Feldman, Rini, Woo, & Dunkel-Schetter, 1999). In Latino culture, the extended family is typically the primary source of social support. Again, inadequate social support amongst this population may be a result of migration away from their extended family.

Similarly, women identifying with African ethnicity also reported relatively high levels of inadequate social support. According to Stewart (2007), within many African cultures family is considered any group of people who have close ties, whether or not they are biologically related. It is generally expected that close friends and extended family will provide emotional and tangible support to help pregnant and new mothers whenever possible (Stewart, 2007). In many African countries, pregnancy and fertility is highly valued, and unlike in many western cultures, high fertility is considered socially and economically rewarding (Mekonnen & Worku, 2011) and subsequently, pregnancy is highly celebrated and supported. During and after birth, a woman's mother assumes responsibility of looking after her daughter and newborn grandchild. These practices and beliefs about motherhood are considerably different from those of western cultures and may contribute to a perception of low social support relative to support expectations in her country of origin. Thus, it is likely that experiences of social support in Canada differ significantly from that of her African country of origin.

Systemic barriers may also contribute to difficulties in accessing social supports. Qualitative research conducted by Reitmanova and Gustafson (2008) identified barriers in accessing culturally responsive maternal health care such as language, lack of flexibility for cultural practices, and co-ed prenatal classes (not acceptable in all cultures/religions). In another qualitative study conducted by Ahmed, Stewart, Teng, Wahoush, and Gagnon (2008), barriers to accessing community supports included lack of information in preferred language and lack of culturally competent primary care providers. Despite the Canadian dependence on immigration for population growth, maternal care programs continue to be organized to address the maternal health needs of mainstream Canadian-born women which, according to Ahmed et al. (2008), are not responsive to Canada's growing cultural diversity.

In addition to the above systemic barriers to accessing social support, there may also be differences in support-seeking behaviours among groups. In a study of support-seeking attitudes, researchers Kim, Sherman, Ko, & Taylor (2006), found that participants who identified as Asian or a subgroup of Asia (e.g., Vietnamese, Filipino, Korean), were less likely to seek support than European Americans. They also found that for Asian-Americans, seeking help was associated with negative self-stigma and a reduced sense of self-efficacy. In the current study, over a quarter of the women who identified as Asian (27.5%) reported having inadequate levels of social support. Therefore, it may be that seeking social support in pregnancy is not considered a culturally appropriate behaviour and that the inadequate levels of social support may be a function of help-seeking attitudes.

5.3.2 Depression

The overall prevalence rates of depressive symptoms in the current study (6%) were on par with the estimated one-year prevalence of depression amongst Canadian adult women. The Canadian Community Health Survey conducted from 2001 - 2007 found the prevalence of depression in the general population was stable across time with 6 - 7% annual prevalence for women (Simpson, Meadows, Frances, & Patten, 2012). However, other studies have found higher rates of depressive symptoms amongst pregnant women. In a population-based study that utilized the EPDS, Josefsson, Berg, Nordin, and Sydsjo (2001) reported the prevalence rate of depressive symptoms in the last trimester of pregnancy at 17%. A systematic review of depression during pregnancy by Bennet and colleagues (2004) reported the overall rates of women detected as having depressive disorder at 12.8% during the second trimester and 12.0% during the third trimester. However, in the above study both the EPDS and Beck Depression Inventory were included in the analysis, and previous studies using the Beck Depression Inventory reported higher prevalence rates. In comparison with prevalence rates of depressive

symptoms in similar population studies using the EDPS, the women in this study reported fewer depressive symptoms.

When using depressive symptoms as a measure, the hypothesis that women who identify with an ethnic minority will experience greater levels of psychosocial stress was supported. In the current study, depressive symptoms amongst women who identified with an ethnic minority were significantly higher (9.8%) than women who identified as White (5.9%). All ethnic minority groups reported higher levels of depressive symptoms than the White reference group. This is contrary to results from the Canadian Community Health Survey that found visible minorities and immigrant populations reported fewer depressive symptoms than non-immigrant populations (Stafford, Newbold, & Ross, 2011).

However, findings from the present study are consistent with other recent research on minority status and depressive symptoms. For example, a recent population-based study of 23 European countries reported that immigrants and ethnic minorities experienced more depressive symptoms than those from the dominant culture (Missinne & Bracke, 2010). Research conducted in a working population in Germany found that migration status may also contribute to depressive symptoms in that migrant females were twice as likely to report depressive symptoms as non-migrant females (Maksimović, Ersöz, Machleidt, Ziegenbein, & Calliess, 2012).

Depressive symptoms in pregnancy can have serious impacts on pregnancy and birth outcomes. In a meta-analysis of health risks of women who experience depressive symptoms in pregnancy, Grote and colleagues (2010) found that women who reported symptoms of depression during pregnancy were at a greater risk for PTB, and their infants had greater risk of lower birth weight and intrauterine growth restriction. The aforementioned study also identified women of minority status to be at greater risk for depression in pregnancy.

