EXAMINING HEALTH ANXIETY AND ANXIETY ABOUT FETAL HEALTH DURING PREGNANCY

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Sarah Jane Reiser, candidate for the degree of Doctor of Philosophy in Clinical Psychology, has presented a thesis titled, *Examining Health Anxiety and Anxiety About Fetal Health During Pregnancy*, in an oral examination held on December 14, 2018. The following committee members have found the thesis acceptable in form and content, and that the candidate demonstrated satisfactory knowledge of the subject material.

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Abstract

Background: Health anxiety refers to excessive preoccupation or worry about one’s health. The experience of health anxiety during pregnancy is unclear. The limited existing research provides mixed results regarding the impact of pregnancy on health anxiety (e.g., Kowalyk, Hadjistavropoulos, & Jones, 2009; Savron et al., 1989).

Purpose: The current investigation was designed to assess health anxiety in pregnant women, examine the relationship between health anxiety and fetal health anxiety, and examine the relationships between health anxiety, fetal health anxiety, associated constructs (i.e., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty), and core health cognitions. In addition, inductive content analysis of open-ended questions facilitated a more comprehensive understanding of women’s experiences of fetal health anxiety.

Methods: Participants comprised a sample of pregnant women (n = 100) and a sample of similarly aged non-pregnant women (n = 111) who completed a battery of measures to assess health anxiety, fetal health anxiety (pregnant women only), and additional constructs of interest.

Results: Overall levels of health anxiety did not differ between the pregnant and non-pregnant women; in fact, scores for related subscales measuring perceived likelihood of having an illness and perceived negative consequences of having an illness were significantly lower in the pregnant sample suggesting that pregnancy may serve a protective function against some components of health anxiety. Significant, positive correlations between maternal health anxiety and measures of fetal health anxiety were observed. Significant, positive associations were also observed between health anxiety and the associated constructs (i.e., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty) in both
samples. General anxiety accounted for significant variance in health anxiety in the pregnant sample, and general anxiety and anxiety sensitive accounted for significant variance in health anxiety in the non-pregnant sample. The core health cognitions also accounted for significant variance in health anxiety, with differences observed between the samples. All four of the core health cognitions were uniquely related to health anxiety even when controlling for general anxiety and depression in both samples (with the exception of awfulness of illness in the non-pregnant sample). Significant, positive associations between fetal health anxiety and the associated constructs (with the exception of inhibitory intolerance of uncertainty and one measure of depression) were observed and general anxiety accounted for significant variance in fetal health anxiety. The core health cognitions accounted for significant variance in fetal health anxiety; however, only one of the four health cognitions (i.e., difficulty coping with illness) approached accounting for unique variance in fetal health anxiety when controlling for general anxiety and depression. Results from the inductive content analysis provided further information about pregnant women’s experiences of fetal health anxiety.

Implications: The current investigation increases our knowledge of factors that may underlie elevated health anxiety during pregnancy. The results also extend our understanding of fetal health anxiety during pregnancy and the association between this construct and maternal health anxiety. The results support the cognitive-behavioural model of health anxiety and may have implications for assessment and treatment strategies for elevated health anxiety and fetal health anxiety during pregnancy.
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Dedication

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1.0 Introduction

The large majority of women will be pregnant at least once in their lifetime (Ventura, Abma, Mosher, & Henshaw, 2004). Pregnancy is a period of great physiological and emotional change in preparation for childbirth and the addition of an infant to one’s family. Pregnancy is often an exciting time for expectant mothers, but it can also be a stressful experience (Gregg, 1995). Prenatal stress (e.g., major life events, occupational stress, homelessness, psychological disorders) can significantly impact a woman’s functioning and her experience of pregnancy and can also negatively impact the developing fetus (e.g., Graignic-Philippe, Dayan, Chokron, Jacquet, & Tordjman, 2014; Nordentoft et al., 1996; Witt, Litzelman, Cheng, Wakeel, & Barker, 2014).

Psychological disorders are common during pregnancy (i.e., 14.1% of women experience a psychological disorder during the second trimester of pregnancy) and the large majority of women who experience a mental health disorder during their pregnancy do not receive treatment for their condition (Andersson, Sundström-Poromaa, Bixo, et al., 2003). The majority of research in the area of psychological disorders and childbearing focuses on depression during the perinatal period (i.e., the period immediately before and after birth; e.g., Patel et al., 2012). Other psychological disorders have received relatively limited research attention, including those disorders that fall under the health anxiety umbrella (i.e., somatic symptom disorder, illness anxiety disorder).

Severe health anxiety is among the most prevalent of the mental health disorders (Asmundson, Taylor, & Cox, 2001). Subclinical, yet distressing, levels of health anxiety have been even more prevalent in the general population (e.g., Looper & Kirmayer, 2001; Rief, Hessel, & Braehler, 2001). Despite the high prevalence of health anxiety,
empirical research exploring this condition during pregnancy is sparse. To date, only
two published studies have examined whether levels of health anxiety differ between
pregnant and non-pregnant women (i.e., Kowalyk, Hadjistavropoulos, & Jones, 2009;
Savron et al., 1989); these studies have yielded mixed results regarding the impact of
pregnancy on health anxiety (see review in section 1.2.2). Additional examination of the
influence of pregnancy on levels of health anxiety and the factors that contribute to
health anxiety during the prenatal period is necessary for a more comprehensive
understanding of this experience.

Kowalyk and colleagues (2009) found that health anxiety was not elevated in
pregnant women and may even be reduced during pregnancy. The absent elevation might
be due to a woman’s focus of attention shifting to the health of her unborn infant.
Expectant mothers may shift their attention to the well-being of their fetus, resulting in
fetal health worries for some pregnant women. The current investigation was designed
to explore this speculation by examining fetal health anxiety during pregnancy and its
relationship to (prenatal) maternal health anxiety.

An exploration of factors that may contribute to levels of health anxiety during
pregnancy will add to the extant literature. The current investigation included measures
of associated constructs including general anxiety, depression, anxiety sensitivity, and
intolerance of uncertainty, in addition to the core health cognitions, to explore the
contribution of these constructs to the experience of health anxiety. The relationships
between the associated constructs, core health cognitions, and fetal health anxiety were
also examined.
There is currently limited information regarding the construct of fetal health anxiety (i.e., anxiety regarding the health of one’s developing fetus); therefore, a more detailed examination of fetal health anxiety appeared warranted. For the current investigation, a comprehensive measure of fetal health anxiety was developed and a series of open-ended questions were included to facilitate content analysis of these experiences in (pregnant) participants who self-identified as experiencing elevated levels of fetal health anxiety. The open-ended questions queried the content of fetal health worries, factors that increased and decreased worries, how participants might feel better supported by health care providers regarding fetal health anxiety, and the personal impact of fetal health anxiety on participants.

The following introduction includes an overview of health anxiety, the associated constructs, and the core health cognitions. The limited research that has investigated health anxiety during pregnancy is reviewed to provide relevant context for the current study. In addition, the concept of fetal health anxiety and relevant literature is described.

1.1 Health Anxiety

Health anxiety refers to excessive health-related worries or fears that result from misinterpretations that bodily sensations or symptoms are indicative of a serious illness (e.g., Barsky & Ahern, 2004) and these worries persist despite appropriate medical evaluation and reassurance (e.g., Lucock & Morley, 1996; Warwick, 1989). The experience of health anxiety varies from person to person and research supporting a dimensional perspective indicates that health anxiety is best characterized as a construct existing on a continuum from mild to severe (e.g., Ferguson, 2009; Longley et al., 2010). Experiencing mild degrees of health anxiety can be adaptive, as concern regarding
bodily symptoms can facilitate the early detection of a medical condition (Asmundson et al., 2001); however, unwarranted and excessive worries about one’s health can be distressing and maladaptive. On the extreme end of the continuum, severe health anxiety can be diagnosed as a mental health disorder. Individuals with severe health anxiety may believe that they are exceptionally susceptible to illnesses in general or to a specific illness (common fears include concerns of cancer, heart attacks, AIDS, strokes, and mental illness; Rachman, 2012).

In the Diagnostic and Statistical Manual of Mental Disorders, Fourth edition, Text Revision (DSM-IV-TR; American Psychiatric Association [APA], 2000) severe health anxiety was often diagnosed as hypochondriasis, a condition under the classification of a somatoform disorder. There was considerable debate as to whether hypochondriasis would be more appropriately classified as an anxiety disorder due to the substantial symptom overlap and high comorbidity rates between hypochondriasis and other anxiety disorders (e.g., Deacon & Abramowitz, 2008; Noyes, 1999; Taylor & Asmundson, 2004). The current Diagnostic and Statistical Manual of Mental Disorders, Fifth edition (DSM-5; APA, 2013) revealed several important changes in the classification and conceptualization of severe health anxiety. In the DSM-5, the category of somatoform disorders was changed to somatic symptom and related disorders and hypochondriasis was eliminated as a disorder (APA, 2013). According to the DSM-5, approximately 75% of individuals that would have previously been diagnosed with hypochondriasis using the DSM-IV-TR are now subsumed under the DSM-5 diagnosis entitled somatic symptom disorder. Somatic symptom disorder is characterized by significant health anxiety and somatic symptoms (APA, 2013). The DSM-5 holds that
previous criteria overemphasized the importance of medically unexplained symptoms and that this new diagnosis focuses on positive indicators (i.e., distressing somatic symptoms plus maladaptive thoughts, feelings, and behaviours in response to these symptoms). Furthermore, somatic symptom disorder can coexist with diagnosed medical conditions. The minority of individuals with the DSM-IV-TR diagnosis of hypochondriasis (approximately 25%) experience high health anxiety without somatic symptoms and would currently receive a diagnosis of illness anxiety disorder, a new addition to the DSM-5 (APA, 2013). Illness anxiety disorder is located in the somatic symptom and related disorders section because, like the other disorders in this category, this condition most often presents in medical settings; however, illness anxiety disorder can also be considered an anxiety disorder (APA, 2013). The influence of these new health anxiety disorder classifications on research and diagnostic processes in clinical practice remains unclear (Bailer et al., 2016; Rief & Martin, 2014).

1.1.1 Prevalence. Estimated prevalence rates of severe health anxiety vary extensively depending on the setting and on the diagnostic criteria being utilized. In primary care and general medical settings prevalence estimates range from as low as 0.8% (Gureje, Ustun, & Simon, 1997) to as high as 8.5% (Noyes et al., 1993). In a review of prevalence rates in seven primary care samples, the median prevalence of severe health anxiety was 4.2% (Creed & Barsky, 2004). According to the APA (2013), the prevalence of somatic symptom disorder for adults in the general population is approximately 5-7% and is likely to be higher in females. The prevalence of illness anxiety disorder is unknown, but is thought to have a similar prevalence in males and
females (APA, 2013). Overall, severe health anxiety is considered to be among the most prevalent of the psychological disorders (Asmundson et al., 2001).

Subclinical health anxiety may be even more prevalent in the general population and remains a significant concern. Looper and Kirmayer (2001) surveyed a community sample (N = 533, mean age = 46 years) and found that 6% of the sample had elevated health anxiety. Moreover, health anxiety was a predictor of somatic symptoms, help-seeking behaviours, and disability when demographic and medical variables were controlled. Another study examined health anxiety in the general population (N = 2050, 14 to 92 years of age) and found that 10% of the sample reported elevated health anxiety or the conviction of having a serious illness, despite a lack of a medical explanation for the concerns (Rief et al., 2001). An epidemiological study examining the prevalence of health anxiety in the general population in Australia (N = 8841, 16 to 85 years of age) found that 5.7% of the population had experienced health anxiety at some point in their life and 3.4% had health anxiety at the time of the interview (Sunderland, Newby, & Andrews, 2013). In adults attending hospital clinics, the prevalence of significant health anxiety ranged from 17.5% (in endocrinology patients) to 24.7% (in neurology patients), suggesting that excessive health anxiety is a common and substantial problem in adults with a medical illness (Tyrer et al., 2011). Considering the aforementioned results, elevated health anxiety appears to be a common experience in adult populations.

1.1.2 Comorbidity. Health anxiety is associated with several other mental health conditions. For some people severe health anxiety appears to be an independent disorder; however, persons with severe health anxiety commonly present with coexisting anxiety and depressive disorders (APA, 2013). There is no current consensus within
existing research on the rate of psychiatric comorbidity in individuals with severe health anxiety. For example, Noyes and colleagues (1994) conducted a study involving 50 patients (mean age = 39.6 years) with severe health anxiety and 50 age- and sex-matched controls from the same medical clinic and found that overall comorbidity with any other psychiatric disorder was 62% in those with severe health anxiety, compared with 30% in the control patients. Another study examined psychiatric comorbidity in patients from a general medical clinic (mean age = 57.1 years) and found that 88% of individuals with severe health anxiety ($n = 42$) had more than one Axis I disorder compared to 51% in the control group ($n = 76$; Barsky, Wyshak, & Klerman, 1992).

More recently, psychiatric comorbidity was examined within a community sample of adults with severe health anxiety ($N = 194$) and results indicated that 65% of patients had at least one other Axis I diagnosis (Scarella, Laferton, Ahern, Fallon, & Barsky, 2016).

Individuals with other psychological disorders as a primary diagnosis often present with severe health anxiety as a secondary condition or as an associated feature of another condition. For example, in a sample of psychiatric outpatients, 50% of individuals diagnosed with a Diagnostic and Statistical Manual of Mental Disorders, Third edition, Revised (DSM-III-R) anxiety disorder ($N = 82$, 21 to 68 years of age) also presented with symptoms of severe health anxiety (Bach, Nutzinger, & Hartl, 1996).

There are several disorders characterized by symptoms similar to health anxiety including generalized anxiety disorder (GAD), obsessive-compulsive disorder (OCD), panic disorder, and depression (Noyes, 2001). More recently, elevated health anxiety was significantly associated with the occurrence of major depressive episodes, persistent low mood, and symptoms of DSM-IV-TR GAD (Lee, Lam, Kwok, & Leung, 2014).
The latter study found that high health anxiety is common in individuals with GAD and may indicate greater severity of GAD and poorer clinical outcomes. Rates of GAD have been higher in individuals with severe health anxiety compared to those with other psychiatric conditions (Barsky et al., 1992). In addition, epidemiological research found a significant association between health anxiety and other comorbid mental health conditions including GAD, agoraphobia, panic disorder, and bipolar disorder (Sunderland et al., 2013). Research has found significant overlap between severe health anxiety, panic, and OCD symptoms (e.g., Deacon & Abramowitz, 2008). Severe health anxiety is often accompanied by panic symptoms, obsessions, and compulsions, but to a lesser degree than those who meet criteria for panic disorder and OCD. Individuals with panic disorder (e.g., Demopulos et al., 1996) and OCD (Savron et al., 1996) also frequently present with symptoms of health anxiety.

1.1.3 Onset and course. The most common age of onset of severe health anxiety is thought to be in early adulthood (APA, 2013). Although, more recent research indicates that health anxiety can develop in childhood (Delparte et al., 2015; Rask et al., 2016; Rask, Elberling, Skovgaard, Thomsen, & Fink, 2013; Villadsen et al., 2017; Wright, Adams Lebell, & Carleton, 2016; Wright & Asmundson, 2003; 2005). Previous research has found associations between health anxiety and adverse childhood experiences (e.g., Noyes et al., 2002; Reiser, McMillan, Wright, & Asmundson, 2014), stress and life crises (e.g., Barsky & Klerman, 1983), personal illness or a misdiagnosis (e.g., Warwick & Salkovskis, 1990), and illness among relatives (e.g., Kellner, 1986). Sandin, Chorot, Santed, and Valiente (2004) found that health-related life events (i.e., personal physical illness or the physical illness of a close friend or relative) were the
category of adverse experiences that most consistently related to the onset of severe health anxiety. Health anxiety can also arise following exposure to illness-related media information (Martin, Lemos, & Levanthal, 2001).

Elevated levels of health anxiety have been found in individuals with a variety of medical conditions (Looper & Kirmayer, 2001). For example, elevated health anxiety has been found in samples with multiple sclerosis (Kehler & Hadjistavropoulos, 2009), chronic pain (Hadjistavropoulos, Owens, Hadjistavropoulos, & Asmundson, 2001), breast cancer (Grassi, Rossi, Sabato, Cruciani, & Zembelli, 2004), and cardiovascular disease (Zvolensky, Eifert, Feldner, & Leen-Feldner, 2003). In addition, older adults with health problems experience greater levels of health anxiety compared to older adults with relatively fewer health problems (Bourgault-Fagnou & Hadjistavropoulos, 2009). Recently health anxiety has also been explored in a pediatric chronic health population. Specifically, Oliver and colleagues (2018) examined health anxiety and associated constructs in children and adolescents with congenital heart disease and demonstrated that children and adolescents with this condition \( n = 42 \) had significantly higher levels of health anxiety, anxiety sensitivity, and intolerance of uncertainty compared to typically developing children and adolescents \( n = 42 \). Individuals with severe health anxiety (previously diagnosed as hypochondriasis) have not been found to have more medical illness compared to those without a diagnosis of hypochondriasis (e.g., Barsky, Wyshak, Latham, & Klerman, 1991); therefore, while individuals with a medical condition may experience increased health anxiety, severe health anxiety does not appear to be impacted by medical morbidity. Predisposing factors that underlie elevated health
anxiety may include increased anxiety sensitivity, neuroticism, and depression (McLure & Lilienfeld, 2001; Williams, 2004).

Due to the nature of significant health anxiety, people with this condition often utilize health care resources in ways that are maladaptive and costly for the health care system (Barsky, Ettner, Horsky, & Bates, 2001; Rask et al., 2016). Frequent, and often unwarranted, visits to a physician, medical examinations, diagnostic testing, and doctor shopping are commonly displayed; these repeated procedures are expensive and carry their own risks (APA, 2000). Barsky and colleagues (2001) found that primary care patients (18 to over 65 years of age) who had high levels of health anxiety ($n = 212$) had more frequent medical appointments at higher costs compared to those without elevated health anxiety ($n = 664$). Subsequent research has found a positive association between health anxiety and medical service utilization (e.g., Fergus, Bardeen, Gratz, Fulton, & Tull, 2015; Fergus, Griggs, Cunningham, & Kelley, 2017; Longley, Watson, & Noyes, 2005). The ineffective use of health care resources is a significant consequence of health anxiety and associated behaviours.

1.1.4 Cognitive-behavioural model of health anxiety. According to the cognitive-behavioural model, an individual’s health-related cognitions are critical in the development and maintenance of health anxiety (Salkovskis & Warwick, 2001). From this perspective, health anxiety is caused by the misinterpretations that harmless bodily sensations are indications of a serious or fatal illness. Other cognitive factors are also thought to contribute to the maintenance of health anxiety including enhanced attention to threats (especially health-related threats), an accumulation of threatening memories, and cognitive biases (Rachman, 2012). Unwanted, intrusive images can also provoke
concern and contribute to health anxiety; these images are typically focused on the future and have themes of disease or death (Muse, McManus, Hackmann, Williams, & Williams, 2010; Wells & Hackmann, 1993).