5.3.3 *Anxiety*

The overall prevalence of anxiety symptoms in the current study was 18.3%, which is higher than the Canadian one-year estimated prevalence rates of 5.8% amongst females (Statistics Canada, 2003). In a national study to examine prevalence rates of psychiatric disorders amongst pregnant women in the United States, 13% of pregnant women had been diagnosed with an anxiety disorder (Vesga-López et al., 2008). However, the instrument used in the present study (the SAI) identifies state anxiety and is not diagnostic of an anxiety disorder. Regardless, the experience of state anxiety in pregnancy has been correlated with increased risk of preterm birth (Glynn, Schetter, Hobel, & Sandman, 2008), low birth weight (Rahman, Bunn, Lovel & Creed, 2007), intrauterine growth restriction (Rondo, Ferreira, Nogueira, Ribeiro, Lobert & Artes, 2003), neurodevelopmental problems (Wadhwa et al., 2002), childhood behavioural problems (O'Connor, Heron, & Glover, 2002; Rice et al., 2010), and postnatal depressive symptoms (Sutter-Dallay, Giaconne-Marcasche, Glatigny-Dallay, & Verdoux, 2004).

Women who identified with an ethnic minority experienced greater levels of state anxiety than women who identified as White. Perhaps the most surprising finding was that 50% of all women who identified with Arab ethnicity reported symptoms of anxiety. As discussed in relation to social support, identifying with Arab ethnicity does not explain the elevated symptoms of anxiety in the AOB cohort. For example, in a large-scale population study conducted in Lebanon, which is a member state of the Arab League, Karam and colleagues (2006) reported a 12-month prevalence of anxiety disorders to be 11.2%, which is similar to Canadian national prevalence rates. In a smaller cross sectional study ($N = 800$) conducted in Morocco (also a member state of the Arab League), 25.5% of the participants met the criteria for an anxiety disorder (Kadri, Agoub, Gnaoui, Berrada, & Driss, 2007). Although much higher rates of anxiety disorders were reported in the second study, twice as many women who

identified as Arab in the present study reported symptoms of anxiety, suggesting that this particular group may face additional challenges in the Canadian context, and warrants further exploration.

5.3.4 *Perceived Stress*

In the second trimester of pregnancy, more women of an ethnic minority perceived their life situation as stressful (28.9%) than the White reference group (19.7%). Again, Arab women reported the highest levels of perceived stress (39.5%) in the second trimester and an even greater percentage of Arab women perceived their life situation as stressful in the third trimester (44%). Perhaps it is not surprising that with higher levels of inadequate social support, depressive symptoms, and elevated rates of state anxiety, women who identified as Arab more often perceive their life situation as stressful.

Women who identified as First Nations, Other Asian, Latin American, Black, and Asian also reported higher levels of perceived stress in the second and third trimester of pregnancy than the White reference group. As with women who identified as Arab, there was an increase in the perception of stress with advancing gestation. Researchers Glynn, Schetter, Hobel, and Sandman (2008) tested whether women who do not experience a decline in perceived stress with advancing gestation may be at greater risk to deliver preterm. Indeed, Glynn et al. found a modest correlation between patterns of increased levels of perceived stress and state anxiety in mid- to late- gestation and delivering preterm. Considering the emergence of similar patterns of subpopulations in the current study, it may be prudent to conduct a further correlational analysis of patterns of stress attenuation in relation to pregnancy and birth outcomes in the AOB cohort.

5.3.5 Physical and Emotional Health

5.3.6 Emotional Health.

The vast majority of women in this study rated their emotional health as good (88.2%). Interestingly, poor emotional health was reported less frequently than reports of perceived stress, or anxiety, which are all indicators of poor emotional health. Inadequate social support has been correlated with poor emotional health (Jesse & Swanson 2007; Lancaster et al., 2010; Lee et al. 2007; Leigh & Milgrom, 2008; Westdahl et al., 2007). The emotional health reported in the current study indicates that there is a difference between objective measures of mental health (e.g., SAI, EPDS) and the subjective interpretations of emotional health.

Despite the relatively high rates of reported good emotional health, the percentage of women reporting poor emotional health was greater than what has been found in previous studies. For example, 7.8 % of women reported their mental health as poor in a population-based study of pregnant women conducted by Witt and colleagues (2010), which is less than the 11.2% reported in the current study. Women who identified with an ethnic minority reported significantly poorer emotional health than the White reference group. Using self-reported emotional health as an indicator of psychosocial stress, the hypothesis that women who identify with an ethnic minority will experience greater levels of psychosocial stress than the White reference group was supported.

5.3.7 Physical Health.

As with emotional health, the majority of women in this study reported being in good physical health with 15.7% reporting poor physical health. However, this proportion is still higher than self-reports of physical health in the general population. In a secondary analysis of the Canadian Community Health survey, researchers Roman, Cohen, and Forte (2011) found that only 9% of individuals living in Canadian urban centers rated their physical health as poor.

Considering the physical demands of pregnancy, it is difficult to know if some of the poor physical health reports were related to pregnancy or underlying health problems that may be exacerbated with pregnancy.

Interestingly, women who identified as Arab, Black/African, or White all reported the same levels of good physical health throughout pregnancy (89%). As with emotional health, First Nations women were the least likely to report being in good physical health (71.9%). This finding is consistent with the small body of literature that addresses physical health disparities amongst First Nations Women. Across Canada, First Nations women have poorer physical health trajectories than all other Canadians (Guimond, 2008; Harris et al., 1997; Lui, Hanley, Young, Harris, & Zinman, 2006). Unfortunately, pregnancy has been shown to increase the risk for developing metabolic problems such as gestational diabetes in First Nations women (Roland, Osgood, Lin, Gao, & Stang, 2010).

5.4 Summary of Psychosocial Measures

In every psychosocial measure analyzed, women who identified with an ethnic minority had poorer scores than the White reference group. By further separating the analyses into subpopulations, important differences between groups were identified. Although the intent of this analysis was to measure psychosocial stress, the use of mental health screening instruments also identified women at greatest risk for mental health problems. As mental health *is* a health outcome, findings from this study are important to consider in relation to primary care. Specifically, it is important for mental health care professionals to recognize that women who identify with an ethnic minority are at a greater risk for poor mental health outcomes.

By including a variety of measures, different contributors to psychosocial stress could be explored and compared to consider the allostatic load. Allostatic load can be understood as the cumulative effects of stressful experiences in daily life (Fava, Guidi, Semprini, Tomba, &

Sonino, 2010). Allostasis can be adaptive in the short term or maladaptive in the case of long-term allostatic load (McEwen & Gianaros, 2010). Arguably, women who identified as an ethnic minority are more likely to experience greater allostatic load as they more frequently reported stress indicators.

Perhaps the stress of migration is a contributing factor to the elevated levels of psychosocial stress that women who identified with an ethnic minority indicated experiencing. The difficulties of relocation may be compounded by the challenges of adjusting to the norms of the new host country. Harris (2012) posits that individuals who have experienced stressful cultural encounters may suffer from a specific form of the Diagnostic and Statistical Manual of Mental Disorders, adjustment disorders (American Psychological Association, 2003). An adjustment disorder is defined as “a psychological response to an identifiable stressor or stressors that result in the development of clinically significant emotional or behavioural symptoms” (APA, 2003; p. 679). Women who have endured various forms of difficulties related to cultural integration may consequently suffer from what Harris proposes is a cultural adjustment disorder.

5.5 Pregnancy and Birth Outcomes

Complications in pregnancy and birth can have extraordinary short and long-term consequences. The pregnancy and birth outcomes measured in the present study have long been recognized as predictors of infant morbidity and mortality and long-term health and development (Canadian Institute for Health Information, 2009). The burden of poor pregnancy and birth outcomes on the health care system alone is estimated at over half of infant hospitalization costs and over a quarter of all paediatric costs (Russell et al., 2007). According to data from the Canadian Institute for Health Information (2009), the average hospital costs of singleton babies born preterm in Canada is \$9,233 versus an average hospital cost of \$1,050 for singleton babies born full term. Hospital costs of singleton babies born LBW cost an average of \$17,791. Of

course, hospital costs only reflect some of the short-term monetary costs of poor pregnancy and birth outcomes and do not measure the long-term costs to physical and emotional health. In the following section pregnancy and birth outcomes will be discussed.

5.6 Pregnancy Outcomes

The leading cause of infant mortality and morbidity in Canada is being born preterm (Canadian Institute for Health Information, 2009). The long-term consequences of PTB include increased risk for respiratory disease (Moss, 2006), neurodevelopmental disturbances (Lax et al., 2012), metabolic diseases (Godfrey, Gluckman, & Hanson, 2010), and cardio vascular disease (Edstedt Bonamy, & Parikh, 2013). The PTB rate in the current study was slightly below Alberta provincial rates (6.6% versus 8.9%). This is likely due to the screening process for participation in the AOB study that included exclusion of participants who knew they were carrying multiples.

Obstetric complications during delivery were also included as a pregnancy outcome. In the present study, the rates of extended LOS in hospital after controlling for type of delivery was 11.8%, which indicated that these women experienced some type of obstetric complications severe enough to cause an extended hospitalization (e.g., haemorrhaging, sepsis, severe perineal trauma). However, to my knowledge, there are no comparable published reports of pregnancy LOS in Alberta.

5.6.1 Pregnancy Outcomes by Ethnic Identity

The hypothesis that women who identified with an ethnic minority would have poorer pregnancy outcomes (i.e., preterm birth and/ or complications) than women from the White reference group was supported. The two ethnic groups with the highest rates of poor outcomes were Other Asian and Mixed/Other, which are populations that have not previously been identified as high-risk populations. Again, this is most likely because most of the Canadian

literature exploring ethnicity and health outcomes has not explored pregnancy outcomes of specific ethnic subpopulations. Women who identified as Latin American, Black/African, and Asian also had higher rates of poor pregnancy outcomes compared to the White reference group. Findings from this study have identified specific subpopulations in Canada that may be at a greater risk for poor pregnancy outcomes.