Salkovskis and Warwick’s (2001) cognitive-behavioural model of health anxiety outlines four core cognitions related to the degree of threat experienced by an individual with health anxiety: (1) perceived likelihood of illness, (2) perceived awfulness of illness, (3) perceived ability to cope with the illness, and (4) perceived effectiveness of medical resources to treat a health problem. Dysfunctional beliefs, along with persistent illness-related worry, induce maladaptive coping behaviours (e.g., reassurance seeking, avoidance, checking behaviours, pharmaceutical use, information seeking) in an effort to reduce the anxiety (Abramowitz & Moore, 2007; Taylor & Asmundson, 2004). In contrast to their intended purpose, these safety behaviours are not helpful and, instead, are partly responsible for the maintenance of health anxiety (Rachman, Radomsky, & Shafran, 2008). Safety behaviours contribute to the maintenance of health-related concerns by preventing the natural extinction of anxiety, interfering with the correction of mistaken beliefs and interpretations, and increasing preoccupation with the health concern (Salkovskis, 1991).

Hadjistavropoulos and colleagues (2012) created and validated a measure of the four core health cognitions and investigated these cognitions in self-reported medical and non-medical samples of adults. Consistent with the cognitive-behavioural model of health anxiety, their measure included assessment of health cognitions related to the following: likelihood of illness, awfulness of illness, difficulty coping with illness, and medical service inadequacy. Their results provided support for the cognitive-
behavioural model of health anxiety as the core health cognitions accounted for significant variance in health anxiety in both samples, with some differences demonstrated between those who did and did not report having a medical condition (e.g., the medical sample scored higher on the difficulty coping subscale, medical services inadequacy subscale, and likelihood of illness subscale). All four subscales of health cognitions (excluding medical service inadequacy in the non-medical sample) were uniquely associated with health anxiety even when controlling for general anxiety and depression. To date, no published research has examined the core health cognitions in a sample of pregnant women. Given that medical and non-medical samples report some differences in core cognitions an examination of these beliefs in pregnant women is of particular interest, as the condition of pregnancy can be viewed as a non-medical state (i.e., a natural process), a medical condition, or both, depending on cultural factors, personal philosophies, and circumstances related to the process of pregnancy (Mullin, 2005).

1.2 Pregnancy

The large majority of women will be pregnant at least once in their lifetime. In Canada, the average parity is 1.61 children per woman and the average age of first-time mothers is 28.5 years (Statistics Canada, 2015). Pregnancy is a period of physiological and emotional change, adjustment, and preparation for childbirth and the addition of an infant to one’s family. Research suggests that there is increased emphasis on, and awareness of, one’s health during pregnancy (e.g., Szwajcer, Hiddink, Koelen, & van Woerkum, 2007) and that navigating health during pregnancy can be a complex and dynamic experience (e.g., Maher & Lowe, 2015). During pregnancy, expectant mothers’
health priorities are influenced by numerous factors including a sense of responsibility to protect and provide the best for their unborn child and conforming to social norms and health guidance (Maher & Lowe, 2015). The vast number of health guidelines and health messages directed at pregnant women can be overwhelming and perceived as an excessive list of restrictions for expectant mothers (Maher & Lowe, 2015).

Pregnancy can be an emotionally complex experience. Pregnancy is often an exciting time for expectant mothers as well as a time of concern and anxiety (Gregg, 1995). During pregnancy, expectations and worries often develop about the process of pregnancy and the birth of the child, which then contribute to increased stress throughout pregnancy (Gregg, 1995). Prenatal stress has been associated with adverse consequences for both mothers and their offspring (Dunkel Schetter & Tanner, 2012), especially pathological birth outcomes including prematurity and low birth weight (e.g., Graignic-Philippe et al., 2014; Loomans et al., 2013).

A growing body of literature has focused, specifically, on the experience and impact of depression during the perinatal period (e.g., Patel et al., 2012). Overall, the available research suggests that perinatal depression negatively impacts women’s social functioning, personal adjustment, and mother-infant interaction (e.g., Brockington, 2004; Martins & Gaffan, 2000). The literature on prenatal depression also indicates that depression during pregnancy can represent a risk factor for negative obstetric outcomes including the infant being small for gestational age (Goedhart et al., 2010) and postpartum depression (Larsson, Sydsjö, &Josefsson, 2004). A systematic review found the prevalence of depression during pregnancy to be 7.4%, 12.8%, and 12.0% for each trimester, respectively (Bennett, Einarson, Taddio, Koren, & Einarson, 2004).
Andersson, Sundström-Poromaa, Bixo, et al. (2003) examined the point prevalence of DSM-IV psychiatric disorders during the second trimester of pregnancy (N = 1556) and found that psychiatric disorders were present in 14.1% of the women. Major depression and minor depression were prevalent in 3.3% and 6.9% of the women, respectively. The same study evidenced that most women with psychiatric disorders (i.e., 94.5%) had not received treatment for their mental health condition. While depressive disorders are common during pregnancy it is not clear whether or not pregnancy is associated with an increase in depression for women. Research has found comparable rates of mood disorders between pregnant and non-pregnant women (O’Hara, Zekoski, Philipps, & Wright, 1990; Uguz, Gezginc, Kayhan, Sari, & Büyüköz, 2010); however, pregnant women have endorsed higher levels of subclinical depressive symptoms (Halbreich, 2004; O’Hara et al., 1990). In contrast, pregnancy is not consistently associated with increased depressive symptoms (Leach, Christensen, & MacKinnon, 2014) and may even be associated with a lower risk for mood disorders (Vesga-Lopez et al., 2008). In comparison to perinatal depression, the prevalence, clinical presentation, and treatment of anxiety disorders during pregnancy (and postpartum) have received much less research attention (e.g., Ross & McLean, 2006; Rubertsson, Hellström, Cross, & Sydsjö 2014).

1.2.1 Pregnancy and anxiety. Existing research indicates that anxiety during pregnancy is a common experience for women. Some worry is normal during pregnancy, but excessive worry and anxiety can be dysfunctional and interfere with the expectant mother’s decision-making and day-to-day living (Affonso, Liu-Chiang, & Mayberry, 1999). Prenatal anxiety is a prevalent issue that tends to demonstrate a
changing course throughout pregnancy (Lee et al., 2007). Anxiety during pregnancy appears to follow a u-shaped pattern, with a decrease in anxiety in mid-pregnancy (e.g., Da Costa, Larouche, Dritsa, & Brender, 1999; Statham, Green, & Katesios, 1997; Teixeira, Figueiredo, Conde, Pacheco, & Costa, 2009); therefore, the first and third trimesters of pregnancy have been identified as high-risk periods for anxiety (Lee et al., 2007). A recent study examined the prevalence of elevated anxiety during the first trimester in pregnant women ($N = 916$, mean age = 29.0) and found that 15.6% of the women reported elevated levels of anxiety symptoms (Rubertsson et al., 2014). Andersson, Sundström-Poromaa, Bixo, et al. (2003) found the point prevalence of DSM-IV anxiety disorders to be 6.6% in pregnant women in their second trimester ($N = 1556$), suggesting that anxiety remains a substantial problem for many women in the mid stage of pregnancy. Overall, Lee and colleagues (2007) found that over half (54%) of pregnant women ($n = 335$) had elevated anxiety at some point during pregnancy. In addition, research has found that the majority of women who report elevated levels of anxiety during pregnancy also report elevated anxiety postpartum. For example, levels of anxiety have been found to remain relatively stable from pregnancy to seven (Grant, McMahon, & Austin, 2008), eight (Heron, O’Connor, Evans, Golding, & Glover, 2004), and 12 months postpartum (Moss, Skouteris, Wertheim, Paxton, & Milgrom, 2009).

Elevated anxiety is common during pregnancy, but whether anxiety levels significantly differ in pregnancy compared to non-pregnancy remains unclear. Comparable levels of trait anxiety (Breitkopf et al., 2006) and anxiety disorders (Vesga-Lopez et al., 2008; Uguz et al., 2010) have been found between pregnant and non-pregnant women. Furthermore, Leach and colleagues (2014) analyzed longitudinal, population-based data
and found that pregnancy was associated with a decrease in anxiety levels from pre-pregnancy.

Anxiety is commonly co-morbid with depression during pregnancy (Lee et al., 2007). Heron and colleagues (2004) proposed that depression during or following pregnancy may be secondary to anxiety, and that depression may develop from an inability to manage symptoms of anxiety. Research has found an association between prenatal anxiety and postpartum depression (Austin, Tully, & Parker, 2007; Martini, Knappe, Beesdo-Baum, Lieb, & Wittchen, 2010; van Bussel, Spiz, & Demyttenaere, 2009) and high levels of prenatal anxiety have been identified as a strong predictor of depressive disorders in women during the postpartum period (Lee et al., 2007; Robertson, Grace, Wallington, & Stewart, 2004). To illustrate, Heron and colleagues (2004) examined pre- and post-natal anxiety and depression in a large community sample of women \( (N = 8323) \). The results suggested that anxiety in pregnancy predicted postnatal depression at 8 weeks and 8 months, even after controlling for prenatal depression.

Anxiety during pregnancy has been associated with negative obstetric outcomes for the expectant mother. In addition to predicting postpartum depression (e.g., Lee et al., 2007; Robertson et al., 2004), research demonstrates associations between prenatal anxiety and pain and distress during labour (Wuitchik, Hesson, & Bakal, 1990), increased fear of childbirth and preference for cesarean section (Andersson, Sundström-Poromaa, Wulf, Åström, & Bixo, 2004; Rubertsson et al., 2014), and increased risk of preeclampsia (Kurki, Hiilesmaa, Raitasalo, Mattila, & Ylikorkala, 2000; Qiu, Williams, Calderon-Margalit, Cripe, & Sorensen, 2009). Maternal prenatal anxiety may also pose a significant risk for the fetus and later development. There is evidence to suggest that
excessive anxiety can be harmful to the developing fetus by decreasing blood flow to the uterus (Teixeira, Fisk, & Glover, 1999), increasing fetal heart rate (Monk, Myers, Sloan, Ellman, & Fifer, 2003), and increasing maternal cortisol levels that cross the placenta to the fetal environment (Glover, 2014). With some exceptions (Perkin, Bland, Peacock, & Anderson, 1993; Andersson, Sundström-Poromaa, Wulff, Åström, & Bixo, 2003), a large body of research is mounting in support of the association between prenatal anxiety and adverse consequences for the infant including lower Apgar scores (Berle et al., 2005), reduced fetal growth (Conde et al., 2010), and preterm birth (Dole et al., 2003). Subsequent childhood development may also be negatively impacted by prenatal anxiety. For example, a community-based, longitudinal study followed a cohort of women ($N = 7,144$) from pregnancy to four years following the birth of their child and found that prenatal anxiety in late pregnancy (and not prenatal depression) was independently associated with behavioural/emotional problems in the children at age 4 years (O’Connor, Heron, & Glover, 2002). Further, results from this study suggested that prenatal anxiety and postnatal depression are separate risk factors for behavioural/emotional problems in children and contribute in an additive manner (O’Connor et al., 2002). Graignic-Philippe and colleagues (2014) conducted an extensive literature review on the effects of prenatal anxiety on adverse fetal and child outcomes and found that the relationship between anxiety and preterm delivery/low birth rate demonstrated the most robust and consistent association.

### 1.2.1.1 Pregnancy-specific anxiety.

Pregnant women may experience pregnancy-specific anxiety (also referred to as pregnancy-related anxiety or pregnancy anxiety), which comprises anxiety related to the process of pregnancy, the anticipation of
childbirth, and the health of the developing baby (Melender, 2002). Early efforts to understand pregnancy-specific anxiety began with a foundational study that examined the nature of anxieties in nulliparous women (n = 50) and found that participants experienced specific anxieties related to their baby’s health and development, pain and tearing during labour, and the effect of direct trauma to the baby (Pleshette, Asch, & Chase, 1956). Subsequent research has identified additional aspects of pregnancy anxiety. For example, an exploratory study found that expectant mothers can have intense worries and fears specific to pregnancy and anticipating childbirth including fear of her own incompetence, fear of her own death and/or death of the baby, intolerable pain, and loss of control during the delivery (Sjogren, 1997). In a recent review of the literature on pregnancy anxiety, Bayrampour and colleagues (2016) identified nine dimensions within the concept of pregnancy-related anxiety (i.e., fetal health, loss of fetus, childbirth, mother’s well-being, body image, parenting and care for child, health care related, financial, and family and social support).

The existing research indicates that pregnancy anxiety constitutes a distinct concept, separate from general anxiety and depression (e.g., Huizink, Mulder, Robles de Medina, Visser, & Buitelaar 2004; McMahon et al., 2013; Orr, Reiter, Blazer, & James, 2007; Theut, Pedersen, Zaslow, & Rabinovich, 1988). Pregnancy anxiety, specifically, has been associated with several child outcomes including increased fetal motor activity (DiPietro, Hilton, Hawkins, Costigan, & Pressman, 2002), poorer attention regulation at age 3 months (Huizink, de Medina, Mulder, Visser, & Buitelaar, 2002) and 27 months (Gutteling et al., 2005), and decreased mental and motor development at age 8 months (Huizink, Robles de Medina, Mulder, Visser, & Buitelaar, 2003). Pregnancy anxiety has
also been found to impact neurobiological mechanisms including the methylation state of particular gene receptors in the newborn child (Hompes et al., 2013) and decreased gray matter in later childhood (Buss, Davis, Muftuler, Head, & Sandman, 2010).

Pregnancy anxiety has been found to predict negative outcomes more robustly than general anxiety, depression, or a combination of both (e.g., Dunkel Schetter & Tanner, 2012). A review of the research in the area of stress and negative affective states during pregnancy highlighted the substantial convergent evidence of the adverse effects of pregnancy anxiety, particularly on preterm birth (Dunkel Schetter & Tanner, 2012). For example, Kramer and colleagues (2009) examined associations between a large number of stress and psychological distress measures and spontaneous preterm birth in a large sample of Canadian women ($N = 5337$). When controlling for social-demographic factors, medical and obstetric risks, and depression, among other variables, only pregnancy anxiety was consistently and independently associated with spontaneous preterm birth (Kramer et al., 2009). Due to the aforementioned links between prenatal anxiety and negative outcomes for the mother and child it is imperative to investigate anxieties specific to pregnancy for a further understanding of these conditions in an effort to inform appropriate prenatal assessment and tailored prevention and treatment strategies.

### 1.2.2 Pregnancy and health anxiety

Research investigating health anxiety in pregnant women is sparse. Few studies on pregnancy-related anxiety have briefly queried worries about the woman’s own health during pregnancy (e.g., Ohman, Grunewald, & Waldenstrom, 2003). To date, there are only three published studies that have examined the construct of health anxiety in pregnant women (i.e., Kowalyk et al.,
Two of these studies examined whether there was a significant difference in levels of health anxiety between pregnant and non-pregnant women, which yielded mixed results. Savron and colleagues (1989) examined hypochondriacal symptoms in pregnant women \((n = 26)\) and a group of matched control participants \((n = 26)\) using the Italian version of the Illness Attitude Scales (IAS; Kellner, 1987), a commonly used self-report measure of health-related anxiety and abnormal illness behaviour. The results indicated that health anxiety was elevated in the pregnant women compared to the non-pregnant women. In each trimester of pregnancy, women demonstrated more hypochondriacal fears and stronger disease conviction than the control group. Moreover, compared to the control group, pregnant women reported significantly more fears of dying and preoccupation with bodily signs in the third trimester.

Subsequently, Kowalyk and colleagues (2009) aimed to further examine health anxiety during pregnancy by designing a study with improved methodology (e.g., increased sample size, employ an additional measure of health anxiety). The authors highlighted potential issues with the use of the IAS in the Savron and colleagues (1989) study, suggesting that this measure is limited when used with pregnant women, as many of the items may be endorsed based on having a health-related condition (e.g., Item 24. \textit{How many different doctors, chiropractors, or other healers have you seen in the past year?}). To address this limitation, the authors utilized the IAS and the Short Health Anxiety Inventory (SHAI; Salkovskis, Rimes, Warwick, & Clark, 2002) – a widely used measure designed to assess health anxiety in individuals with or without a medical condition. The study examined levels of health anxiety in women in the third trimester.
of pregnancy \((n = 252)\) and a control group of similarly aged non-pregnant women \((n = 45)\). Their results indicated that, contrary to previous results, levels of health anxiety (as measured by the IAS total score and the SHAI total score) did not significantly differ between the group of pregnant women and the control group. Furthermore, pregnant women scored lower than the control group on the IAS disease phobia subscale, which assesses concern about having a disease, and reported lower health anxiety compared to normative samples in the literature for both scales. The authors theorized that reduced health anxiety during pregnancy may be due to a woman’s focus of attention shifting to the health of her unborn infant or because unusual bodily sensations are attributed to being pregnant as opposed to an illness.

Most recently, Prescott and colleagues (2018) examined predictors of health anxiety related to current and past health complications, sources of support, and online health-related information seeking behaviour in pregnant women \((N = 159)\). Participants included women in all trimesters of pregnancy (the majority [almost half] were in their third trimester). There results indicated that complications experienced in a previous pregnancy and current medical treatment for a non-pregnancy related condition were significant predictors of health anxiety (as measured by the SHAI); medical complications in the current pregnancy was not a significant predictor. Receiving support from pregnant family members and friends (but not support from doctors and midwives) was associated with decreased levels of health anxiety. In regard to online health-related information seeking, knowing when you have had enough information and repeating searches were significant predictors of health anxiety during pregnancy.
Overall, the limited research that has examined whether levels of health anxiety differ between pregnant and non-pregnant women has demonstrated contradictory results. Savron and colleagues (1989) found that health anxiety was elevated in all three trimesters of pregnancy, while results from Kowalyk and colleagues (2009) indicated that health anxiety is not elevated during the third trimester of pregnancy, and may even be reduced during this time (Kowalyk et al., 2009). A recent study examining predictors of health anxiety elucidated factors that may impact health anxiety during pregnancy related to past and current health complications, social support, and online seeking of health-related information (Prescott et al., 2018). Additional research is required to clarify and further understand the experience of health anxiety during pregnancy.

1.2.3 Pregnancy and fetal health anxiety. It has been suggested that reduced health anxiety during pregnancy may be due to the woman’s focus of attention shifting to the health of her unborn infant, diminishing the focus of her own health concerns (Kowalyk et al., 2009). It is plausible that expectant mothers shift their attention to the well-being of their fetus, resulting in fetal health worries for some pregnant women. This may be reflected in the results from a study of 200 pregnant women that found that 32% of the women endorsed the possibility of something being wrong with the baby as a major worry, compared to only 4% of women who endorsed your own health as a major worry (Ohman et al., 2003).

Research examining concerns about the fetus’s health during pregnancy is limited; the topic is sometimes included in the broader context of pregnancy-specific anxiety. The prevalence of worries about the fetus’ health range from 12% (Saisto, Ylikorkala, & Halmesmaki, 1999) to 69% (Szeverenyi, Poka, Hetey, & Torok, 1998).
For example, Geissbuehler and Eberhard (2002) examined childbirth-related fears among expectant mothers \( N = 8528 \) and found that the most frequently mentioned fear was fear for the child’s health, which was reported by 50% of the pregnant women. Concerns about the developing baby’s health have been one of the most common and intense worries during pregnancy (e.g., Arizmendi & Affonso, 1987; Glazer, 1980; Harpel, 2008; Light & Fenster, 1974; Ohman et al., 2003).