An unexpected finding was that women who identified as Arab had better pregnancy outcomes than the White reference group. This finding is especially curious in relation to the psychosocial outcomes already discussed where women who identified as Arab reported the greatest distress during pregnancy. It may be that this particular subpopulation experience the healthy migrant paradox previously described.

5.7 Birth Outcomes

A quarter of the infants had one or more sub-optimal birth outcomes. Of the measures used, birth weight is arguably the strongest predictor of infant health. Infants who are born with low birth weight or small for gestational age are considered to be at the greatest risk for poor health outcomes (Canadian Institute for Health Information, 2009). The proportions of LBW and SGA in this sample were less than the provincial prevalence rates. The most recent data released from the Canadian Institute for Health Information (2009) reported the prevalence of LBW in Alberta at 6.8% while LBW in the AOB sample was 4.8%. There were smaller proportions of SGA and LGA in the AOB sample with 8.4% SGA versus 9% provincially and 7% LGA versus 11% national prevalence.

5.7.1 Birth Outcomes by Ethnic Identity

The hypotheses that infants of women who identify with an ethnic minority will have poorer birth outcomes than infants of women who identify with the White reference group was supported. Of the ethnic sub-groups, infants of mothers who identified as Black/African had the

poorest birth outcomes (40.5%) in comparison to all other groups. This finding is consistent with the substantial body of research on birth outcomes of African American populations in the United States that identifies infants of African Americans as having poorer birth outcomes than the White reference group (Collins & David, 2009). The most common explanations for these findings are racial discrimination (Earnshaw et al., 2013), low SES (Moutquin, 2003), and lack of access to medical care (Heaman et al., 2013).

The findings from the present study are unique in that comparative analysis showed Black/African women did not differ from the White reference group in relation to SES, access to prenatal health care (as prenatal care is offered at no cost and is available to all Canadians), or measures of discrimination (unreported analysis). The AOB sample is also unique to the American cohorts in both history and generational status in that the majority (74%) of AOB participants who identified as Black/African were also foreign born. Eliminating potential explanations for the disparity in birth outcomes can help researchers further isolate what is contributing to birth outcome disparities amongst Black/Africans.

Although the pregnancy outcomes of Arab women were better than the White reference group, Arab infants had poorer birth outcomes. If Arab pregnancy outcomes can be attributed to the healthy migrant effect, perhaps the poorer infant birth outcomes are an early indicator of generational health deterioration. A more detailed analysis of this population may help future research in identifying possible epigenetic effects. The infants of Latin American and Other Asian were also at an increased risk for having poor birth outcomes. Rather than finding the healthy migrant paradox amongst these groups, infants of women who identified with an ethnic minority had poorer birth outcomes.

The only group that had similar, but not better, birth outcomes than the White reference group were women who identified as Asian. In a study of birth outcomes amongst six Asian subgroups in California, Qin and Gould (2006), found that the Asians who identified as Chinese, Japanese, and Korean had better birth outcomes than the White reference group, while those who identified as Cambodians/ Laotians (Southeast Asian) had significantly poorer birth outcomes than all comparison groups. As with the present study, by separating the Asian group into subgroups, we also found important differences between groups.

Findings from the present study indicate significant heterogeneity in birth outcomes between ethnic groups in Canada. It is likely that women from different ethnic groups have adopted different prenatal strategies and behaviours that may impact birth outcomes. Further research into the prenatal behaviours and experiences of women who identify as Chinese, Japanese or Korean may help in the identification of protective factors in relation to birth outcomes amongst minority status women in Canada.

5.8 Birthplace and Ethnic Identity

5.8.1 *Pregnancy Outcomes*

The hypothesis that Canadian born women from the dominant culture will have the most favourable pregnancy and birth outcomes was not supported. The healthy migrant paradox that foreign-born women who identify with an ethnic minority would have better pregnancy outcomes than the Canadian born reference group was not observed. Surprisingly, the group with the most favourable pregnancy outcomes were foreign-born women who identified as White. Foreign born and Canadian born women who identified with an ethnic minority had almost equal risk of poor pregnancy outcomes as foreign-born women who identified with an ethnic minority. Thus, these findings do not support previous findings of a healthy migrant paradox (Newbold, 2005). One proposed explanation for the healthy migrant effect is that

women who immigrate initially retain prenatal practices of their country of origin (e.g., a traditional diet, rest, etc.). Therefore, it is possible that minority status women who immigrate to Canada do not retain these practices. Another future direction may be to explore differences in prenatal behaviour and pregnancy outcomes among immigrant subpopulations.