In a prospective study, Statham and colleagues (1997) examined the extent to which pregnant women \( N = 1072 \) worried about the possibility of something being wrong with their baby and specific factors related to this worry. This study examined what they referred to as baby worry with a single item querying participants’ level of worry related to the possibility of something being wrong with the baby. Their results indicated that baby worry was one of the most prevalent worries at 16 weeks pregnant. The factors most strongly related to this worry were perceived likelihood that something might be wrong with the baby and trait anxiety. In addition, negative mood, previous pregnancy outcomes, and initial reactions to the pregnancy all demonstrated significant, independent effects (Statham et al., 1997).

More recently, Harpel (2008) conducted a qualitative investigation of fetal health anxiety in relation to an upcoming ultrasound procedure in women between 18 and 38 weeks gestation \( N = 30 \). The results indicated that 93% of the expectant mothers reported fetal health anxiety. The women discussed a fear of the unknown and questions including: Was the baby okay? Did it have all its parts? Was it growing? Their results also indicated that ultrasound played a role in fetal health anxiety and, in most cases, the ultrasound exam decreased the expectant mothers’ anxiety.
Considering that worries about fetal health are among the most common and intense anxieties reported during pregnancy (Ohman et al., 2003), and the substantial evidence supporting the association between prenatal anxiety and adverse outcomes (Dunkel Schetter & Tanner, 2012), a more comprehensive understanding of this experience is imperative. Gaining an understanding of women’s experiences of fetal health anxiety and potential underlying factors of this condition may provide information for more effective assessment and treatment of fetal health anxiety during pregnancy. In addition, the relationship between (maternal) health anxiety and fetal health anxiety during pregnancy has not been investigated within the extant literature. Of note, prior to the current investigation no comprehensive measure of fetal health anxiety existed.

1.3 Associated Constructs

1.3.1 Anxiety and depression. General anxiety and depression have been linked to both pregnancy (e.g., Lee et al., 2007) and health anxiety (e.g., Barsky et al., 1992). Therefore, these associated constructs appear important to consider when investigating health anxiety during pregnancy. Anxiety and depressive disorders are common comorbid conditions in adults with severe health anxiety. To illustrate, Noyes and colleagues (1994) examined psychiatric comorbidities in adults with severe health anxiety (n = 50) and found that major depression was the most frequent comorbid condition with 28% reporting current major depression, followed by panic disorder with agoraphobia, which was reported by 16% of the individuals. Overall, 44% reported having a coexisting depressive disorder and 22% reported having a coexisting anxiety disorder. More recently, Scarella and colleagues (2016) examined psychiatric comorbidity in a community sample of adults with severe health anxiety (N = 194, mean
age = 39.8 years) and found that comorbid diagnoses included major depression (32.6%), GAD (28.5%), and panic disorder (14.4%). These results indicate that high levels of depressive and anxiety symptoms are experienced among those with severe health anxiety.

1.3.2 Anxiety sensitivity. Reiss and McNally (1985) were the first to conceptualize anxiety sensitivity as a fearful response to anxiety-related bodily sensations based on the belief that they will have harmful consequences, including embarrassment, illness, or further anxiety. Anxiety sensitivity is distinct from, but related to, anxiety (Silverman, Fleisig, Rabian, & Peterson, 1991). Anxiety sensitivity is conceptualized as being comprised of three dimensions including the fear of arousal-related sensations associated with cognitive, physical, and social concerns (Taylor et al., 2007). Several researchers have identified a relationship between health anxiety and anxiety sensitivity (e.g., Abramowitz, Olatunji, & Deacon, 2007; Stewart & Watt, 2000). There is also initial evidence that anxiety sensitivity may be a predisposition for developing health anxiety (Watt, Stewart, & Cox, 1998). Anxiety sensitivity has been a unique predictor of health anxiety in non-clinical (Sexton, Norton, Walker, & Norton, 2003) and clinical (Norton, Sexton, Walker, & Norton, 2005; Otto, Pollack, Sachs, & Rosenbaum, 1992) samples. Wheaton, Berman, and Abramowitz (2010) found that anxiety sensitivity was associated with levels of health anxiety in an undergraduate student sample ($N = 636$, mean age = 19.9 years). Individuals in the high-health anxiety group reported greater levels of anxiety sensitivity relative to those in the low-health anxiety group and the physical concerns component of anxiety sensitivity was predictive of health anxiety.
Research examining the impact of anxiety sensitivity during pregnancy has increased over the past two decades. The earliest of these studies found that anxiety sensitivity assessed at approximately 36 weeks gestation was associated with posttraumatic stress disorder two weeks postpartum (Keogh, Ayers, & Francis, 2002), suggesting that anxiety sensitivity may represent a risk factor for the development of clinical levels of anxiety following pregnancy. Anxiety sensitivity has been associated with a fear of childbirth in expectant mothers and the physical concerns dimension of anxiety sensitivity was predictive of elevated fear of childbirth (Spice, Jones, Hadjistavropoulos, Kowalyk, & Stewart, 2009). The physical concerns dimension of anxiety sensitivity assessed during late pregnancy also demonstrated a significant association with sensory pain during labour (Curzik & Jokic-Begic, 2011). Considering the aforementioned research, the role of anxiety sensitivity should be considered when examining health anxiety in women who are pregnant.

1.3.3 Intolerance of uncertainty. Another construct related to health anxiety is intolerance of uncertainty (Deacon & Abramowitz, 2008). Intolerance of uncertainty has been defined as “an individual’s dispositional incapacity to endure the aversive response triggered by the perceived absence of salient, key, or sufficient information, and sustained by the associated perception of uncertainty” (Carleton, 2016a, p. 31) and represents a dispositional fear of the unknown (Carleton, 2012). It is independent from, yet strongly related to, anxiety sensitivity (Carleton, Sharpe, & Asmundson, 2007). Intolerance of uncertainty can be conceptualized as having two dimensions: prospective intolerance of uncertainty (i.e., a cognitive component) and inhibitory intolerance of uncertainty (i.e., a behavioural component; Carleton, Norton, & Asmundson, 2007).
Research indicates that different anxiety disorders are associated more strongly with a specific dimension of intolerance of uncertainty (e.g., McEvoy & Mahoney, 2011).

Intolerance of uncertainty appears to be a core vulnerability for diverse anxiety-related constructs, including worry (Carleton, 2016a; Carleton, 2016b; Hong & Cheung, 2015); however, worry may also be used to cope with intolerance of uncertainty (Dugas, Buhr, & Ladouceur, 2004). A growing body of research indicates that intolerance of uncertainty may be a maintaining factor across anxiety disorders and depression (see Carleton, 2016a; Hong & Cheung, 2015 for reviews) and associated with health anxiety, more specifically (e.g., Boelen & Carleton, 2012; Fergus, 2013; Fergus & Valentiner, 2011; Wright et al., 2016). For example, both intolerance of uncertainty and anxiety sensitivity have incrementally predicted health anxiety in a sample of community adults (Fergus & Bardeen, 2013). Anxiety sensitivity and intolerance of uncertainty are both considered risk factors for health anxiety within cognitive-behavioural models (e.g., Abramowitz & Braddock, 2008).

The experience of uncertainty during pregnancy is universal and is associated with stress and the possibility of perinatal complications (Sorenson, 1990). Feelings of uncertainty tend to accompany pregnancy, as much is unknown throughout the process and many aspects are out of the expectant mother’s control (Jones, Statham, & Solomou, 2005). A fear of the unknown appears to be a prominent focus of anxiety in pregnant women (Harpel, 2008), consistent with contemporary theory regarding uncertainty (Carleton, 2016b), and greater psychosocial adjustment during pregnancy has been associated with lower uncertainty (Hui Choi et al., 2012). Despite the common experience of uncertainty during pregnancy, there remains a lack of empirical research
regarding the significance of uncertainty in prenatal care (Hui Choi et al., 2012). To date, the construct of intolerance of uncertainty, and its relationship with psychological outcomes, has not been examined in pregnant women.

1.4 Purposes and Objectives

The current investigation was designed to expand upon the limited research on health anxiety during pregnancy. Two of the existing studies in this area have yielded conflicting results and a main objective of the current study was to clarify whether or not health anxiety is elevated during pregnancy. Kowalyk and colleagues (2009) found that health anxiety was not elevated during pregnancy; however, this study only included women in the third trimester of pregnancy. The current study included women from all stages of pregnancy, as significant levels of anxiety have also been found in the early and mid stages of pregnancy (e.g., Andersson, Sundström-Poromaa, Bixo, et al., 2003; Rubertsson et al., 2014). The current study also included associated constructs that, to date, have not been examined in pregnant women including intolerance of uncertainty and the core health cognitions associated with health anxiety. The inclusion of these constructs may elucidate factors that underlie health anxiety in pregnancy.

For the purposes of the current study, a comprehensive measure of fetal health anxiety was developed and utilized to facilitate a more thorough inquiry of this construct. The fetal health anxiety measure allows for an examination of the possible associations between fetal health anxiety and maternal health anxiety, associated constructs, and the core health cognitions during pregnancy. An assessment of these relationships will help to determine whether fetal health anxiety is a possible extension or manifestation of maternal health anxiety and provide information on potential overlap and dissimilarities
between these two constructs. To facilitate a more detailed understanding of fetal health anxiety during pregnancy, a series of open-ended questions were also included to query components of this experience.

More specifically, the current investigation was designed to achieve the following objectives:

1. To compare levels of health anxiety and associated constructs between a sample of pregnant women and a similarly aged control sample of non-pregnant women.
2. To develop and utilize a comprehensive measure of fetal health anxiety in order to examine the association between fetal health anxiety and maternal health anxiety in pregnant women.
3. To examine the associations between health anxiety, the associated constructs (i.e., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty), and the core health cognitions in both samples of women.
4. To examine the relationships between fetal health anxiety, the associated constructs (i.e., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty), and the core health cognitions in the pregnant sample.
5. To utilize inductive content analysis to examine responses to open ended questions to acquire further information about the experience of fetal health anxiety in pregnant women.

1.5 Hypotheses

Based on the existing literature, the current study had six main hypotheses:

1. There would be a statistically significant, negative correlation between health anxiety scores and fetal health anxiety scores in the pregnant sample.
2. There would be statistically significant, positive correlations between health anxiety scores and the scores for the associated constructs (i.e., anxiety, depression, anxiety sensitivity, intolerance of uncertainty) in both the pregnant and non-pregnant samples.

3. The associated construct scores (i.e., anxiety, depression, anxiety sensitivity, intolerance of uncertainty) would account for statistically significant variance in health anxiety scores in both the pregnant and non-pregnant samples.

4. There would be statistically significant, positive correlations between health anxiety scores and the core health cognitions in both samples.

5. The core health cognitions would account for statistically significant unique variance in health anxiety after controlling for general anxiety and depression in both samples.

6. The core health cognitions as a group would account for statistically significant variance in health anxiety in both samples.

Several exploratory analyses did not have explicit hypotheses. The exploratory analyses and associated results will be presented in the results section in order of the respective objectives outlined above. The exploratory analyses included comparing health anxiety scores between the two samples (i.e., pregnant women and non-pregnant women) as previous research has yielded conflicting results. Similarly, hypotheses regarding between-sample comparisons of additional constructs of interest were not included due to conflicting results in the literature (as is the case for general anxiety and depression) or a lack of previous research in the area (as is the case for anxiety sensitivity, intolerance of uncertainty, and the core health cognitions). In addition,
hypotheses regarding the associations between fetal health anxiety and the associated constructs (i.e., anxiety, depression, anxiety sensitivity, intolerance of uncertainty) and the utility of the associated constructs in explaining variance in fetal health anxiety were not included as there is no previous research available exploring these relationships. Likewise, hypotheses regarding the associations between fetal health anxiety and the core health cognitions and the utility of the core health cognitions in explaining variance in fetal health anxiety were not included as there is no previous research in this area.

2.0 Method

2.1 Participants

There were two power analyses conducted using G*Power 3.1 to determine an adequate sample size for the current research (Faul, Erdfelder, Buchner, & Lang, 2009). First, a power analysis for linear multiple regression using a medium effect size (.15) and a power of .90 (\(\alpha = .05\)), and four predictor variables (i.e., the maximum number of predictor variables to be entered into the regression analyses). The results indicated that 73 participants would achieve adequate power when examining the association between the constructs of interest and levels of health anxiety/fetal health anxiety. The second power analysis for a \(t\)-test using a medium effect size (.50) and a power of .90 (\(\alpha = .05\)) indicated that 172 participants (i.e., 86 pregnant women and 86 non-pregnant women) would achieve adequate power in comparing constructs of interest between pregnant and non-pregnant women. Pregnant women (in any trimester of pregnancy) and similarly aged, non-pregnant women were recruited from the community for the current study. All participants were required to be at least 18 years of age (i.e., an adult) and have the ability to read and write/type in English.
The pregnant women were recruited through advertisements at local services and programs targeted toward pregnant women (e.g., childbirth preparation classes, pre-natal exercise classes, online pregnancy-related forums, medical offices). The non-pregnant women were recruited from local establishments (e.g., libraries, coffee shops). A total of 133 pregnant women provided consent to participate and began to complete study measures. Among the initial participants, 33 did not complete the majority of the study questionnaires and were subsequently disqualified from analysis, resulting in a total of 100 participants in the pregnant group of women. In addition, 140 non-pregnant women provided consent to participate and began to complete study measures; a number of these participants were disqualified because they did not complete the majority of the study questionnaires \((n = 28)\) or due to age (i.e., above the age of typical child-bearing years \([\text{age } 56 \text{ years}]; n = 1\)). Overall, the study comprised of 211 female participants, of which 100 were pregnant and 111 were not pregnant at the time of the study.

2.2 Measures

2.2.1 Demographics Information Form (Appendix B). A basic demographics form assessed relevant background information about the participants. The questions inquired about various demographic variables including age, education, relationship status, ethnicity, and medical and psychiatric diagnoses. For the pregnant sample, the same form included questions pertaining to pregnancy including number of weeks pregnant, number of previous pregnancies, and history of pregnancy complications.

2.2.2 SHAI (Salkovskis et al., 2002; Appendix C). The SHAI is a self-report measure of health anxiety in adults. The measure consists of 18 items, each comprised of four statements from which the respondent chooses the statement that best captures
their experience over the past week. The SHAI includes two scales: a 14-item main scale that assesses health anxiety independent of health status and a four-item subscale that measures perceived negative consequences of having an illness. Both an 18-item and 14-item (excludes the latter subscale) version of the SHAI have been utilized to measure overall health anxiety (Alberts, Hadjistavropoulos, Jones, & Sharpe, 2013); the current study utilized the 14-item version, as the latter subscale was not developed to directly measure health anxiety. The SHAI consists of items scored on a scale from 0 (no symptoms) to 3 (severe symptoms). The sum of the items produce a total score of health anxiety ranging from 0 to 42, with higher scores indicative of higher levels of health anxiety. An average total score for the 14-item version of the SHAI in non-clinical samples is not available, as the large majority of non-clinical studies have utilized the 18-item version (Alberts et al., 2013). This measure has demonstrated good reliability and validity in clinical and nonclinical samples (Abramowitz, Deacon, & Valentiner, 2007; Salkovskis et al., 2002). The use of the SHAI as a measure of health anxiety during pregnancy has been recommended, as scores on this measure are not inappropriately influenced by the frequent health care utilization that typically accompanies the process of pregnancy (Kowalyk et al., 2009). The SHAI demonstrated high internal consistency in both the pregnant ($\alpha = .87$) and non-pregnant ($\alpha = .90$) samples in the current study.

2.2.3 Fetal Health Anxiety Inventory (Fhai; Reiser & Wright, 2018; Appendix D). This questionnaire was developed for the current study to assess anxiety related to the health of one’s fetus during pregnancy. This questionnaire was developed because there was no existing measure available to provide a comprehensive assessment
of fetal health anxiety. Resembling the SHAI, the FHAI consists of 14-items scored on a scale from 0 (no symptoms) to 3 (severe symptoms). The sum of the items produce a total score of fetal health anxiety ranging from 0 to 42, with higher scores indicative of higher levels of fetal health anxiety.

To create the FHAI, all questions from the 14-item version of the SHAI (Salkovskis et al., 2002) were adapted to pertain to potential worries that an expectant mother might experience regarding the health of her developing baby. The revised questionnaire was distributed to four pregnant women for review and feedback. This feedback primarily consisted of comments related to items that did not translate well from the original measure and were difficult to understand. Items were reworded and revised as appropriate. Subsequently, the updated measure was distributed to three subject matter experts in the field of health anxiety (i.e., doctoral psychologists across Canada) for additional review and feedback (e.g., regarding item appropriateness, item wording, potential problems with the measure). Questionnaire instructions and items were further revised based on this feedback.

Since beginning the current dissertation project, preliminary psychometric evaluation of the FHAI has been conducted (see Reiser & Wright, 2018), suggesting that the FHAI represents a psychometrically sound measure of fetal health anxiety. According to Reiser and Wright (2018), the FHAI has demonstrated convergent validity with conceptually similar measures (i.e., Pregnancy-Related Anxiety Questionnaire-Revised (PRAQ-R) total score, and the PRAQ-R fear of bearing a mentally or physically handicapped child subscale, in particular), discriminant validity with a divergent construct (i.e., depression) and excellent internal consistency ($\alpha = .91$). Exploratory
factor analytic results also support the use of the FHAI as a one-factor scale (Reiser & Wright, 2018).

2.2.4 PRAQ-R (Huizink et al., 2004; Appendix E). The PRAQ-R is a 10-item questionnaire, based on the original PRAQ (Van den Bergh, 1990), designed to assess pregnancy-specific anxiety in pregnant women. The current study utilized a 9-item version of the measure (i.e., excludes Item 8, *I am anxious about the delivery because I have never experienced one before*), which is recommended for use with samples that include parous women (Westerneng, de Cock, Spelten, Honig, & Hutton, 2015). Each item is rated on a 5-point Likert-style scale ranging from 1 (absolutely not relevant) to 5 (very relevant). Total scores range from 9 to 45, with higher scores indicative of higher pregnancy-specific anxiety. The PRAQ-R is comprised of three subscales: fear of giving birth, concern about one’s appearance, and fear of bearing a physically or mentally handicapped child. The *fear of bearing a physically or mentally handicapped child* subscale is of particular relevance to the current study (and will also be referred to as the *PRAQ-R subscale* in following analyses), as this subscale provides a measure of fetal health anxiety. This subscale includes three items related to fetal health anxiety, which is the highest number of items devoted to examining fetal health anxiety among the common measures of pregnancy-specific anxiety (Bayrampour et al., 2016). The PRAQ-R has demonstrated good internal consistency across various research samples (e.g., Arch, 2013; Hompes et al., 2013; Vollebregt et al., 2008) for the total score (α = .81 - .83) and the *fear of bearing a physically or mentally handicapped child* subscale (α = .88 - .89). In the current study, good internal consistency was demonstrated by both the
PRAQ-R (9-item) total score ($\alpha = .81$) and the fear of bearing a physically or mentally handicapped child subscale ($\alpha = .84$).