5.8.2 Birth Outcomes.

The hypothesis that infants of Canadian-born women from the dominant culture will have better birth outcomes was not supported. Interestingly, infants of foreign-born women who identified as White had the lowest proportions of poor birth outcomes compared to Canadian born White and non-White sub-groups. The hypothesis that infants of Canadian-born women who identify with an ethnic minority will have poorer birth outcomes than foreign-born women who identify with an ethnic minority was not supported, nor was the healthy migrant paradox observed. Rather, birth outcomes of both foreign-born and Canadian born women who identified with an ethnic minority were poorer than those of the White reference group. Thus, it seems that there is a healthy migrant effect amongst White groups, but not for groups identifying with an ethnic minority.

5.9 Healthy Migrant Paradox?

The findings from the present study do not support a universal healthy migrant paradox amongst immigrant populations in Canada. However, the healthy migrant paradox is possibly supported when looking at pregnancy outcomes of Arab and birth outcomes of Asian subpopulations. In a further analysis conducted to see if there was a deterioration of health across generations of immigrant populations, the outcomes of second generation Canadians were also explored. Second generation Canadians who identified with an ethnic minority had poorer outcomes than second-generation women who identified with the White reference group, suggesting that deterioration in pregnancy health outcomes across generations is unique to

women identifying with an ethnic minority. Independent of migration status and generational effects, findings from this study indicate that minority status women are at an increased risk for suboptimal pregnancy and birth outcomes regardless of whether they were foreign born or Canadian born.

5.9.1 *Intergenerational Non-Genomic Mechanisms*

A possible explanation for the presence of poorer pregnancy and birth outcomes in the second-generation populations could be a transgenerational epigenetic effect. Non-genetic phenotypes that are passed on to subsequent generations are called transgenerational epigenetic effects (Youngson & Whitelaw, 2008). The term transgenerational epigenetic effect is used broadly to describe all forms of non-genomic inheritance and includes, but is not limited to, parental effects, shared uterine environment, and fetal programming. Transgenerational epigenetic inheritance is a more specific term referring to a “phenotype present in successive generations that is non-genetically determined and results from epigenetic modifications passed via the gametes that escape reprogramming” (Youngson & Whitelaw, 2008; p. 233). These modifications can occur through DNA methylation, histone modifications, chromatin structures, and through small non-coding RNA modifications (Drake & Lui, 2009). Transgenerational changes can be passed on from the parental generation to the offspring through sperm (Cairns et al., 2009), ovum (Hales & Barker, 1992), or germ line (Youngson & Whitelaw, 2008). Such epigenetic ‘programming’ allows for the transmission of a phenotype to an unexposed individual *in utero*. Results indicating that second-generation ethnic minorities have poorer pregnancy and birth outcomes than the dominant group, as well as the first generation suggest that there may be such transgenerational epigenetic effects.

5.10 Predictors of Health Outcomes

Of the identified predictors of pregnancy outcomes, I hypothesized that the independent variable to have the greatest predictive value would be social support. Interestingly, and congruent with the findings from the previous three questions, ethnic identity (dichotomized as White or non White) was the strongest predictor of health outcomes. The second strongest predictor was experiencing low levels of perceived stress in the third trimester (32 weeks \pm 1 week). This finding differs from other research exploring the differential effects of the timing of stress on pregnancy outcomes. For example, a study comparing acute stress at different times in pregnancy found that stress experienced earlier compared to late in pregnancy was associated with shortened length of gestation (Glynn et al., 2001). However, when Glynn et al. (2008) tested for associations between patterns of increasing stress, rather than attenuation of stress, they found that perceived stress mid- to late-gestation increased the risk for poor pregnancy outcomes. It could be that the women in the current study who did not perceive their life situation as stressful in the third trimester experienced an attenuation of stress thought to be protective against the deleterious effects of prenatal stress. This finding has direct implications in relation to the importance of minimizing stress with increasing gestation.

5.11 Attenuation of Stress with Advancing Gestation?

Findings from the current study suggest that there may have been a protective factor in relation to pregnancy outcomes for women who experienced an attenuation of stress. It is generally accepted that there is a down regulation of the HPA axis during pregnancy to protect the fetus and mother from circulating stress hormones (for a review see de Weerth & Buitelaar, 2005). However, other findings have not observed patterns of attenuation of the HPA axis during pregnancy (e.g., Nierop et al., 2006; Giesbrecht, Campbell, Letoumeau, Kooistra, & Kaplan, 2012). The self-report measure of perceived stress in the current study indicates that not

all women experience a reduction in stress perception with advanced gestation. A future direction of study may be to analyze the collected blood samples to test for correspondence between cortisol levels and patterns in levels of perceived stress, and pregnancy outcomes.

5.12 Additional Analysis

5.12.1 *Missing Data*

As described in the Methods chapter, not all women completed all three questionnaires or one or more sections of a particular questionnaire (i.e., individual X completed demographic questions but not PSS on the second questionnaire). Findings from the analysis of missing data revealed a significant association between incomplete questionnaires/sections, psychosocial measures and health outcomes (i.e., all groups with missing data showed significant association with all poor outcomes). This analysis suggests that our findings may underrepresent the most vulnerable populations in that the women with the poorest outcomes in one measure were less likely to have completed all other measures.