2.2.5 Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983; Appendix F). The HADS is a self-report measure that assesses symptoms of anxiety and depression. The measure consists of 14 items, half of which are designed to measure anxiety (HADS-ANX) and the other half to measure depression (HADS-DEP). The items are rated on a 4-point Likert-style scale ranging from 0 (indicating the absence of a symptom) to 3 (indicating considerable symptom endorsement). Total scores for each subscale range from 0 to 21 and are calculated by summing the value for the seven items within each subscale, with higher scores indicative of higher symptom endorsement. For either subscale, a cut-off score of 8 or greater is recommended to identify mild anxiety or depression and 11 or greater to identify probable clinical levels of anxiety or depression (Zigmond & Snaith, 1983). The HADS was originally designed for use with patients at hospital clinics; however, it has been successfully employed in numerous community samples (Bartram, Yadegarfar, & Baldwin, 2009; Phillips, Gallagher, Hunt, Der, & Carroll, 2009). The HADS has demonstrated good internal consistency across various samples and good concurrent validity with other commonly used measures of depression and anxiety (e.g., Beck Depression Inventory, Stait-Trait Anxiety Inventory; Bjelland, Dahl, Haug, & Neckelmann, 2002). The HADS has also demonstrated good test-retest (2 week) reliability ($r > .80$; Herrmann, 1997). Normative data from a large non-clinical sample found mean scores of 6.14 ($SD = 3.76$) and 3.68 ($SD = 3.07$) for the HADS-ANX and HADS-DEP, respectively (Crawford, Henry, Crombie, & Taylor, 2001).
The HADS is commonly used with samples of pregnant women (e.g., Watts, Miller, & Marshall, 2013; Weidner et al., 2010) and is an appropriate measure in this sample because it does not include items that assess physical indicators of psychological distress (e.g., headaches, insomnia, fatigue). For pregnant samples, the HADS is considered superior to other measures that include somatic symptoms, which may artificially inflate rates of anxiety and depression because these somatic symptoms overlap with symptoms associated with pregnancy (Brunton, 2017; Fadzil et al., 2013; Lee et al., 2007). The HADS has been validated among pregnant women, where the anxiety subscale demonstrated a sensitivity and specificity of 93% and 90%, respectively, and the depression subscale demonstrated a sensitivity and specificity of 90% and 91%, respectively (Abiodun, 1994). In the current study, the HADS-ANX and HADS-DEP demonstrated acceptable-good internal consistency within the pregnant sample with reliability coefficients (Cronbach’s alpha) of .83 and .74, respectively. Within the non-pregnant sample, reliability coefficients (Cronbach’s alpha) were .84 for both subscales.

2.2.6 Center for Epidemiologic Studies Depression Scale – 14-item Version (CESD-14; Carleton et al., 2013; Appendix G). The CESD-14 is a revised version of the Center for Epidemiologic Studies Depression Scale (Radloff, 1977) and is a self-report measure of depressive symptoms in adults. The measure is comprised of 14 items, which are rated on a 4-point Likert-style scale ranging from 0 (rarely or none of the time [less than 1 day]) to 3 (most or all of the time [5–7 days]). The sum of the CESD-14 items produces a total score ranging from 0 to 42, with higher scores indicative of increased depressive symptoms. The CESD-14 total score has high internal consistency.
(α = .80-.93) across various samples (Carleton et al., 2013) and a stable factor structure within diverse populations (Aoki et al., 2014; Yang, Jia, & Qin, 2015). In the current study, the CESD-14 demonstrated high internal consistency in both the pregnant (α = .87) and non-pregnant (α = .89) samples.

The CESD-14 items reflect three factors of depression including anhedonia (i.e., absence of positive emotion), negative affect (i.e., negative emotion), and somatic symptoms. The CESD-14 was included as a complement to the HADS-DEP (the primary measure of depression in the current study), which primarily focuses on depressive symptoms related to anhedonia. The HADS-DEP has been recommended for use with pregnant women because the measure does not assess somatic symptoms (Brunton, 2017; Fadzil et al., 2013; Lee et al., 2007), the inclusion of the CESD-14 allows for assessment of additional components of depression, including negative affect, which is considered a key dimension of depression (APA, 2013).

2.2.7 Anxiety Sensitivity Index-3 (ASI-3; Taylor et al., 2007; Appendix H). The ASI-3 is a self-report measure that assesses an individual’s sensitivity to anxiety. The measure consists of 18 items, which are rated on a 5-point Likert-style scale to evaluate how much the respondent agrees with each statement ranging from 0 (very little) to 4 (very much). The sum of the items produces a total score ranging from 0 to 72, with higher scores indicative of higher levels of anxiety sensitivity. Scores 0-16 can be classified as low/normal levels of anxiety sensitivity, 17-22 as moderate anxiety sensitivity, and 23 and above as high anxiety sensitivity (Allan, Korte, Capron, Raines, & Schmidt, 2014). The ASI-3 is comprised of three subscales: physical (i.e., fear of somatic sensations), cognitive (i.e., fear of cognitive dyscontrol), and social (i.e., fear of
socially observable anxiety reactions). The ASI-3 has demonstrated convergent, discriminant, and criterion validity (Taylor et al., 2007). Previous versions of the ASI have been utilized with samples of pregnant women and have demonstrated a normal distribution and high internal consistency within this population (e.g., Curzik & Jokic-Begic, 2011). In the current study, the ASI-3 total score demonstrated excellent internal consistency in both the pregnant ($\alpha = .91$) and non-pregnant ($\alpha = .93$) samples. The physical, cognitive, and social subscales all demonstrated high internal consistency within the pregnant sample with reliability coefficients (Cronbach’s alpha) of .83, .86, and .81, respectively; within the non-pregnant sample, reliability coefficients (Cronbach’s alpha) were .90, .90, and .84, respectively.

### 2.2.8 Intolerance of Uncertainty Scale – Short Form (IUS-12; Carleton, Norton, et al., 2007; Appendix I).

The IUS-12 is the short form of the original 27-item Intolerance of Uncertainty Scale (Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994) and is a self-report measure that assesses reactions to uncertainty, ambiguous situations, and the future. The measure consists of 12 items, which are rated on a 5-point Likert-style scale ranging from 1 (not at all characteristic of me) to 5 (entirely characteristic of me). The measure yields a total score ranging from 12-60, with higher scores indicative of increased intolerance of uncertainty. The IUS-12 is comprised of two subscales: Prospective IU (i.e., cognitive dimension) and Inhibitory IU (i.e., behavioural dimension). The IUS-12 total score has demonstrated excellent internal consistency ($\alpha = .91$) and a high correlation with the original 27-item version of the measure ($r = .96$; Carleton, Norton, et al., 2007). The IUS-12 has demonstrated good psychometric properties in both non-clinical and clinical samples (Carleton et al., 2012;
McEvoy & Mahoney, 2011). In the current study, the IUS-12 total score demonstrated 
excellent internal consistency in both the pregnant (α = .93) and non-pregnant (α = .92) 
samples. The Prospective IU subscale and Inhibitory IU subscales both demonstrated 
high internal consistency within the pregnant sample with reliability coefficients 
(Cronbach’s alpha) of .90 and .87, respectively; within the non-pregnant sample, 
reliability coefficients (Cronbach’s alpha) were .89 and .86, respectively.

2.2.9 Health Cognitions Questionnaire (HCQ; Hadjistavropoulos et al., 2012; 
Appendix J). The HCQ is a self-report measure designed for use in both medical and 
non-medical samples that assesses the four core beliefs that are thought to contribute to 
the development of health anxiety. The measure consists of 20 items, which are rated on 
a 5-point Likert-style scale ranging from 1 (strongly disagree) to 5 (strongly agree). The 
HCQ yields the following four subscales: (1) Likelihood of Illness, (2) Awfulness of 
Illness, (3) Difficulty Coping with Illness, and (4) Medical Service Inadequacy. Higher 
scores within each subscale reflect more strongly held beliefs related to that core 
cognition. Internal consistency for the four subscales has been found to range from 
acceptable to very good across various samples including healthy undergraduate students 
(α = .68 - .89), healthy adults within the community (α = .72 - .90), and adults with a 
medical condition within the community (α = .75 - .91; Hadjistavropoulos et al., 2012). 
Initial analyses of the HCQ have also established the four-factor structure of the measure 
as well as evidenced good discriminant and predictive validity (Hadjistavropoulos et al., 
2012). In the current study, the HCQ subscales demonstrated acceptable internal
consistency in both the pregnant (α = .81 - .88; of note, n = 96 due to missing data) and non-pregnant (α = .74 - .90) samples.

2.3 Procedure

Ethical approval was obtained from the University of Regina Research Ethics Board (see Appendix A). Subsequently, posters and brochures advertising the study were distributed online and to community establishments. The advertising material included a direct link to access the online survey site hosted by SurveyMonkey and contact information if potential participants required additional information or wanted to request a paper-pencil version of the survey. Despite the paper-pencil option, all participants completed the survey online. Internet-based data collection has been a valid approach for research using self-report questionnaires and provides results that are consistent with traditional data collection methods (Gosling, Vazire, Srivastava, & John, 2004).

Prior to beginning the survey, potential participants were provided with information about the purpose of the study, voluntary participation, anticipated risks and benefits, and the time required to complete the questionnaire. Participants were notified about the nature of the questionnaires and were provided with the contact information of community mental health resources in the case that a participant was experiencing significant distress. Subsequently, participants provided online consent to partake in the study. Participants had the option of entering into a draw to win one of six $50 shopping gift certificates.

All participants were asked to complete the demographics form and six measures (i.e., SHAI, HADS, CESD-14, HCQ, ASI-3, IUS-12). The participants who were
pregnant were also asked to complete the FHAI and the PRAQ-R. In addition, the pregnant women were asked to complete a series of open-ended questions related to worries about the health of their developing baby (see Appendix K). The entire survey took approximately one to two hours to complete. Upon completion, the survey data was entered into either the Software Package for the Social Sciences (SPSS) for Windows version 20.0 or Nvivo for Windows version 11.0 for subsequent analyses.

2.3.1 Mixed methods approach. The current investigation utilized a mixed methods design referred to as a dominant-less dominant study, where the dominant research design (i.e., quantitative) was supplemented with a small component drawn from an alternative design (i.e., qualitative; Creswell, 1994). The intent of this mixed-methods design was complementarity (Greene, Caracelli, & Graham, 1989), namely, the inclusion of the qualitative component was to elaborate on, enhance, and illustrate the results examining fetal health anxiety. A mixed methods approach allows a researcher to assess different aspects of a phenomenon (Creswell & Plano Clark, 2011) and can offset the limitations inherent in each method by itself (Johnson & Turner, 2003).

In addition, the purpose of this design was to increase interpretability and meaningfulness (Greene at al., 1989) of the data regarding women’s experiences of fetal health anxiety during pregnancy. Within the current investigation, the development of the FHAI allowed for the quantification of levels of fetal health anxiety; yet, if women endorsed experiences of fetal health anxiety within this measure, what were they referring to specifically? What, in particular, were these women anxious about and how did this worry impact them during their pregnancy? What increased and eased this anxiety? And what could health care providers do to assist the management of fetal
health anxiety? The opportunity to explore these questions and allow pregnant women to provide details in their own words facilitated a more comprehensive understanding of a phenomenon that has been the focus of limited empirical research.

2.3.1.1 Inductive content analysis. The current study employed inductive content analysis, which is a qualitative research method utilized for the subjective interpretation of text data through a systematic classification process of coding and identifying themes within the data (Hsieh & Shannon, 2005). It is a flexible method for analyzing text data (Cavanagh, 1997) that can be obtained from various sources including open-ended survey questions (Kondracki & Wellman, 2002). In recent years, content analysis has become commonly used in health-related research fields, as it can facilitate the acquisition of a more thorough understanding of a phenomenon (Hsieh & Shannon, 2005).

Inductive content analysis was implemented for the coding and analysis of the qualitative data (i.e., text responses to open-ended questions) in the current investigation. Inductive content analysis is considered an appropriate approach when limited research exists regarding a phenomenon (Hsieh & Shannon, 2005), which is the case when exploring women’s experiences of fetal health anxiety. This approach avoids using predetermined categories (Kondracki & Wellman, 2002) and allows categories to flow from the data and reflect participants’ unique experiences (Hsieh & Shannon, 2005).

Consistent with the recommendations for inductive content analysis (Hsieh & Shannon, 2005), all responses for each question were first read from beginning to end to formulate an understanding of the responses as a whole. Next, the responses were re-read to begin deriving meaningful categories, by initially highlighting words from the
text that appear to capture key concepts. From there, notes were kept regarding first impressions and thoughts regarding the data and initial analyses. As the process continued, preliminary themes were formed prior to attempting to code each individual response. Following individual coding, themes were modified or divided into more focused categories in an effort to best capture responses. The frequency of the themes within each question is reported as the number of responses and percentages of the total responses.

Specific strategies were employed to ensure validity and rigor (also referred to as *trustworthiness*) throughout the process of the content analysis. An awareness of, and attention to, maintaining an inductive perspective was imperative throughout the qualitative analysis (Morse, 2015). In addition, all of the available text responses, rather than a designated subset, were included in the data analysis to minimize bias (Morse, 2015). Peer debriefing is also a recommended strategy for establishing validity in qualitative analyses (Morse, 2015). As such, the researcher engaged in peer review and debriefing with clinical psychologist and qualitative researcher, Dr. Kimberly Zorn. During the analysis phase, the researcher consulted with Dr. Zorn several times to discuss the content analysis process including generating codes and categorizing themes, with a focus on allowing the categories to flow from the data and using the participants’ own words. The guidance offered by, and questions posed by, Dr. Zorn assisted the researcher in preventing bias, conceptualizing the qualitative component of the research, and synthesizing the data.

### 3.0 Results

#### 3.1 Preliminary Analyses
The standard values for the total and subscale scores for the measure were calculated for each sample. As recommended by Tabachnick and Fidell (2013), outliers were defined as cases with 3.29 standard deviations above or below the mean (z-score values that equaled ±3.29). If the z-score of a data point exceeded this cutoff, the outlying score was changed to one unit higher or lower than the next most extreme score that remained within the data cutoff parameter. Within the pregnant sample, outliers were identified and changed for the SHAI total score (1 case), PRAQ-R total score (1 case), PRAQ-R fear of bearing a physically or mentally handicapped child subscale (1 case), ASI-3 total score (1 case), IUS-12 total score (1 case), and HCQ awfulness of illness subscale (1 case). Within the non-pregnant sample, outliers were identified and changed for the HADS-DEP subscale (2 cases), ASI-3 total score (1 case), and HCQ awfulness of illness subscale (1 case).

Next, skewness and kurtosis were examined to assess the distribution of the scores for each measure in both samples. The data was examined by visually assessing distribution plots and also numerically, whereby the skewness and kurtosis statistics were divided by their respective standard error to produce z-score values (Field, 2009). The z-scores with an absolute value greater than 2.58 were considered to be non-normal, based on the size of our samples (Field, 2009). Following analysis, a number of measures exhibited non-normal distributions. To correct for this bias, the central limit theorem infers that utilizing a technique such as bootstrapping will result in a normal sampling distribution (Field, 2013). The sample size of both the pregnant sample and non-pregnant sample aligns with Field’s (2013) sample size recommendation for the central limit theorem to take effect. Accordingly, bootstrapping was utilized for all
analyses to produce robust estimates of the regression coefficients and maximize the normality of the parameter estimates. In addition, prior to all regression analyses, multicollinearity was assessed among the independent variables and was not considered problematic, as the independent variables in each analysis were not considered very highly correlated with one another ($r > .70$) nor did the Variance Inflation Factor statistics for the independent variables exceed the recommended cut-off of 2.5 (Field, 2013).

### 3.2 Descriptive Information

#### 3.2.1 Demographics.

Descriptive statistics were computed for demographic information, with continuous variables summarized as mean and standard deviation and categorical variables summarized as percentages. The sample of pregnant women was comprised of 100 participants ranging from 21 to 39 years of age ($M_{age} = 30.15$ years ($SD = 3.59$)). The women ranged from 6 to 41 weeks pregnant (8% were in the first trimester, 37% were in the second trimester, and 55% were in the third trimester). Most of the pregnant women were Caucasian/white (94%), lived in a major city (i.e., population of more than 50,000; 66%), were married/common law (96%), and had a university degree (70%). A number of participants reported having an existing medical condition (18%), or a previous serious health condition (6%). Some participants also reported currently (9%), or previously (24%), having a mental health condition. Most women in a relationship reported feeling emotionally well supported (81%) or somewhat supported (14%) by their spouse/partner. Close to half of the pregnant women had biological offspring (52%), most commonly one (37%) or two (8%) children. For details describing pregnancy-related information in the pregnant sample refer to Table 1.
Table 1

*Pregnancy-Related Information for the Pregnant Sample*

<table>
<thead>
<tr>
<th>Category</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expecting first child</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>No</td>
<td>56</td>
<td>56</td>
</tr>
<tr>
<td>Planned Pregnancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>81</td>
<td>81</td>
</tr>
<tr>
<td>No</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Use of special measures to become pregnant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>No</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td>Pregnancy considered high-risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>No</td>
<td>85</td>
<td>85</td>
</tr>
<tr>
<td>Don't know</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pregnancy complications with a previous pregnancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>No/Not applicable</td>
<td>86</td>
<td>86</td>
</tr>
<tr>
<td>History of miscarriage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>No</td>
<td>76</td>
<td>76</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Completed/enrolled in prenatal classes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>69</td>
<td>69</td>
</tr>
<tr>
<td>No</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>Prenatal/labour caregiver(s)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obstetrician/Gynecologist</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>Midwife</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Doula</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Family Physician</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>No birth attendant</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Planned birthing location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

* Participants were able to endorse more than one caregiver.

\(N = 100.\)
The sample of non-pregnant women was comprised of 111 participants ranging from 23 to 41 years of age \([M_{\text{age}} = 30.57 \, \text{years} \, (SD = 3.53)]\). The majority of the women were Caucasian/white \((n = 100; \, 90.1\%)\), lived in a major city (i.e., population of more than 50,000; \(n = 88; \, 79.3\%\)), were in a relationship \((n = 99; \, 89.2\%)\), and had a university degree \((n = 89; \, 80.2\%)\). The minority of participants reported having an existing medical condition \((n = 23; \, 20.7\%)\) or a previous serious health condition \((n = 17; \, 15.3\%)\). Several participants also reported currently \((n = 22; \, 19.8\%)\), or previously \((n = 30; \, 27.0\%)\), having a mental health condition. Some of the women had biological offspring \((n = 47; \, 42.3\%)\), most commonly one \((n = 18; \, 16.2\%)\) or two \((n = 22; \, 19.8\%)\) children. Nearly half of the participants reported never being pregnant \((n = 54; \, 48.6\%)\) and others reported a history of pregnancy loss (e.g., miscarriage or abortion; \(n = 21; \, 18.9\%)\). A number of women reported planning to be pregnant (or pregnant again) in the future \((n = 53; \, 47.7\%)\) and one woman \((0.9\%)\) was in the process of adopting a child. For detailed descriptive information for each sample, refer to Table 2.

In line with the study objective to recruit two samples of women of a similar age, an independent samples \(t\)-test was conducted to compare age between the pregnant \((M = 30.15, \, SD = 3.59)\) and non-pregnant \((M = 30.57, \, SD = 3.53)\) samples. There was no significant difference in age between the groups, \(t(209) = 0.85, \, p = 0.40\). Chi-square results (with Yates Continuity Correction) indicated that the two samples did not significantly differ with regard to the presence of an existing medical condition, \(X^2(1, \, n = 211) = .11, \, p = .746, \, \phi = -.03\), history of a serious medical condition, \(X^2(1, \, n = 211) = 3.79, \, p = .052, \, \phi = -.15\), nor history of a mental health condition, \(X^2(1, \, n = 211) = .12, \, p = .730, \, \phi = -.04\). However, the relation between pregnant/non-pregnant and the
Table 2

Demographic Information for the Pregnant and Non-pregnant Samples

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Pregnant&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Non-Pregnant&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>M (SD)</em></td>
<td>30.15 (3.59)</td>
<td>30.57 (3.53)</td>
</tr>
<tr>
<td><em>n (%)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>94 (94.0)</td>
<td>100 (90.1)</td>
</tr>
<tr>
<td>Asian</td>
<td>3 (3.0)</td>
<td>4 (3.6)</td>
</tr>
<tr>
<td>Black/African</td>
<td>-</td>
<td>1 (0.9)</td>
</tr>
<tr>
<td>Aboriginal/First Nations</td>
<td>1 (1.0)</td>
<td>2 (1.8)</td>
</tr>
<tr>
<td>Metis</td>
<td>2 (2.0)</td>
<td>3 (2.7)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-</td>
<td>1 (0.9)</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm/Rural community</td>
<td>15 (15.0)</td>
<td>3 (2.7)</td>
</tr>
<tr>
<td>Town (pop. 500-4,999)</td>
<td>11 (11.0)</td>
<td>9 (8.1)</td>
</tr>
<tr>
<td>Small city (pop. 5,000-49,999)</td>
<td>8 (8.0)</td>
<td>11 (9.9)</td>
</tr>
<tr>
<td>Major city (pop. 50,000+)</td>
<td>66 (66.0)</td>
<td>88 (79.3)</td>
</tr>
<tr>
<td><strong>Highest level of education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>5 (5.0)</td>
<td>3 (2.7)</td>
</tr>
<tr>
<td>College/Trade school</td>
<td>15 (15.0)</td>
<td>11 (9.9)</td>
</tr>
<tr>
<td>Some university</td>
<td>10 (10)</td>
<td>8 (7.2)</td>
</tr>
<tr>
<td>University degree(s)</td>
<td>70 (70.0)</td>
<td>89 (80.2)</td>
</tr>
<tr>
<td><strong>Relationship status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maried/Common law</td>
<td>96 (96.0)</td>
<td>78 (70.3)</td>
</tr>
<tr>
<td>Dating</td>
<td>-</td>
<td>21 (18.9)</td>
</tr>
<tr>
<td>Single</td>
<td>4 (4.0)</td>
<td>12 (10.8)</td>
</tr>
<tr>
<td><strong>Current medical condition(s)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thyroid condition</td>
<td>8 (8.0)</td>
<td>1 (0.9)</td>
</tr>
<tr>
<td>Asthma</td>
<td>6 (6.0)</td>
<td>5 (4.5)</td>
</tr>
<tr>
<td>Polycystic ovary syndrome</td>
<td>2 (2.0)</td>
<td>3 (2.7)</td>
</tr>
<tr>
<td>Cerebral palsy</td>
<td>1 (1.0)</td>
<td>-</td>
</tr>
<tr>
<td>Antiphospholipid syndrome</td>
<td>1 (1.0)</td>
<td>-</td>
</tr>
<tr>
<td>Heart condition</td>
<td>1 (1.0)</td>
<td>-</td>
</tr>
<tr>
<td>Crohn's disease/Colitis</td>
<td>1 (1.0)</td>
<td>2 (1.8)</td>
</tr>
<tr>
<td>Diabetes (type II)</td>
<td>1 (1.0)</td>
<td>-</td>
</tr>
<tr>
<td>Pituitary adenoma</td>
<td>1 (1.0)</td>
<td>1 (0.9)</td>
</tr>
<tr>
<td>Arthritis</td>
<td>-</td>
<td>3 (2.7)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>-</td>
<td>2 (1.8)</td>
</tr>
<tr>
<td>Endometriosis</td>
<td>-</td>
<td>2 (1.8)</td>
</tr>
<tr>
<td>Condition</td>
<td>Count</td>
<td>Percentage</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------</td>
<td>------------</td>
</tr>
<tr>
<td>Scoliosis</td>
<td>2</td>
<td>1.8%</td>
</tr>
<tr>
<td>Plantar fasciitis</td>
<td>1</td>
<td>0.9%</td>
</tr>
<tr>
<td>Acid reflux</td>
<td>1</td>
<td>0.9%</td>
</tr>
<tr>
<td>Irritable bowel syndrome</td>
<td>1</td>
<td>0.9%</td>
</tr>
<tr>
<td>Primary ovarian insufficiency</td>
<td>1</td>
<td>0.9%</td>
</tr>
<tr>
<td>Chronic fatigue</td>
<td>1</td>
<td>0.9%</td>
</tr>
<tr>
<td>Current mental health condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADHD</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Anxiety</td>
<td>4</td>
<td>4%</td>
</tr>
<tr>
<td>Depression</td>
<td>3</td>
<td>3%</td>
</tr>
<tr>
<td>Anxiety and depression</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Bipolar/ADHD</td>
<td></td>
<td>1%</td>
</tr>
<tr>
<td>OCD/ADHD</td>
<td></td>
<td>1%</td>
</tr>
<tr>
<td>Autism</td>
<td></td>
<td>1%</td>
</tr>
</tbody>
</table>

Note. pop. = population; ADHD = Attention-deficit/Hyperactivity Disorder; OCD = Obsessive-compulsive disorder.

\(^a\)n = 100. \(^b\)n = 111.

* Participants were able to endorse more than one current medical condition.
presence of an existing mental health condition was significant, $X^2 (1, n = 211) = 4.09, p = .043, \text{phi} = -.15$. Non-pregnant women were more likely to endorse the presence of an existing mental health condition.

3.2.2 Relationships between pregnancy-related variables, health anxiety, and fetal health anxiety. The descriptive statistics for the measures of interest for the pregnant sample and non-pregnant sample can be found in Table 3 and Table 4, respectively. Within the pregnant sample, bivariate correlations and point biserial correlations (two-tailed) were computed to examine the relationships between relevant background variables, health anxiety, and fetal health anxiety (see Table 5). Scores on both the SHAI and FHAI were not significantly correlated with number of weeks pregnant, parity of the mother, history of miscarriage, current pregnancy considered high-risk, complications with the current pregnancy, or reported complications in previous pregnancy. The correlation between age and the SHAI was approaching statistical significance, $r(98) = -.19, p = .057$, and was significantly, negatively associated with the FHAI, $r(98) = -.21, p = .04$. The latter indicates that younger participants in the pregnant group reported higher levels of fetal health anxiety. The correlation between the SHAI and complications in the current pregnancy also approached statistical significance $r(98) = -.20, p = .05$, suggesting a possible relationship between pregnancy complications and increased health anxiety in pregnancy.

3.3 Primary Analyses

3.3.1 Objective 1: Examination of group differences for health anxiety and associated constructs. The first objective of the current investigation was to compare
Table 3

Ranges, Means, Standard Deviations, and Reliability Coefficient for Scores in the Pregnant Sample

<table>
<thead>
<tr>
<th>Measure</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
<th>Minimum</th>
<th>Maximum</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHAI</td>
<td>10.97</td>
<td>4.48</td>
<td>0-42</td>
<td>1</td>
<td>25</td>
<td>0.83</td>
</tr>
<tr>
<td>Neg. Consequences</td>
<td>2.47</td>
<td>1.60</td>
<td>0-12</td>
<td>0</td>
<td>7</td>
<td>0.56</td>
</tr>
<tr>
<td>FHAI</td>
<td>10.88</td>
<td>5.57</td>
<td>0-42</td>
<td>2</td>
<td>27</td>
<td>0.91</td>
</tr>
<tr>
<td>PRAQ-R</td>
<td>18.32</td>
<td>6.05</td>
<td>9-45</td>
<td>9</td>
<td>36</td>
<td>0.81</td>
</tr>
<tr>
<td>Subscale</td>
<td>8.27</td>
<td>3.31</td>
<td>4-20</td>
<td>4</td>
<td>19</td>
<td>0.84</td>
</tr>
<tr>
<td>HADS-ANX</td>
<td>5.51</td>
<td>3.52</td>
<td>0-21</td>
<td>0</td>
<td>17</td>
<td>0.83</td>
</tr>
<tr>
<td>HADS-DEP</td>
<td>3.69</td>
<td>2.56</td>
<td>0-21</td>
<td>0</td>
<td>11</td>
<td>0.74</td>
</tr>
<tr>
<td>CESD-14</td>
<td>8.71</td>
<td>6.27</td>
<td>0-42</td>
<td>0</td>
<td>29</td>
<td>0.87</td>
</tr>
<tr>
<td>ASI-3</td>
<td>11.49</td>
<td>9.90</td>
<td>0-72</td>
<td>0</td>
<td>48</td>
<td>0.91</td>
</tr>
<tr>
<td>IUS-12</td>
<td>26.83</td>
<td>9.45</td>
<td>12-60</td>
<td>13</td>
<td>49</td>
<td>0.93</td>
</tr>
<tr>
<td>HCQ-LOI</td>
<td>10.15</td>
<td>3.32</td>
<td>4-20</td>
<td>4</td>
<td>20</td>
<td>0.88</td>
</tr>
<tr>
<td>HCQ-AOI</td>
<td>14.40</td>
<td>2.39</td>
<td>4-20</td>
<td>6</td>
<td>20</td>
<td>0.81</td>
</tr>
<tr>
<td>HCQ-DC</td>
<td>19.54</td>
<td>3.87</td>
<td>8-40</td>
<td>8</td>
<td>30</td>
<td>0.86</td>
</tr>
<tr>
<td>HCQ-MSI</td>
<td>10.56</td>
<td>3.06</td>
<td>4-20</td>
<td>4</td>
<td>19</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Note. N = 100; SHAI = Short Health Anxiety Inventory; Neg. = Negative; FHAI = Fetal Health Anxiety Inventory; PRAQ-R = Pregnancy-Related Anxiety Questionnaire-Revised; HADS = Hospital Anxiety and Depression Scale; ANX = Anxiety Subscale; DEP = Depression Subscale; CESD = Center for Epidemiologic Studies Depression Scale; ASI = Anxiety Sensitivity Index; IUS-12 = Intolerance of Uncertainty Scale Short Form; HCQ = Health Cognitions Questionnaire; LOI = Likelihood of Illness; AOI = Awfulness of Illness; DC = Difficulty Coping; MSI = Medical Service Inadequacy. *n = 96.
### Table 4

*Ranges, Means, Standard Deviations, and Reliability Coefficient for Scores in the Non-pregnant Sample*

<table>
<thead>
<tr>
<th>Measure</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
<th>Minimum</th>
<th>Maximum</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHAI</td>
<td>12.05</td>
<td>6.12</td>
<td>0-42</td>
<td>1</td>
<td>31</td>
<td>0.90</td>
</tr>
<tr>
<td>Neg. Consequences</td>
<td>3.04</td>
<td>1.95</td>
<td>0-12</td>
<td>0</td>
<td>9</td>
<td>0.72</td>
</tr>
<tr>
<td>HADS-ANX</td>
<td>7.41</td>
<td>4.11</td>
<td>0-21</td>
<td>0</td>
<td>20</td>
<td>0.84</td>
</tr>
<tr>
<td>HADS-DEP</td>
<td>2.86</td>
<td>3.22</td>
<td>0-21</td>
<td>0</td>
<td>14</td>
<td>0.84</td>
</tr>
<tr>
<td>CESD-14</td>
<td>9.11</td>
<td>7.73</td>
<td>0-42</td>
<td>0</td>
<td>32</td>
<td>0.89</td>
</tr>
<tr>
<td>ASI-3</td>
<td>15.98</td>
<td>13.80</td>
<td>0-72</td>
<td>0</td>
<td>62</td>
<td>0.93</td>
</tr>
<tr>
<td>IUS-12</td>
<td>28.75</td>
<td>9.71</td>
<td>12-60</td>
<td>13</td>
<td>56</td>
<td>0.92</td>
</tr>
<tr>
<td>HCQ-LOI</td>
<td>11.56</td>
<td>3.72</td>
<td>4-20</td>
<td>4</td>
<td>20</td>
<td>0.85</td>
</tr>
<tr>
<td>HCQ-AOI</td>
<td>14.35</td>
<td>2.96</td>
<td>4-20</td>
<td>6</td>
<td>20</td>
<td>0.74</td>
</tr>
<tr>
<td>HCQ-DC</td>
<td>20.32</td>
<td>5.61</td>
<td>8-40</td>
<td>8</td>
<td>36</td>
<td>0.90</td>
</tr>
<tr>
<td>HCQ-MSI</td>
<td>10.57</td>
<td>3.54</td>
<td>4-20</td>
<td>4</td>
<td>20</td>
<td>0.87</td>
</tr>
</tbody>
</table>

*Note.* $N = 111$; SHAI = Short Health Anxiety Inventory; Neg. = Negative; HADS = Hospital Anxiety and Depression Scale; ANX = Anxiety Subscale; DEP = Depression Scale; CESD = Center for Epidemiologic Studies Depression Scale; ASI = Anxiety Sensitivity Index; IUS-12 = Intolerance of Uncertainty Scale Short Form; HCQ = Health Cognitions Questionnaire; LOI = Likelihood of Illness; AOI = Awfulness of Illness; DC = Difficulty Coping; MSI = Medical Service Inadequacy.
Table 5

*Correlations among Study Variables in the Pregnant Sample*

<table>
<thead>
<tr>
<th>Variable</th>
<th>SHAI</th>
<th>FHAI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-.19</td>
<td>-.21*</td>
</tr>
<tr>
<td>Weeks pregnant</td>
<td>.03</td>
<td>.03</td>
</tr>
<tr>
<td>Expecting first child</td>
<td>-.04</td>
<td>-.14</td>
</tr>
<tr>
<td>History of miscarriage</td>
<td>-.05</td>
<td>-.09</td>
</tr>
<tr>
<td>Considered high risk</td>
<td>-.15</td>
<td>.01</td>
</tr>
<tr>
<td>Current complications</td>
<td>-.20</td>
<td>-.02</td>
</tr>
<tr>
<td>History of complications</td>
<td>.04</td>
<td>.09</td>
</tr>
</tbody>
</table>

*Note. N = 100.*

*p < .05, two-tailed.*
levels of health anxiety and associated constructs between the pregnant and non-pregnant samples. No hypothesis regarding the comparison of health anxiety scores across the two samples (i.e., pregnant women and non-pregnant women) was made, as previous research has yielded conflicting results (i.e., Kowalyk et al., 2009; Savron et al., 1989). Similarly, hypotheses regarding between-sample comparisons of additional constructs of interest are not included due to conflicting results in the literature (as is the case for general anxiety and depression) or a lack of previous research in the area (as is the case for anxiety sensitivity, intolerance of uncertainty, and the core health cognitions).

Independent samples t-tests (two-tailed) were computed to compare SHAI total scores and the SHAI supplemental subscale scores between study samples (see Table 6). Results demonstrated a significant difference in scores between pregnant and non-pregnant women for the SHAI supplemental subscale (examining the perceived negative consequences of having an illness), but not the SHAI total score. These findings indicate that there was not a significant difference in overall levels of health anxiety between the samples; however, the non-pregnant women endorsed significantly higher levels of perceived negative consequences of having an illness than the pregnant women.

In addition, a series of independent sample t-tests (two-tailed) were computed to compare the scores across the other measures of interest (i.e., SHAI, HADS, CESD-14, ASI-3, IUS-12, HCQ) between samples. Results demonstrated a significant difference in scores between pregnant and non-pregnant women for measures of general anxiety, anxiety sensitivity, perceived likelihood of illness, and depression (as measured by the HADS-DEP; see Table 6). The results indicate that the non-pregnant women reported significantly higher levels of general anxiety, anxiety sensitivity, and perceived
Table 6

*Differences Between Samples Across the Measures of Interest*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Pregnant M (SD)</th>
<th>Non-Pregnant M (SD)</th>
<th>t</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHAI</td>
<td>10.97 (4.48)</td>
<td>12.05 (6.12)</td>
<td>1.47</td>
<td>.20</td>
</tr>
<tr>
<td>Neg. Consequences</td>
<td>2.47 (1.60)</td>
<td>3.04 (1.95)</td>
<td>2.29*</td>
<td>.32</td>
</tr>
<tr>
<td>HADS-ANX</td>
<td>5.51 (3.52)</td>
<td>7.41 (4.11)</td>
<td>3.58**</td>
<td>.50</td>
</tr>
<tr>
<td>HADS-DEP</td>
<td>3.69 (2.56)</td>
<td>2.86 (3.22)</td>
<td>2.05*</td>
<td>.29</td>
</tr>
<tr>
<td>CESD-14</td>
<td>8.71 (6.27)</td>
<td>9.11 (7.73)</td>
<td>0.41</td>
<td>.06</td>
</tr>
<tr>
<td>ASI-3</td>
<td>11.49 (9.90)</td>
<td>15.98 (13.80)</td>
<td>2.74*</td>
<td>.37</td>
</tr>
<tr>
<td>IUS-12</td>
<td>26.83 (9.45)</td>
<td>28.75 (9.71)</td>
<td>1.45</td>
<td>.20</td>
</tr>
<tr>
<td>HCQ-LOIa</td>
<td>10.15 (3.32)</td>
<td>11.56 (3.72)</td>
<td>2.86**</td>
<td>.40</td>
</tr>
<tr>
<td>HCQ-AOIa</td>
<td>14.40 (2.39)</td>
<td>14.35 (2.96)</td>
<td>0.12</td>
<td>.02</td>
</tr>
<tr>
<td>HCQ-DCa</td>
<td>19.54 (3.87)</td>
<td>20.32 (5.61)</td>
<td>1.18</td>
<td>.16</td>
</tr>
<tr>
<td>HCQ-MSIa</td>
<td>10.56 (3.06)</td>
<td>10.57 (3.54)</td>
<td>0.01</td>
<td>.003</td>
</tr>
</tbody>
</table>

*Note.* Pregnant sample (n = 100), Non-pregnant sample (n = 111); SHAI = Short Health Anxiety Inventory; Neg. = Negative; HADS = Hospital Anxiety and Depression Scale; ANX = Anxiety Subscale; DEP = Depression Subscale; CESD = Center for Epidemiologic Studies Depression Scale; ASI = Anxiety Sensitivity Index; IUS-12 = Intolerance of Uncertainty Scale Short Form; HCQ = Health Cognitions Questionnaire; LOI = Likelihood of Illness; AOI = Awfulness of Illness; DC = Difficulty Coping; MSI = Medical Service Inadequacy.

*a* n = 96 in the pregnant sample.

*p < .05. **p < .01, two-tailed.*
likelihood of having an illness compared to the pregnant women; however, the pregnant women reported significantly higher levels of depressive symptoms compared to the non-pregnant women on one measure of depression.