5.13 Limitations

As with any comparative study, one must be careful not to imply causation. Despite best efforts to identify the many factors that could possibly influence health outcomes, many more confounding factors could not be compared. In any research exploring stress on health outcomes, there can be several confounding factors such as genetic vulnerabilities, diet, lifestyle, etc. that make it nearly impossible to delineate the complete interaction of psychosocial and biological factors. Also, results from the forward stepwise regression analysis should be interpreted with caution, as it is vulnerable to Type II errors and was intended to be exploratory only.

The current research is an attempt to explore the psychological contribution to health outcomes, but it is part of a much larger interdisciplinary project. As such, the inventories

chosen were selected based on the goals of the larger project and were not necessarily the best available measures for the research question. However, the measures used still provided enough relevant information to explore the variables of interest.

Ethnic identity was determined by having participants choose from a list of 15 ethnic categories. However, in Canada, there are more than 200 different ethnic origins represented (Statistics Canada, 2006). Thus, the categories were in no way exhaustive nor able to capture the extent of Canadian diversity. From the categories selected, the sample was further collapsed into seven groups. Although the groups were chosen according to historical, geographic and cultural similarities, there is a tremendous amount of ethnic diversity within each group.

All measures in this study capture participants' short-term experiences of psychosocial stress (i.e., right now, past 7 days, within 30 days). According to the DSM-IV (American Psychological Association, 2003), stress is considered acute if it persists for less than six months. Thus, the instruments utilized measured acute stress (less than 6 months). However, from a physiological perspective, stress occurring over days and weeks could be considered chronic. Further analysis is necessary to know if the psychosocial stress was indeed chronic. Another limitation to be considered is that the instruments used to measure psychosocial indicators were selected based on the frequency they occur in population cohort studies. Although frequently used cross culturally, not all measures report psychometric properties for cross-cultural validity.

Another limitation of this study is that it may not capture the most vulnerable of marginalized women such as women who were not proficient in English and transient populations. To be eligible to participate in the AOB study, participants were expected to remain in the Calgary area and be proficient enough in English to complete the questionnaire packages. Additionally, the inclusion criteria for participation in the AOB study required participants to be

receiving prenatal care. Women who were not receiving prenatal care, and transient, and who experience language barriers may be at a higher risk for poor physical and mental health outcomes. Furthermore, as previously discussed, even within the AOB sample, the most vulnerable women may be under represented due to being more likely to have incomplete data sets.

Although the AOB sample is representative of Canadians in fertility age, ethnic distribution, and level of education, their economic status may be higher than national averages. Furthermore, pregnancy care programs and other community supports differ relative to the municipality. Thus, caution should be used when generalizing these findings to other populations outside of Calgary.

5.14 Application to Counselling Practice

Research has shown that persons from visible minorities are less likely to access psychological services than those from the dominant culture (Bemack, Chung, & Pedersen, 2003). Those who do access counselling services terminate earlier than most and are differentially treated in comparison to other Canadians (Sue, 2001). The underrepresentation of visible minorities accessing mental health services likely reflects a dearth of health professionals who provide culturally relevant and accessible services (Bemack et al., 2003). Considering the Canadian policy on immigration (Citizen and Immigration Canada, 2010), equal access to appropriate care for all ethnic groups in Canada is an important consideration in relation to both a public health and a human rights perspective (Whitehead & Dahlgren, 2006).

The present study demonstrated that women who identified with an ethnic minority experienced increased symptoms of depression, anxiety, perceived stress, and isolation during pregnancy compared to women who identify with the dominant culture. This finding is consistent with previous research (Dominquez, Schetter, Mancuso, Rini, & Hobel, 2005;

Pestronk & Franks, 2003) and has direct implications for counselling interventions. Strategic psychosocial interventions for at-risk pregnant women may include goals such as stress reduction, coping strategies, and promoting social support (Bastani, Hidarnia, Kazemnejad, Vafaei, & Kashanian, 2005; Roy-Matton et al., 2011).

A recent meta-analysis of culturally adapted treatments for depression and anxiety found a large effect size on therapy outcomes when cultural intervention adaptations were implemented (van Loon, van Shaik, Dekker, & Beekman, 2013). Specifically, their analysis identified evidence-based interventions that were adapted to include a focus on the patient's cultural values, beliefs and symptom presentation were more effective than non-adapted, evidence based interventions (e.g., culturally adapted versus non-adapted Cognitive Behavioural Therapy for anxiety symptoms). These findings suggest that rather than abandoning one's training in a specific counselling modality (e.g., CBT, Solution Focused, Reality Therapy, etc.), an effective approach for counselling diverse populations is to adapt one's current counselling framework to include cultural values, beliefs, and cultural consideration of symptom presentation.