3.3.2 Objective 2: Development of a comprehensive measure of fetal health anxiety and examination of the associations between fetal health anxiety and maternal health anxiety. The second objective of the current investigation was to develop and utilize a comprehensive measure of fetal health anxiety in order to examine the association between fetal health anxiety and maternal health anxiety in pregnant women. The development of the FHAI and a description of the measure are outlined in the Measures section (see 2.2.3). A directional hypothesis was made with respect to this objective; specifically, Hypothesis 1 stated that there would be a statistically significant, negative correlation between health anxiety and fetal health anxiety scores (i.e., FHAI total and the PRAQ-R subscale scores) in the pregnant sample. To test Hypothesis 1, bivariate correlations (two-tailed) were computed between the SHAI and both the FHAI and PRAQ-R subscale (see Table 7). Results demonstrated a statistically significant, positive association between SHAI scores and both FHAI scores, \( r(98) = .533, p < .001 \) and the PRAQ-R subscale, \( r(98) = .522, p < .001 \). The current results did not provide support for Hypothesis 1; on the contrary, the results indicated that levels of fetal health anxiety were positively correlated with levels of maternal health anxiety.

3.3.3 Objective 3: Examination of the associations between health anxiety and constructs of interest. The third objective of the current investigation was to examine the associations between health anxiety, the associated constructs (i.e., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty), and the core health
cognitions in both samples of women. Directional hypotheses were made for this objective; specifically, Hypothesis 2 stated that there would be statistically significant, positive correlations between health anxiety scores and scores for the associated constructs (i.e., anxiety, depression, anxiety sensitivity, intolerance of uncertainty) in both the pregnant and non-pregnant samples. To test Hypothesis 2, bivariate correlations (two-tailed) were computed between scores for the SHAI, HADS-ANX, HADS-DEP, CESD-14, ASI-3, and IUS-12 within both samples. As predicted, in the pregnant sample (see Table 7), the results demonstrated statistically significant, positive associations between the SHAI and the HADS-ANX, \( r(98) = .60, p < .001 \) and both the HADS-DEP, \( r(98) = .33, p = .001 \), and the CESD-14, \( r(98) = .45, p < .001 \). Statistically significant, positive associations were observed between the SHAI and the ASI-3 total score, \( r(98) = .55, p < .001 \), and all ASI subscales. SHAI scores were also significantly correlated with IUS-12 total scores, \( r(98) = .46, p < .001 \), and both IUS-12 subscales.

Similar to the pregnant sample the results for the non-pregnant sample (see Table 8) demonstrated statistically significant, positive associations between the SHAI and the HADS-ANX, \( r(109) = .51, p < .001 \) and both the HADS-DEP, \( r(109) = .36, p < .001 \), and the CESD-14, \( r(109) = .45, p < .001 \). Statistically significant, positive associations were observed between SHAI scores and the ASI-3 total score, \( r(109) = .56, p < .001 \), and all ASI-3 subscales. SHAI scores were also significantly correlated with IUS-12 total scores, \( r(109) = .36, p < .001 \), and both IUS-12 subscales.
Table 7

Summary of Correlations among Measures in the Pregnant Sample

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SHAI</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. FHAI</td>
<td>.53***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. PRAQ-R</td>
<td>.53***</td>
<td>.56***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. PRAQ-R sub.</td>
<td>.52***</td>
<td>.68***</td>
<td>.77***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. HADS-ANX</td>
<td>.60***</td>
<td>.57***</td>
<td>.46***</td>
<td>.53***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. HADS-DEP</td>
<td>.33**</td>
<td>.16</td>
<td>.20*</td>
<td>.11</td>
<td>.45***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. CESD-14</td>
<td>.45***</td>
<td>.23*</td>
<td>.32**</td>
<td>.29**</td>
<td>.58***</td>
<td>.77***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
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<td>.39***</td>
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<td>.59***</td>
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<tr>
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<td>.53***</td>
<td>.56***</td>
<td>.90***</td>
<td>.77***</td>
</tr>
</tbody>
</table>

Note. N = 100; SHAI = Short Health Anxiety Inventory; FHAI = Fetal Health Anxiety Inventory; Pregnancy-Related Anxiety Questionnaire-Revised; sub. = subscale; HADS = Hospital Anxiety and Depression Scale; ANX = Anxiety Subscale; DEP = Depression Subscale; CESD = Center for Epidemiologic Studies Depression Scale; ASI = Anxiety Sensitivity Index; Phys. = Physical; Cog. = Cognitive; Soc. = Social; IUS-12 = Intolerance of Uncertainty Scale Short Form; IU = Intolerance of Uncertainty.

*p < .05. **p < .01. ***p < .001, two-tailed.
Table 8

**Summary of Correlations among Measures in the Non-pregnant Sample**

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tr>
<td>3. HADS-DEP</td>
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<td>.55***</td>
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<tr>
<td>6. ASI-Phys.</td>
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<td>.56***</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>9. IUS-12</td>
<td>.36***</td>
<td>.54***</td>
<td>.40***</td>
<td>.54***</td>
<td>.47***</td>
<td>.31**</td>
<td>.42***</td>
<td>.48***</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>10. Prospective IU</td>
<td>.29**</td>
<td>.48***</td>
<td>.28**</td>
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<td>.35***</td>
<td>.21*</td>
<td>.29**</td>
<td>.38***</td>
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<tr>
<td>11. Inhibitory IU</td>
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<td>.56***</td>
<td>.51***</td>
<td>.61***</td>
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<td>.41***</td>
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<td>.55***</td>
<td>.90***</td>
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</table>

*Note. N = 111; SHAI = Short Health Anxiety Inventory; HADS = Hospital Anxiety and Depression Scale; ANX = Anxiety Subscale; DEP = Depression Subscale; CESD = Center for Epidemiologic Studies Depression Scale; ASI = Anxiety Sensitivity Index; Phys. = Physical; Cog. = Cognitive; Soc. = Social; IUS-12 = Intolerance of Uncertainty Scale Short Form; IU = Intolerance of Uncertainty. 
*p < .05. **p < .01. ***p < .001, two-tailed.*
To further understand the relationships between health anxiety and the associated constructs in both the pregnant and non-pregnant samples, the utility of the associated constructs in accounting for significant variance in health anxiety was examined. Hypothesis 3 stated that the associated constructs (i.e., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty) would account for significant variance in health anxiety scores (the dependent variable) in both the pregnant and non-pregnant samples. Separate hierarchical linear regression analyses (two-tailed) were conducted to examine Hypothesis 3 with health anxiety (i.e., SHAI total scores) as the dependent variable. The HADS-DEP was considered the primary depression measure in the current study and was the measure of depression included in all regression analyses. The HADS is a preferred measure of mood in pregnant women due to the omission of somatic symptoms that often overlap with typical pregnancy symptoms (Brunton, 2017; Fadzil et al., 2013; Lee et al., 2007).

Based on theory and previous research (Carleton, 2016b; Carleton, Norton, et al., 2007; McEvoy & Mahoney, 2011), the IUS-12 total score was entered in step 1 of the model, followed by the ASI-3 total score in step 2, and lastly the HADS-ANX and HADS-DEP subscales were entered in step 3. The order that the independent variables were assigned in the model was based on the concept that intolerance of uncertainty may be a distinct, yet fundamental, component of anxiety sensitivity (Carleton, 2012; Carleton, Sharpe, et al., 2007), and that intolerance of uncertainty and anxiety sensitivity may be underlying components of general anxiety and depression (Naragon-Gainey,
2010; Yook, Kim, Suh, & Lee, 2010), which are psychological conditions associated with elevated health anxiety (Barsky at al., 1996; Scarella et al., 2016).

The outcomes from the hierarchical linear regression with the pregnant sample provided partial support for Hypothesis 3 (see Table 9 for comprehensive results). When placed in step 1, intolerance of uncertainty explained 21% of the variance in health anxiety, $F(1, 98) = 26.90, p < .001$, and accounted for statistically significant unique variance ($p = .001$). Following the entry of anxiety sensitivity in step 2, the total variance explained was 31%, $F(2, 97) = 23.52, p < .001$, and only anxiety sensitivity accounted for statistically significant unique variance ($p = .003$). The inclusion of anxiety sensitivity explained an additional 11% of the variance in health anxiety. Lastly, general anxiety and depression were added in step 3 and the total variance explained by the model as a whole was 44%, $F(4, 95) = 20.48, p < .001$. In the final model, only general anxiety ($\beta = .41, p = .001$) accounted for statistically significant unique variance in health anxiety. Anxiety sensitivity approached statistical significance as a unique contributor ($\beta = .26, p = .057$).

Comprehensive results for the hierarchical linear regression with the non-pregnant sample are presented in Table 10. When placed in step 1, intolerance of uncertainty explained 12% of the variance in health anxiety, $F(1, 109) = 15.70, p < .001$, and accounted for statistically significant unique variance ($p = .001$). Following the entry of anxiety sensitivity in step 2, the total variance explained was 31%, $F(2, 108) = 25.48, p < .001$, and only anxiety sensitivity accounted for statistically significant unique variance ($p = .001$). The inclusion of anxiety sensitivity explained an additional 20% of
Table 9

Hierarchical Multiple Regression Including Associated Constructs in the Pregnant Sample (Dependent Variable: Health Anxiety)

<table>
<thead>
<tr>
<th>Model step</th>
<th>Coefficient statistics</th>
<th>Model statistics</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>$B$ ($SE$)</td>
<td>$\beta$</td>
</tr>
<tr>
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<td>.46**</td>
</tr>
<tr>
<td>2. IUS-12</td>
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<td>.19</td>
</tr>
<tr>
<td></td>
<td>ASI-3</td>
<td>.20 (.06)</td>
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<tr>
<td>3. IUS-12</td>
<td>.06 (.06)</td>
<td>.13</td>
</tr>
<tr>
<td></td>
<td>ASI-3</td>
<td>.12 (.06)</td>
</tr>
<tr>
<td></td>
<td>HADS-ANX</td>
<td>.52 (.14)</td>
</tr>
<tr>
<td></td>
<td>HADS-DEP</td>
<td>.05 (.17)</td>
</tr>
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</table>

Note. $N = 100$; IUS-12 = Intolerance of Uncertainty Scale Short Form; ASI = Anxiety Sensitivity Index; HADS = Hospital Anxiety and Depression Scale; ANX = Anxiety Subscale; DEP = Depression Subscale.

**$p < .01$. ***$p < .001$, two-tailed.
Table 10

*Hierarchical Multiple Regression Including Associated Constructs in the Non-Pregnant Sample (Dependent Variable: Health Anxiety)*

<table>
<thead>
<tr>
<th>Model step</th>
<th>Coefficient statistics</th>
<th>Model statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$B$ (SE) $\beta$ $p$</td>
<td>Part $r$ Adj. $R^2$ $\Delta R^2$ $\Delta F$</td>
</tr>
<tr>
<td>1. IUS-12</td>
<td>0.22 (0.06) 0.36** 0.001 0.36</td>
<td>0.12 0.13 15.70***</td>
</tr>
<tr>
<td>2. IUS-12</td>
<td>0.08 (0.06) 0.12 0.215 0.10</td>
<td>0.31 0.20 30.95***</td>
</tr>
<tr>
<td>ASI-3</td>
<td>0.22 (0.04) 0.50** 0.001 0.44</td>
<td></td>
</tr>
<tr>
<td>3. IUS-12</td>
<td>-0.001 (0.07) -0.002 0.985 -0.001</td>
<td>0.36 0.06 4.98**</td>
</tr>
<tr>
<td>ASI-3</td>
<td>0.18 (0.05) 0.40** 0.001 0.32</td>
<td></td>
</tr>
<tr>
<td>HADS-ANX</td>
<td>0.45 (0.20) 0.31* 0.022 0.23</td>
<td></td>
</tr>
<tr>
<td>HADS-DEP</td>
<td>0.01 (0.18) 0.003 0.976 0.002</td>
<td></td>
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</tbody>
</table>

Note. $N$ = 111; IUS-12 = Intolerance of Uncertainty Scale Short Form; ASI = Anxiety Sensitivity Index; HADS = Hospital Anxiety and Depression Scale; ANX = Anxiety Subscale; DEP = Depression Subscale. 

* $p < .05$. ** $p < .01$. *** $p < .001$, two-tailed.
the variance in health anxiety. Lastly, general anxiety and depression were added in step 3 and the total variance explained by the model as a whole was 36%, $F(4, 106) = 16.17$, $p < .001$. Step 3 explained an additional 6% of the variance in health anxiety. In the final model, two variables accounted for statistically significant unique variance in health anxiety, with anxiety sensitivity ($\beta = .40$, $p = .001$) demonstrating a higher beta value than general anxiety ($\beta = .31$, $p = .022$).

Examining the associations between health anxiety and the core health cognitions was also a primary objective of the current investigation. Linked to this objective, Hypothesis 4 stated that there would be statistically significant, positive correlations between health anxiety and the core health cognitions (i.e., likelihood of illness, difficulty coping, awfulness of illness, medical service inadequacy). To test Hypothesis 4, bivariate correlations (two-tailed) were computed between scores for the SHAI and HCQ subscales in the pregnant (see Table 11) and non-pregnant (see Table 12) samples. There were four participants in the pregnant sample who did not complete the HCQ measure and were therefore removed from all analyses utilizing HCQ subscales. The results provided partial support for our hypothesis. Within the pregnant sample ($n = 96$), the SHAI demonstrated statistically significant, positive relationships with three of the four HCQ subscales: likelihood of illness, $r(94) = .42$, $p < .001$, difficulty coping, $r(94) = .32$, $p = .001$, and medical service inadequacy, $r(94) = .41$, $p < .001$. Contrary to Hypothesis 4, the SHAI did not demonstrate a statistically significant relationship with HCQ awfulness of illness, $r(94) = .14$, $p = .187$. Within the non-pregnant sample, the
Table 11

*Correlations between Health Cognitions and Measures of Interest in the Pregnant Sample*

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<td>3. HADS-ANX</td>
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<td>.57***</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4. HADS-DEP</td>
<td>.32**</td>
<td>.16</td>
<td>.47***</td>
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</tr>
<tr>
<td>5. HCQ-LOI</td>
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<td>.29**</td>
<td>.33**</td>
<td>.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. HCQ-AOI</td>
<td>.14</td>
<td>.16</td>
<td>.11</td>
<td>.06</td>
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<td></td>
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<tr>
<td>7. HCQ-DC</td>
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<td>.33**</td>
<td>.33**</td>
<td>.47***</td>
<td>.48***</td>
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<tr>
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<td>.24*</td>
<td>.23*</td>
<td>.44***</td>
<td>.24*</td>
<td>.47***</td>
</tr>
</tbody>
</table>

*Note.* N = 96; SHAI = Short Health Anxiety Inventory; FHAI = Fetal Health Anxiety Inventory; HADS = Hospital Anxiety and Depression Scale; ANX = Anxiety Subscale; DEP = Depression Subscale; HCQ = Health Cognitions Questionnaire; LOI = Likelihood of Illness; AOI = Awfulness of Illness; DC = Difficulty Coping; MSI = Medical Service Inadequacy.

*p < .05. **p < .01. ***p < .001, two-tailed.
Table 12

Correlations between Health Cognitions and Measures of Interest in the Non-pregnant Sample

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<td></td>
<td></td>
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<td>3. HADS-DEP</td>
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<td>.55***</td>
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<tr>
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</tr>
<tr>
<td>5. HCQ-AOI</td>
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<td>.30**</td>
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<tr>
<td>6. HCQ-DC</td>
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<td>.47***</td>
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<td>.53***</td>
<td>-</td>
</tr>
<tr>
<td>7. HCQ-MSI</td>
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<td>.33***</td>
<td>.22*</td>
<td>.30**</td>
<td>.12</td>
<td>.40***</td>
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</table>

Note. N = 111; SHAI = Short Health Anxiety Inventory; HADS = Hospital Anxiety and Depression Scale; ANX = Anxiety Subscale; DEP = Depression Subscale; HCQ = Health Cognitions Questionnaire; LOI = Likelihood of Illness; AOI = Awfulness of Illness; DC = Difficulty Coping; MSI = Medical Service Inadequacy.

*p < .05. **p < .01. ***p < .001, two-tailed.
SHAI demonstrated statistically significant, positive relationships with all four of the HCQ subscales: *likelihood of illness*, $r(109) = .50, p < .001$, *difficulty coping*, $r(109) = .43, p = .001$, *medical service inadequacy*, $r(109) = .40, p < .001$, and *awfulness of illness*, $r(109) = .30, p = .002$.

Hypothesis 5 stated that the core health cognitions (i.e., likelihood of illness, difficulty coping, awfulness of illness, medical service inadequacy) would account for statistically significant unique variance in health anxiety after controlling for general anxiety and depression. To test Hypothesis 5, a series of hierarchical linear regressions were conducted in both the pregnant and non-pregnant samples. In order to compare the results of these analyses to previous research (i.e., Hadjistavropoulos et al., 2012), participants with self-reported medical conditions were excluded from both samples (i.e., pregnant sample [$n = 73$], non-pregnant sample [$n = 90$]). Based on theory and previous research (Hadjistavropoulos et al., 2012), the HADS-ANX and HADS-DEP subscales were entered in step 1 of the model, followed by the HCQ subscale in step 2. The order that the independent variables were assigned in the model was based on evidence that general anxiety and depression are commonly comorbid conditions with health anxiety (Barsky at al, 1996; Scarella et al., 2016) and also common experiences during pregnancy (Lee et al., 2007). The addition of the health cognition in the subsequent step allowed for an examination of whether the core health cognition contributed to accounting for statistically significant unique variance in health anxiety when controlling for general anxiety and depression.
Consistent with Hypothesis 5, in both the pregnant and non-pregnant samples, nearly all subscales (i.e., likelihood of illness, awfulness of illness, difficulty coping, medical service inadequacy) accounted for statistically significant unique variance in health anxiety, even after controlling for general anxiety and depression, with the exception that variance accounted for by awfulness of illness only approached statistical significance in the non-pregnant sample. Comprehensive results for the hierarchical linear regression analyses in the pregnant sample are presented in Table 13. In all four of the hierarchical regression analyses, when placed in the first step, anxiety and depression accounted for 21% of the variance in health anxiety, $F(2, 70) = 10.31, p < .001$, and general anxiety accounted for statistically significant unique variance ($\beta = .44, p = .001$). In all four analyses, the inclusion of the core health cognition in step 2 produced a statistically significant $F$ change from step 1 to step 2 (all $p$ values were < .05). In the final model for each analysis, the core health cognition accounted for statistically significant unique variance when controlling for general anxiety and depression. In the final model for each analysis, general anxiety also accounted for statistically significant unique variance in health anxiety (all $p$ values were < .01).

Comprehensive results for the hierarchical linear regression analyses in the non-pregnant sample are presented in Table 14. In all four of the hierarchical regression analyses, when placed in the first step, anxiety and depression accounted for 21% of the variance in health anxiety, $F(2, 87) = 12.76, p < .001$, and general anxiety accounted for statistically significant unique variance ($\beta = .41, p < .05$). In three of the four analyses, the inclusion of the core health cognition in step 2 produced a statistically significant
### Table 13

**Hierarchical Multiple Regressions Including Health Cognitions in the Pregnant Sample**
(Dependent Variable: Health Anxiety)

<table>
<thead>
<tr>
<th>A. Model step</th>
<th>Variables</th>
<th>Coefficient statistics</th>
<th>Model statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$r$</td>
<td>B (SE)</td>
</tr>
<tr>
<td>1 1 Anxiety</td>
<td>.47***</td>
<td>.57 (.15)</td>
<td>.44**</td>
</tr>
<tr>
<td>Depression</td>
<td>.27*</td>
<td>.14 (.25)</td>
<td>.07</td>
</tr>
<tr>
<td>2 1 Anxiety</td>
<td>.47***</td>
<td>.42 (.15)</td>
<td>.33**</td>
</tr>
<tr>
<td>Depression</td>
<td>.27*</td>
<td>.14 (.25)</td>
<td>.07</td>
</tr>
<tr>
<td>LOI</td>
<td>.47***</td>
<td>.45 (.16)</td>
<td>.35**</td>
</tr>
<tr>
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<td>.47***</td>
<td>.53 (.14)</td>
<td>.41**</td>
</tr>
<tr>
<td>Depression</td>
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<td>.07</td>
</tr>
<tr>
<td>AOI</td>
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<td>.48 (.18)</td>
<td>.25**</td>
</tr>
<tr>
<td>3 1 Anxiety</td>
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<td>.57 (.16)</td>
<td>.44**</td>
</tr>
<tr>
<td>Depression</td>
<td>.27*</td>
<td>.14 (.25)</td>
<td>.07</td>
</tr>
<tr>
<td>2 1 Anxiety</td>
<td>.47***</td>
<td>.50 (.15)</td>
<td>.39**</td>
</tr>
<tr>
<td>Depression</td>
<td>.27*</td>
<td>.06 (.24)</td>
<td>.03</td>
</tr>
<tr>
<td>DC</td>
<td>.37**</td>
<td>.32 (.14)</td>
<td>.26*</td>
</tr>
<tr>
<td>4 1 Anxiety</td>
<td>.47***</td>
<td>.57 (.15)</td>
<td>.44**</td>
</tr>
<tr>
<td>Depression</td>
<td>.27*</td>
<td>.14 (.24)</td>
<td>.07</td>
</tr>
<tr>
<td>2 1 Anxiety</td>
<td>.47***</td>
<td>.55 (.14)</td>
<td>.43**</td>
</tr>
<tr>
<td>Depression</td>
<td>.27*</td>
<td>.07 (.23)</td>
<td>.04</td>
</tr>
<tr>
<td>MSI</td>
<td>.36**</td>
<td>.48 (.15)</td>
<td>.33**</td>
</tr>
</tbody>
</table>

*Note. N = 73; A. = Analysis; Adj. = Adjusted; LOI = Likelihood of Illness; AOI = Awfulness of Illness; DC = Difficulty Coping; MSI = Medical Service Inadequacy.

*p < .05. **p < .01. ***p < .001, two-tailed.*

70
### Table 14

**Hierarchical Multiple Regressions Including Health Cognitions in the Non-Pregnant Sample (Dependent Variable: Health Anxiety)**

<table>
<thead>
<tr>
<th>A. Model step</th>
<th>Variables</th>
<th>Coefficient statistics</th>
<th>Model statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$r$</td>
<td>B (SE)</td>
</tr>
<tr>
<td>1 1 Anxiety</td>
<td>.46***</td>
<td>.60 (.23)</td>
<td>.41*</td>
</tr>
<tr>
<td>Depression</td>
<td>.35**</td>
<td>.20 (.23)</td>
<td>.11</td>
</tr>
<tr>
<td>2 1 Anxiety</td>
<td>.46***</td>
<td>.60 (.24)</td>
<td>.41*</td>
</tr>
<tr>
<td>Depression</td>
<td>.35**</td>
<td>.20 (.23)</td>
<td>.11</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.46***</td>
<td>.52 (.23)</td>
<td>.35*</td>
</tr>
<tr>
<td>Depression</td>
<td>.35**</td>
<td>.21 (.22)</td>
<td>.12</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.46***</td>
<td>.60 (.24)</td>
<td>.41*</td>
</tr>
<tr>
<td>Depression</td>
<td>.35**</td>
<td>.20 (.23)</td>
<td>.11</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.46***</td>
<td>.45 (.22)</td>
<td>.31*</td>
</tr>
<tr>
<td>Depression</td>
<td>.35**</td>
<td>.11 (.22)</td>
<td>.06</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.46***</td>
<td>.60 (.24)</td>
<td>.41*</td>
</tr>
<tr>
<td>Depression</td>
<td>.35**</td>
<td>.20 (.23)</td>
<td>.11</td>
</tr>
<tr>
<td>Anxiety</td>
<td>.46***</td>
<td>.47 (.22)</td>
<td>.32*</td>
</tr>
<tr>
<td>Depression</td>
<td>.35**</td>
<td>.19 (.21)</td>
<td>.11</td>
</tr>
</tbody>
</table>

**Note.** $N = 90$; A. = Analysis; Adj. = Adjusted; LOI = Likelihood of Illness; AOI = Awfulness of Illness; DC = Difficulty Coping; MSI = Medical Service Inadequacy.

*p < .05. **p < .01. ***p < .001, two-tailed.
$F$ change from step 1 to step 2 (see Table 14), with the exception of Analysis 2, which included the *awfulness of illness* subscale. In Analysis 2 (see Table 14), although the change in $F$ was not statistically significant from step 1 to step 2 ($\Delta F = 3.66$, $p = .059$), the *awfulness of illness* subscale demonstrated a statistically significant unique contribution in the final model, suggesting that *awfulness of illness* was approaching statistical significance as a unique contributor. In the final model for each analysis, the remainder of the core health cognition (i.e., *likelihood of illness*, *difficulty coping*, *medical service inadequacy*) each accounted for statistically significant unique variance in health anxiety when controlling for general anxiety and depression. In the final model for each analysis, general anxiety also accounted for statistically significant unique variance in health anxiety (all $p$ values were < .05).

Hypothesis 6 stated that the core health cognitions as a group would account for statistically significant variance in health anxiety in both samples. To test this hypothesis, a multiple linear regression (two-tailed) was conducted in both the pregnant and non-pregnant samples with the SHAI total score as the dependent variable and the four HCQ subscales as the independent variables (see Table 15). This analysis allowed for an examination of the extent to which the core health cognitions together account for variance in health anxiety and whether or not the specific cognitions that account for significant unique variance in health anxiety differed between samples. Consistent with our previous regression analyses utilizing HCQ subscales, participants with self-reported medical conditions were excluded from the analyses in order to compare the results to previous research (i.e., Hadjistavropoulos et al., 2012). The results from the regression
Table 15

*Multiple Regressions for the Health Cognitions Questionnaire (Dependent Variable: Health Anxiety)*

<table>
<thead>
<tr>
<th>Sample</th>
<th>Variables</th>
<th>r</th>
<th>B (SE)</th>
<th>β</th>
<th>F(df), R^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnant^a</td>
<td>Likelihood of illness</td>
<td>.47***</td>
<td>.40 (.17)</td>
<td>.31*</td>
<td>F(4, 68) = 7.24, R^2 = .26***</td>
</tr>
<tr>
<td></td>
<td>Awfulness of illness</td>
<td>.31**</td>
<td>.31 (.18)</td>
<td>.16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difficulty coping</td>
<td>.37**</td>
<td>.18 (.13)</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medical service inadequacy</td>
<td>.36**</td>
<td>.21 (.18)</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>Non-pregnant^b</td>
<td>Likelihood of illness</td>
<td>.50***</td>
<td>.64 (.14)</td>
<td>.39**</td>
<td>F(4, 85) = 14.58, R^2 = .38***</td>
</tr>
<tr>
<td></td>
<td>Awfulness of illness</td>
<td>.29**</td>
<td>.49 (.20)</td>
<td>.22*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difficulty coping</td>
<td>.45***</td>
<td>.10 (.14)</td>
<td>.09</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medical service inadequacy</td>
<td>.42***</td>
<td>.44 (.17)</td>
<td>.26*</td>
<td></td>
</tr>
</tbody>
</table>

^a_n = 73. ^b_n = 90.

*p < .05. **p < .01. ***p < .001, two-tailed.
analyses offered partial support for our hypotheses. In the pregnant sample, 25.7% of the variance in health anxiety was explained by the HCQ subscales and likelihood of illness accounted for statistically significant unique variance. In the non-pregnant sample, the HCQ subscales explained 37.9% of the variance in health anxiety and three of the four subscales (i.e., likelihood of illness, awfulness of illness, medical service inadequacy) accounted for statistically significant unique variance in health anxiety.

3.3.4 Objective 4: Examination of the associations between fetal health anxiety and constructs of interest. The fourth objective of the current investigation was to examine the associations between fetal health anxiety, the associated constructs (i.e., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty), and the core health cognitions in the pregnant sample. Hypotheses regarding the associations between fetal health anxiety and the associated constructs and the utility of the associated constructs in a predictive model of health anxiety were not made as there is no previous research available exploring these relationships. To examine the association between fetal health anxiety and scores for the associated constructs, bivariate correlations (two-tailed) were computed between scores for the FHAI, PRAQ-R, HADS-ANX, HADS-DEP, CESD-14, ASI-3, and IUS-12 in the pregnant sample (see Table 7). The results demonstrated statistically significant, positive associations between the FHAI and the PRAQ-R, $r(98) = .56, p < .001$, HADS-ANX, $r(98) = .57, p < .001$, and the CESD-14, $r(98) = .45, p < .001$. No statistically significant association was observed between the FHAI and the HADS-DEP, $r(98) = .16, p = .124$. FHAI scores demonstrated statistically significant, positive associations with the ASI-3, $r(98) = .29, p = .003$, and all three
ASI-3 subscales. Statistically significant associations were also observed between FHAI scores and the IUS-12 total score, $r(98) = .29, p = .003$ and Prospective IU subscale, $r(98) = .35, p < .001$; although, not the Inhibitory IU subscale, $r(98) = .16, p = .124$.

A hierarchical linear regression was conducted to evaluate whether the associated constructs (i.e., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty) accounted for significant variance in fetal health anxiety (the dependent variable) in the pregnant sample. Similar to the two previously conducted hierarchical regression analyses examining the contributions of the associated constructs, the IUS-12 total score was entered in step 1 of the model, followed by the ASI-3 total score in step 2, and lastly the HADS-ANX and HADS-DEP subscales, which were entered in step 3. The order that the independent variables were assigned in the model was based on theory and research indicating that intolerance of uncertainty may be a necessary component of anxiety sensitivity (Carleton, 2012; Carleton, Sharpe, et al., 2007) and that intolerance of uncertainty and anxiety sensitivity may be underlying components of anxiety and depression (Naragon-Gainey, 2010; Yook, Kim, Suh, & Lee, 2010), which have been associated with fetal health anxiety (Statham et al., 1997).

Comprehensive results for the hierarchical linear regression are presented in Table 16. When placed in step 1, intolerance of uncertainty explained 8% of the variance in fetal health anxiety, $F(1, 98) = 9.01, p = .003$, and accounted for statistically significant unique variance ($p = .009$). Following the entry of anxiety sensitivity in step 2, the total variance explained was 9%, $F(2, 97) = 5.61, p = .005$; the change in $F$ was not significant from step 1 to step 2 ($p = .15$) and neither anxiety sensitivity nor
Table 16

Hierarchical Multiple Regression Including Associated Constructs in the Pregnant Sample (Dependent Variable: Fetal Health Anxiety)

<table>
<thead>
<tr>
<th>Model step</th>
<th>Coefficient statistics</th>
<th>Model statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$B$ ($SE$)</td>
<td>$\beta$</td>
</tr>
<tr>
<td>1. IUS-12</td>
<td>.17 (.06)</td>
<td>.29**</td>
</tr>
<tr>
<td>2. IUS-12</td>
<td>.10 (.08)</td>
<td>.17</td>
</tr>
<tr>
<td>ASI-3</td>
<td>.10 (.09)</td>
<td>.18</td>
</tr>
<tr>
<td>3. IUS-12</td>
<td>.07 (.07)</td>
<td>.12</td>
</tr>
<tr>
<td>ASI-3</td>
<td>-.02 (.08)</td>
<td>-.03</td>
</tr>
<tr>
<td>HADS-ANX</td>
<td>.96 (.17)</td>
<td>.61**</td>
</tr>
<tr>
<td>HADS-DEP</td>
<td>-.31 (.24)</td>
<td>-.14</td>
</tr>
</tbody>
</table>

Note. $N = 100$; IUS-12 = Intolerance of Uncertainty Scale Short Form; ASI = Anxiety Sensitivity Index; HADS = Hospital Anxiety and Depression Scale; ANX = Anxiety Subscale; DEP = Depression Subscale.
**$p < .01$. ***$p < .001$, two-tailed.
intolerance of uncertainty accounted for statistically significant unique variance in fetal health anxiety. Lastly, general anxiety and depression were added in step 3 and the total variance explained by the model as a whole was 33%, $F(4, 95) = 12.91, p < .001$. In the final model, only general anxiety accounted for statistically significant unique variance in fetal health anxiety ($\beta = .61, p = .001$).

No hypotheses were made regarding the associations between fetal health anxiety and the core health cognition and the utility of the core health cognitions in predictive models of fetal health anxiety as there is no previous research in this area. To examine the associations between fetal health anxiety and the core health cognitions, bivariate correlations (two-tailed) were computed between scores for the FHAI and HCQ subscales in the pregnant sample (see Table 11). The FHAI demonstrated statistically significant, positive relationships with the likelihood of illness subscale, $r(94) = .29, p = .005$, difficulty coping, $r(94) = .24, p = .018$, and medical service inadequacy, $r(94) = .22, p = .031$. The FHAI did not demonstrate a statistically significant relationship with the HCQ awfulness of illness subscale, $r(94) = .16, p = .116$.

To examine whether the core health cognitions (i.e., likelihood of illness, difficulty coping, awfulness of illness, medical service inadequacy) would account for statistically significant unique variance in fetal health anxiety after controlling for general anxiety and depression, four separate hierarchical linear regressions (two-tailed) were conducted in the pregnant sample. Consistent with our previous regression analyses utilizing HCQ subscales, participants with self-reported medical conditions were excluded from the analyses in order to compare our sample ($n = 73$) with previous
research findings (i.e., Hadjistavropoulos et al., 2012). Based on theory and previous
research (Hadjistavropoulos et al., 2012), the HADS-ANX and HADS-DEP subscales
were entered in step 1 of the model, followed by the HCQ subscale in step 2. The order
that the independent variables were assigned in the model was based on the notion that
general anxiety and depression may be associated with fetal health anxiety (Statham et
al., 1997) and are also common experiences during pregnancy (Lee et al., 2007); the
addition of the core health cognition in the subsequent step allowed for an examination
of whether the core health cognition contributed significant variance to fetal health
anxiety when controlling for general anxiety and depression.

Comprehensive results for the hierarchical linear regression analyses are
presented in Table 17. In all four of the hierarchical regression analyses, the first step
(general anxiety and depression) accounted for 47% of the variance in fetal health
anxiety, $F(2, 70) = 32.50, p < .001$, and general anxiety accounted for statistically
significant unique variance ($\beta = .65, p = .001$). In all four analyses, the inclusion of the
core health cognition in step 2 did not produce a statistically significant $F$ change from
step 1 to step 2 (all $p$ values were > .05). The difficulty coping subscale was the only
HCQ subscale that approached accounting for unique variance in fetal health anxiety
when controlling for general anxiety and depression. In Analysis 3 (see Table 17),
although the change in $F$ was not statistically significant from step 1 to step 2 ($\Delta F =
3.77, p = .056$), the difficulty coping subscale demonstrated a statistically significant
unique contribution in the final model. The current results suggest that difficulty coping
was approaching statistical significance in accounting for unique variance in fetal health
Table 17

Hierarchical Multiple Regressions Including Health Cognitions in the Pregnant Sample
(Dependent Variable: Fetal Health Anxiety)

<table>
<thead>
<tr>
<th>A.</th>
<th>Model step</th>
<th>Variables</th>
<th>Coefficient statistics</th>
<th>Part r</th>
<th>Model statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>r</td>
<td>B (SE)</td>
<td>β</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>Anxiety</td>
<td>.69***</td>
<td>1.15 (.18)</td>
<td>.65**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depression</td>
<td>.37**</td>
<td>.22 (.26)</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depression</td>
<td>.37**</td>
<td>.22 (.26)</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LOI</td>
<td>.33**</td>
<td>.19 (.15)</td>
<td>.11</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Anxiety</td>
<td>.69***</td>
<td>1.09 (.19)</td>
<td>.62**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depression</td>
<td>.37**</td>
<td>.22 (.26)</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anxiety</td>
<td>.69***</td>
<td>1.12 (.18)</td>
<td>.64**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depression</td>
<td>.37**</td>
<td>.21 (.26)</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AOI</td>
<td>.22</td>
<td>.34 (.21)</td>
<td>.13</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Anxiety</td>
<td>.69***</td>
<td>1.15 (.17)</td>
<td>.65**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depression</td>
<td>.37**</td>
<td>.22 (.25)</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anxiety</td>
<td>.69***</td>
<td>1.09 (.18)</td>
<td>.62**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depression</td>
<td>.37**</td>
<td>.15 (.25)</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DC</td>
<td>.36**</td>
<td>.30 (.14)</td>
<td>.17</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Anxiety</td>
<td>.69***</td>
<td>1.14 (.18)</td>
<td>.65**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depression</td>
<td>.37**</td>
<td>.22 (.26)</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anxiety</td>
<td>.69***</td>
<td>1.14 (.18)</td>
<td>.65**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depression</td>
<td>.37**</td>
<td>.19 (.26)</td>
<td>.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MSI</td>
<td>.17</td>
<td>.22 (.15)</td>
<td>.11</td>
</tr>
</tbody>
</table>

Note. N = 73; A. = Analysis; Adj. = Adjusted; LOI = Likelihood of Illness; AOI = Awfulness of Illness; DC = Difficulty Coping; MSI = Medical Service Inadequacy.

*p < .05. **p < .01. ***p < .001, two-tailed.
anxiety. In all hierarchical regression analyses, general anxiety accounted for statistically significant unique variance in fetal health anxiety (all \( p \) values were = .001).

A multiple linear regression (two-tailed) was conducted in the pregnant sample to examine if the core health cognitions as a group would account for statistically significant variance in fetal health anxiety (see Table 18). In this sample (\( n = 73 \)), 12.9% of the variance in fetal health anxiety was explained by the HCQ subscales. Within the regression model, none of the HCQ subscales (i.e., likelihood of illness, awfulness of illness, difficulty coping, medical service inadequacy) accounted for statistically significant unique variance in health anxiety.