5.14.1 *Culturally Adapted Counselling Practice*

Collins and Arthur (2010) have identified four core competencies in relation to developing a culturally-infused counselling relationship: (a) establish trusting and respectful relationships with clients that take into account cultural identities; (b) collaborate with clients to establish counselling goals that are responsive to salient dimensions of cultural identity; (c) collaborate with clients to establish client and counsellor tasks that are responsive of cultural identity; (d) engage in social justice activities to directly influence the systems that negatively affect the lives of non-dominant populations. These competencies will be further discussed in relation to working with mothers who identify with an ethnic minority.

Establishing a trusting therapeutic relationship is arguably the strongest predictor of therapeutic outcomes (Norcross & Lambert, 2010). Within the therapeutic relationship, it is likely that mothers will engage more readily in the counselling process if the counsellor creates an environment that is accepting and respectful of observed, or real, differences (Castonguay, Constantino, & Holtforth, 2006). To establish a respectful and trusting relationship with marginalized mothers, it is important to engage in what Ridley and Lingle (1996) identify as cultural empathy. Cultural empathy is a way of understanding culturally diverse clients that incorporates effective communication through cultural inquiry with an attitude of genuine concern. When working with marginalized mothers, relevant cultural inquiries about how she was raised, cultural expectations of mothers in her country of origin, and her relationship with her own mother may be an excellent starting point. Counsellors can further inquire about the influence of various interpersonal, organizational, and systemic influences (Collins & Arthur, 2010). This form of inquiry has been found to enhance the therapeutic relationship and facilitate change (Pope-Davis et al., 2002).

In establishing therapeutic goals and tasks, it is especially important not to impose one's own cultural values and biases. Feminist critics argue that traditional psychotherapy often fails to consider the broader social context of human psychology (Jordan, 2003). Jordan argues that traditional psychotherapies are both androcentric, representing the White, heterosexual male as the norm, and Eurocentric, viewing the values of non-dominant cultures as deviant or pathological. These norms are represented in the valuing of autonomy, independence, and separation. In working with mothers from non-dominant cultures, it is important to identify what their values are and how they may differ from those of the dominant culture. Although it should not be assumed, it is quite likely that she will value interdependence, community, spirituality,

and her role as a nurturer. Therapeutic exploration of her values will be an important consideration in developing therapeutic goals. Failure to attend to her core values would be culturally insensitive and could inhibit counselling efficacy (Fischer, Jerome, & Atkinson, 1998).

Finally, Collins and Arthur (2010) suggest engaging in advocacy to promote change in the systems that negatively affect the lives of non-dominant populations. As counsellors, it is important to consider our influence as professionals to advocate for social justice and address the systemic issues that place marginalized Canadian women at-risk. For example, issues such as access to mental health services could be brought to the attention of policy makers and local service providers.

When counselling at-risk pregnant women, Stern and Bitsko (2003) suggest that counsellors make an effort to establish a collaborative therapeutic relationship between the primary care physician and public health nurse(s) to develop an integrative care strategy. Such an initiative has been implemented at the Calgary Urban Project Society (CUPS) Health, Education and Housing Centres, as well as other community clinics in Calgary and throughout North America that offer prenatal care programs for at-risk mothers.

5.14.2 Cultural Considerations

5.14.2.1 Gender Roles.

Gender roles are culturally learned and defined. When women migrate to Canada from other countries, their culturally defined roles and expectations of motherhood may conflict with that of the dominant culture. This can create what O'Neil (2008) defines as a gender role conflict, which is "a psychological state in which socialized gender roles have negative consequences for the person or others," (p. 362). Women from traditionally patriarchal societies are often faced with increased pressure to maintain their traditional family values after relocation

(Dion & Dion, 2004). As counsellors, offering support and strategies to help her navigate her multiple and potentially conflicting roles may be an important aspect of the therapeutic process.

5.14.2.2 Employment Status

Upon relocation to Canada, financial pressures may force mothers who would traditionally be expected to stay at home to raise the children to enter the work force. The expectation to contribute to the family income as well as maintain her role as the primary care giver can place a tremendous burden on immigrant mothers (Dion & Dion, 2004). Often times, immigrant women's education or credentials are not recognized in Canada and their only option is to enter into the unskilled labour force (Guo, 2011). If language is also a barrier to employment, she may be forced to work at a lower paying job that is not necessarily matched with her preferred vocation. Arthur and McMahon (2005) suggest that psychologists support their clients who have immigrated and are facing underemployment by engaging in advocacy for expedited evaluation of foreign credentials.

Another consideration when counselling women who have immigrated is to consider her values in relation to career planning. Western career planning typically focuses on matching an individual to a career and does not necessarily consider the family expectations into career planning. In collectivist societies, family approval may be the most salient influence on career planning (Swanson & Fouad, 2010). It is important to consider how to incorporate individual values when working with a client who values the approval of her husband (for example), exploring how to include this consideration into her career plans (e.g., inviting family members to join the session). In counselling women who find themselves in this situation, culturally empathetic understanding of the many role expectations she has can help guide the development of culturally sensitive strategies to balance family, work, and life.

5.14.2.3 Use of Interpreters

Ideally, counsellors should be proficient in the language of the client. Unfortunately, with the number of languages represented in Calgary alone, it is unrealistic to expect that counselling services be provided in all languages and interpreters may be required. There are several considerations when choosing an interpreter. First, it is imperative that the interpreter is fully proficient in English as well as the dialect of the client (Malott & Paone, 2008). In Calgary, Immigrant Services provides certified interpreters for community organizations and individual clients at a cost. However, cost may be a barrier to women who lack access to financial resources. Alberta Health Services also offers over-the-phone interpretive services in over 200 languages. When establishing a contract with the interpreter, confidentiality issues and agreement to a confidentiality statement including its limits should be established (Goh, Dunnigan, & Schuchman, 2004). Malott et al. (2008) also suggest deciding on rules for interaction in advance such as having the counsellor speak directly to the client with the interpreter sitting beside or slightly behind the counsellor.

5.14.2.4 Focus on Strength and Resiliency

All too often the literature on women of an ethnic minority focuses on their adversities, emphasizing difficulties and creating a problem-oriented focus. However, in this present study for example, many of the women facing elevated psychosocial stress still rated their emotional health as good (recall that self-reports of poor emotional health were low). Women who have migrated from another country demonstrate tremendous courage, strength, and resilience.

In a qualitative study of immigrant women's experiences, Berger (2004) found that women attributed their ability to successfully cope with the challenges of immigration to "social, familial, personal, circumstantial and spiritual factors" (p. 180). Counsellors should take the time to recognise and encourage women to identify and draw from their individual sources of

resilience. In providing counselling services to immigrant mothers, Berger found a strength-based approach to be most effective. Focusing on the strengths these women have already demonstrated in migrating to a new country and further highlighting their ability to navigate their ever-changing environment seems to be a culturally appropriate starting point.

Another framework that can inform counselling practice with women who have migrated or who face marginalization is Judith Jordan's Relational Cultural Theory (RCT; Jordan, 2003). This theoretical framework emphasizes the importance of being in relationships with others and attends to the connection and disconnection of individuals. RCT posits that the primary source of suffering is isolation. Using RCT theory, counsellors can explore ways women become connected or disconnected from their community and helps women develop awareness and strategies to strengthen meaningful relationships.

5.14.3 *Additional Considerations*

Women who identify with an ethnic minority face all the normal challenges of motherhood in addition to dealing with the complexities of acculturation, language barriers, shifting role expectations, increased vulnerabilities, and vocational barriers. Although the issues identified refer to general findings, it is important to recognize that each woman will have her own unique experience. Counsellors should make a concerted effort to understand the unique challenges these women face as well as identify the unique strengths each woman possesses to adapt and grow as Canadians.

5.15 Future Directions

Findings from the present study have identified the need for further exploration into the unique experiences of women who identify with an ethnic minority as it relates to physical and mental health outcomes. Although this study identified that greater proportions of poor psychosocial outcomes were found amongst ethnic minorities than the White reference group,

further research is needed to understand specific contributing factors. For example, it is clear that women who identified as Arab experienced much greater levels of psychosocial distress than the White reference group, yet little is known about their specific prenatal experiences. Further qualitative exploration may help elucidate these findings.

As previously discussed, pregnancy and birth outcomes differed among ethnic sub-groups, with some group outcomes on par with the White reference group. Further exploration comparing between-group prenatal behaviours may help identify protective, as well as the most detrimental, prenatal behaviours in relation to pregnancy and birth outcomes. Similarly, it may be beneficial to include measures of protective factors such as resiliency into future studies. Unfortunately, measures utilized in the present study were better at capturing psychosocial distress rather than the mitigating factors of resiliency.

The exploratory analysis of predictive variables identified that women in their last trimester of pregnancy (32 weeks \pm 1 week) who do not perceive their life situation as stressful have a 65% increase in the odds of having a good pregnancy outcome. This finding practically begs for further exploration into the relationship between the attenuation of stress with advancing gestation and pregnancy outcomes.

5.16 Conclusion

The present study focuses on a municipally representative sample of ethnically diverse pregnant women in Canada. This study contributes to the research on the prevalence of prenatal psychosocial health and its relationship to pregnancy and birth outcomes. In particular, this study helps to identify subpopulations that are at the greatest risk for poor pregnancy and birth outcomes. Although the findings from this study are not easily explained, they provide a unique perspective into risk factors and health trends of a Canadian urban population, as well as, the specific subpopulations represented.

The present study found that women who identified with an ethnic minority were at increased risk of experiencing psychosocial stress and poor pregnancy and birth outcomes. Relating back to Canada's immigration policy, Canada relies on its growing immigrant population for the growth and vitality of our nation. As such, it is in the best interest of Canada to help ensure optimal health and well-being of its citizens, including those who are often least visible and most vulnerable, minority status women. Findings from this study can be used to help primary care service providers develop programs to benefit populations that may require additional supports and services. Thus, this information can be used to inform both policy and practice.

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