3.3.5 Objective 5: Analysis of experiences of fetal health anxiety during pregnancy. Little is known about the experience of fetal health anxiety during pregnancy. In the current pregnant sample (\( n = 96 \)), the women were asked “Do you believe that you have high anxiety about your baby’s health during your current pregnancy?” – 12 women (12.5%) answered “yes” and 24 women (25.0%) responded “somewhat”, for a total of 37.5% of the pregnant sample endorsing elevated fetal health anxiety. In an effort to gain further information about fetal health anxiety, participants in the pregnant sample responded to a series of open-ended questions (Appendix I) designed to query various components of this experience. As previously discussed, inductive content analysis (Hsieh & Shannon, 2005) was implemented for the coding and analysis of these responses. The frequency of the themes within each question is reported as the number of responses and percentages of the total responses for each question.
### Table 18

*Multiple Regression for the Health Cognitions Questionnaire (Dependent Variable: Fetal Health Anxiety)*

<table>
<thead>
<tr>
<th>Sample</th>
<th>Variables</th>
<th>$r$</th>
<th>$B$ (SE)</th>
<th>$\beta$</th>
<th>$F(df), R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnant</td>
<td>Likelihood of illness</td>
<td>.33**</td>
<td>.39 (.27)</td>
<td>.22</td>
<td>$F(4, 68) = 3.68, R^2 = .13**$</td>
</tr>
<tr>
<td></td>
<td>Awfulness of illness</td>
<td>.22</td>
<td>.26 (.30)</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difficulty coping</td>
<td>.36**</td>
<td>.44 (.24)</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medical service inadequacy</td>
<td>.17</td>
<td>-.08 (.24)</td>
<td>-.04</td>
<td></td>
</tr>
</tbody>
</table>

$N = 73.$

**$p < .01.$ ***$p < .001,$ two-tailed.
3.3.5.1 Content of fetal health worries. There were many participants (n = 84) who responded to the question: “What are you most anxious about regarding your baby’s health?” Some of the same women (n = 25) also responded to the question: “List any additional worries/fears related to your baby’s health.” Both of these questions generated the same themes and, overall, there were no differences between primary and additional worries; therefore, the responses were combined. Some participants provided multiple answers to these questions, resulting in a total of 138 responses regarding the content of fetal health worries.

There were eight themes that emerged regarding the content of fetal health worries. Listed in order of frequency (beginning with the most frequent) these themes include: (1) physical health condition or defect, (2) general health and development, (3) mental health/cognitive challenges, (4) complications during delivery, (5) loss of baby, (6) prematurity and birth weight, (7) causing inadvertent harm, and (8) difficulty feeding. Below, each theme will be discussed. See Table 19 for a frequency summary regarding the themes for the content of fetal health worries.

The most frequent theme that emerged was physical health condition or defect, with 31 (22.5%) of the responses falling into this category. Responses from this theme used words that described concerns regarding serious and/or specific physical health issues or physical defects. The responses that fell within this theme focused on health issues that could affect infants or future health problems that a child could develop. Many of the participants from this sample mentioned worries about specific health conditions including cerebral palsy, cleft palate, respiratory issues, and birthmarks.
Table 19

Content of Fetal Health Worries

<table>
<thead>
<tr>
<th>Themes</th>
<th>n (%)</th>
<th>Response Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical health condition or defect</td>
<td>31 (22.5)</td>
<td>&quot;That he may develop a heart condition like I have.&quot;</td>
</tr>
<tr>
<td>General health and development</td>
<td>30 (21.7)</td>
<td>&quot;That baby is developing as it should be.&quot;</td>
</tr>
<tr>
<td>Mental health/cognitive challenges</td>
<td>18 (13.0)</td>
<td>&quot;Mentally challenged/delayed and won't be able to live a normal life.&quot;</td>
</tr>
<tr>
<td>Complications during delivery</td>
<td>16 (11.6)</td>
<td>&quot;...I worry about the cord being wrapped around the child's neck at birth.&quot;</td>
</tr>
<tr>
<td>Loss of baby</td>
<td>15 (10.9)</td>
<td>&quot;That I may lose the baby during pregnancy.&quot;</td>
</tr>
<tr>
<td>Prematurity and birth weight</td>
<td>15 (10.9)</td>
<td>&quot;Risks associated with preterm labour.&quot;</td>
</tr>
<tr>
<td>Causing inadvertent harm</td>
<td>8 (5.8)</td>
<td>&quot;(My baby having) long term issues with food due to my diet during pregnancy.&quot;</td>
</tr>
<tr>
<td>Difficulty feeding</td>
<td>5 (3.6)</td>
<td>&quot;Being able to breastfeed as soon as possible.&quot;</td>
</tr>
</tbody>
</table>

Total responses = 138
Concerns regarding hereditary conditions were also common (e.g., “That he may develop a heart conditions like I have”, “If he is going to be prone to extra weight and physical health conditions like his dad”, “That he may inherit male pattern baldness”). There were 10 responses that explicitly mentioned concerns regarding a birth defect or physical deformity; for example, one woman stated, “I have a strange anxiety over physical deformities and birth marks”.

The second theme was general health and development, with 30 (21.7%) of the responses falling into this category. These responses did not describe concerns regarding specific health conditions, but rather described broad worries about the general health and development of the baby. For example, one respondent stated, “I don’t have anything specific that I worry about – no particular illness or issue – I just worry generally that something might be wrong”. Other examples from the second theme include, “That baby is developing as it should be”, “Simply having a healthy baby”, and, “Making sure that all of their parts are working properly!”

The third most frequent theme, mental health/cognitive challenges, was mentioned in 18 (13.0%) of the responses. These responses mentioned general concerns (e.g., “Having a child with special needs because I work with all special needs children and see how difficult it can be on families and marriages”, “(that my child will be) mentally challenged/delayed and won’t be able to live a normal life”, and “Having good mental health”). In addition, some participants within this sample described worries about their baby having a specific condition such as autism and Down syndrome.
The fourth most frequent theme that emerged was *complications during delivery*, which was expressed in 16 (11.6%) of the responses. Some of the women described general concerns about delivery and birth (e.g., “Birth defects due to a complicated labour”, “That he will be under stress during delivery”). Other participants in this sample focused on specific complications including breech positioning, umbilical cord wrapped around the neck, and the need for an emergency cesarean section. An example of a response from this theme includes: “(I am most anxious) that my delivery won’t be easy and could affect my baby’s health, for example, I worry about the cord being wrapped around the child’s neck at birth.”

The next most frequent theme that emerged was *loss of baby*. There were 15 (10.9%) of the responses fell into this category. The majority of these women explicitly stated miscarriage and/or stillbirth, while some of the women described worries related to loss or dying (e.g., “My biggest fear is my baby not coming home with us”, “That I may lose the baby during pregnancy”, “That he will die prematurely”).

The theme *prematurity and birth weight* also had 15 (10.9%) of the responses fall under this theme. The women from this sample mentioned worries specific to the baby’s growth and weight (e.g., “Having a good birth weight”, “Getting enough nutrients and growing”) and concerns of preterm birth (e.g., “Risks associated with preterm labour”, “Needing a potential NICU stay if born early”). Most participants from this sample focused on worries related to prematurity and low birth weight; however, one woman described worries related to her baby being either underweight or overweight: “I am
worried that he will be either too big due to diabetes or that he’s not growing big enough due to me not gaining much weight.”

The next most frequent theme was *causing inadvertent harm*, which comprised eight (5.8%) of the responses. These responses were distinct from the responses within other categories in that the expectant mother described negative outcomes that she perceived might be her fault in some way. These responses included general worries about negatively impacting the health of her developing baby or a focus on specific perceived risk factors (e.g., exposure to environmental toxins, the effect of eating too much sugar during pregnancy). Examples of responses within this category include: “That the baby will not suffer any long term medical conditions as a result of something done during pregnancy” and “(My baby having) long term issues with food due to my diet during pregnancy”.

The final theme, *difficulty feeding*, comprised of five (3.6%) of the responses. These women described worries related to possible difficulties breastfeeding their newborn baby. Examples of responses within this category include: “Had trouble with first child and breastfeeding so hoping it’s not as difficult this time”, “Being able to breastfeed as soon as possible”, and “I’ve started worrying more about future problems (including) difficulty latching and breastfeeding”.

3.3.5.2 *Experiences that increase worries.* There were many participants (*n =* 63) who responded to the question: “List any experiences, events, or circumstances that increase(d) your worries about your baby’s health during your pregnancy.” Some of the women provided multiple answers, resulting in 85 responses. These responses were
categorized into eight themes. Listed in order of frequency, these themes include: (1) maternal condition or accident, (2) news of/knowing children with negative outcomes, (3) concerning procedure or test results, (4) exposure to potential environmental risks, (5) family history, (6) pregnancy-related symptoms, (7) difficulty becoming pregnant/pregnancy loss, and (8) previous perinatal experience. See Table 20 for a frequency summary regarding these themes.

The most frequently coded theme was *maternal condition or accident*, which comprised of 20 (23.5%) of the responses. This category included responses that described maternal illness and health conditions (e.g., having the flu, gestational diabetes, thyroid issues), accidents during pregnancy (e.g., car accident, slipping on ice), lifestyle issues (e.g., poor sleep, poor diet, intense exercise, stress), and other maternal factors (i.e., age). All of the responses from this sample described personal health-related factors or experiences that increased worries about the health of the developing baby. Examples of responses within this category include: “I had a bad stomach flu and was barely eating anything for a few days and worried if the baby was getting enough food” and “My age and hearing that the older you get the higher chance of Downs”.

The second most frequent theme that emerged was *news of/knowing children with negative outcomes*. This category included 17 (20.0%) of the responses. Many participants from this sample stated that information about negative perinatal outcomes increased their worries about their unborn baby’s health. These women mentioned hearing stories from others (e.g., “Hearing about babies who have health issues”, “Stories of friends of friends”) and receiving information online (“Stories on the
### Table 20

*Experiences that Increase Fetal Health Worries*

<table>
<thead>
<tr>
<th>Themes</th>
<th>n (%)</th>
<th>Response Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal condition or accident</td>
<td>20 (23.5)</td>
<td>&quot;I had a bad stomach flu and was barely eating anything for a few days…&quot;</td>
</tr>
<tr>
<td>News of/knowing children with negative outcomes</td>
<td>17 (20.0)</td>
<td>&quot;My mother lost a baby 8 months into pregnancy.&quot;</td>
</tr>
<tr>
<td>Concerning procedure or test results</td>
<td>12 (14.1)</td>
<td>&quot;My 20 week ultrasound was almost traumatizing…&quot;</td>
</tr>
<tr>
<td>Exposure to potential environmental risks</td>
<td>10 (11.8)</td>
<td>&quot;Travelled to the Caribbean prior to the Zika outbreak.&quot;</td>
</tr>
<tr>
<td>Family history</td>
<td>8 (9.4)</td>
<td>&quot;The father’s side has high rates of illness.&quot;</td>
</tr>
<tr>
<td>Pregnancy-related symptoms</td>
<td>7 (8.2)</td>
<td>&quot;Lack of nutrition during the first 14 weeks of pregnancy due to extreme morning sickness…&quot;</td>
</tr>
<tr>
<td>Difficulty becoming pregnant/pregnancy loss</td>
<td>6 (7.1)</td>
<td>My first pregnancy resulted in a stillbirth at 24 weeks, which increases my worries this pregnancy.&quot;</td>
</tr>
<tr>
<td>Previous perinatal experience</td>
<td>5 (5.9)</td>
<td>&quot;Previous complications with an emergency C-section and breastfeeding two biggest.&quot;</td>
</tr>
</tbody>
</table>

Total responses = 85
Internet”, “I Googled stuff which made it worse”). Many women also shared that knowing others who have experienced challenges/loss increased their worries (“A friend had a baby with (a genetic disorder) – makes me think it can happen to anyone”, “Friends who have lost babies”, “My mother lost a baby 8 months into pregnancy”). Other examples of responses coded under this theme include: “Hearing and reading things online about negative pregnancy stories (including) miscarriage, stillbirth, rare occurrences, and bad delivery stories” and “I have five friends who have had stillborn babies. This makes me very concerned that the same will happen to me”.

The third theme that emerged was concerning procedure or test results, which comprised 12 (14.1%) of the responses. Of these responses, nine mentioned concerning ultrasound procedures (e.g., long ultrasounds) or results (e.g., baby’s head circumference measuring small, low heart rate). One participant responded: “My 20 week ultrasound was almost traumatizing and made me feel certain that my baby had a heart defect. The ultrasound was conducted by a student and took twice as long as I was told it should. The student spent an inordinate amount of time on the heart and of course would not answer any questions I had about why…I sobbed all night and barely slept.” Other procedure and testing concerns included positive results on the maternal screening for Down syndrome and detection of early dilation of the cervix.

The fourth theme that emerged was exposure to potential environmental risks, which comprised 10 (11.8%) of the responses. The responses that fell under this theme mentioned exposure to potential environmental risk factors such as medication usage, chemical exposure, and toxins in foods. Examples from this category include: “That I
have received radioactive iodine one year prior to getting pregnant and have used alternative therapy for migraine treatment”, “Travelled to Caribbean prior to the Zika outbreak”, and “We have been building a house…I try to be as cautious as I can, wear masks, wear gloves, but I still worry I am inhaling stains and glues or absorbing chemicals through skin contact”.

The fifth theme, family history, included 8 (9.4%) of the responses. The responses within this category mentioned a family history of hereditary/developmental conditions or medical complications. For example, participants from this sample replied: “(I have a) nephew and cousin with autism”, “Due to my own congenital deformity I worry that he may also have one”, “The father’s side has high rates of illness”.

The sixth theme was pregnancy-related symptoms, which occurred in seven (8.2%) of the responses. Responses that fell under this theme mentioned physiological symptoms that can occur during pregnancy including fainting, vomiting, and spotting/bleeding. Examples of responses from this category include: “I was very sick during my first trimester – puking – and read that it can detach the placenta, which obviously never happened since the baby is still alive”, “lack of nutrition during the first 14 weeks due to extreme morning sickness and throwing up”, “Had some bleeding back in week 24 – Dr. said it was late in the pregnancy to be bleeding so I was worried something may be wrong with the baby”. While the presence of signs or symptoms were typically mentioned as the catalyst for concerns, one woman stated that having “no morning sickness or negative physical symptoms with this pregnancy” increased her worries about her developing baby’s health.
The next most frequent theme that emerged was *difficulty becoming pregnant/pregnancy loss*. This category comprised six (7.1%) of the responses. Responses under this theme mentioned difficulties conceiving, history of miscarriage, or previous stillbirth. Examples of these responses include: “The first 4 months were hard because I had had 3 miscarriages” and “My first pregnancy resulted in a stillbirth at 24 weeks, which increases my worries this pregnancy”.

The final theme that emerged was *previous perinatal experience*, which contained 5 (5.9%) of the responses. The participants in this sample mentioned challenges or complications with a previous pregnancy or childbirth experience (e.g., emergency cesarean section, premature delivery, baby with low birth weight), not including miscarriage or stillbirth. For example, one woman responded that “previous complications with an emergency C-section and breastfeeding two biggest (children)” increased her worries about her unborn baby’s health.

**3.3.5.3 Experiences/strategies that decrease worries.** Many participants (*n* = 73) responded to the question: “Is there anything that eases/eased your worries about your baby’s health?” Some of the same women also responded to the question: “Do you have any strategies to help you cope with worries about your baby’s health? If so, please list.” Both of these questions generated the same themes; therefore, the responses were combined. Some participants provided multiple answers to these questions, resulting in a total of 175 responses regarding experiences that ease concerns and help expectant mothers cope with fetal health worries.
There were seven themes emerged regarding easing/coping with worries about fetal health. Listed in order of frequency, these themes include: (1) health care appointments and assessment, (2) coping behaviours, (3) cognitive strategies, (4) social support, (5) connecting with/feeling the baby, (6) information seeking, and (7) previous positive experiences. See Table 21 for a frequency summary regarding these themes.

The most frequent theme that emerged was *health care appointments and assessment*, with 51 (29.1%) of the responses falling into this category. The participants within this sample indicated that regular check-ups, discussion with their physician/midwife, and prenatal testing eased worries about their developing baby’s health. Fourteen responses explicitly mentioned that ultrasound procedures alleviated worries. Hearing the baby’s heartbeat was another common response. Examples of responses within this category include: “Ultrasounds help because I can see him moving. I see that he has all his limbs and digits and the doctors say he looks healthy” and “Doctor confirmation and hearing the heartbeat myself!”

The second most frequently coded theme was *coping behaviours*, which comprised 31 (17.7%) of the responses. Within this category, participants described the use of coping behaviours to help ease fetal health worries such as distraction (e.g., “Doing something else to get my mind off it”, “Distract myself with healthy activities i.e., exercise and activities with my toddler”), focusing on self-care (e.g., “Doing everything possible to stay healthy”, “Not going overboard with work, house chores, etc.”), and relaxation and breathing exercises. Praying was commonly mentioned as a
<table>
<thead>
<tr>
<th>Themes</th>
<th>n (%)</th>
<th>Response Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health care appointments</td>
<td>51 (29.1)</td>
<td>&quot;Doctor confirmation and hearing the heartbeat myself!&quot;</td>
</tr>
<tr>
<td>and assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping behaviours</td>
<td>31 (17.7)</td>
<td>&quot;Distract myself with healthy activities i.e., exercise and activities with my toddler.&quot;</td>
</tr>
<tr>
<td>Cognitive strategies</td>
<td>30 (17.1)</td>
<td>&quot;I just try not to think about the negative too much.&quot;</td>
</tr>
<tr>
<td>Social support</td>
<td>30 (17.1)</td>
<td>&quot;Talking with other mothers really helps.&quot;</td>
</tr>
<tr>
<td>Feeling/connecting with the baby</td>
<td>14 (8.0)</td>
<td>&quot;Feeling all the movement.&quot;</td>
</tr>
<tr>
<td>Information seeking</td>
<td>13 (7.4)</td>
<td>&quot;Do some research online.&quot;</td>
</tr>
<tr>
<td>Previous positive experience</td>
<td>6 (3.4)</td>
<td>&quot;My own experience delivering healthy children.&quot;</td>
</tr>
</tbody>
</table>

Total responses = 175
coping behaviour, as well as other strategies such as reading inspirational quotes and attending counseling.

The next theme was cognitive strategies, which comprised of 30 (17.1%) of the responses. Responses coded under this theme focused on decreasing negative thoughts and maintaining a helpful mindset. Participants from this sample described various cognitive strategies such as rationalization, thought suppression, positive thinking, and mindfulness. Examples of responses coded under this theme include: “Just knowing that more than likely I will have a healthy baby”, “I just try not to think about the negative too much”, “Realizing I don’t know anyone who has had (a stillbirth)”, and “Time, like just calming down again and being rational”.

Along with cognitive strategies, the theme social support was also comprised of 30 (17.1%) of the responses. Responses coded under this theme emphasized the important role family and friends play and the benefit of talking with others. Examples of responses coded under this theme include: “Talking to my husband about my fears”, “Talking to people who went through what we went through”, and “Talking with other mothers really helps”.

The next most frequent theme that emerged was feeling/connecting with the baby. This category comprised 14 (8.0%) of the responses. The majority of the responses under this theme mentioned that feeling fetal movement helped ease worries (e.g., “Feeling all the movement”, “This baby kicks like crazy so I am generally aware that he/she is alright”). Other responses mentioned that connecting to their baby in other ways helped alleviate concerns, for example, “Talking to the baby”.
The next theme was *information seeking*, which comprised of 13 (7.4%) of the responses. Responses that fell under this theme mentioned that reading, researching, and attaining knowledge was helpful in decreasing worries. Examples of responses coded under this theme include: “Learn all that I can! Knowledge reduces fear”, “Do some research online”, and “Learning what the actual rates of stillbirth are”.

The final theme that emerged was *previous positive experience*. This category was comprised of six (3.4%) of the responses. This sample of participants mentioned having a history of a positive perinatal experience. Sample responses from this theme include: “My own experience delivering healthy children”, “Remembering that (my) first pregnancy was perfect”, and “Knowing that our first child is/was completely healthy”.

### 3.3.5.4 Recommendations for health care providers.

There were 27 participants who responded to the question: “Is there anything you think your health care providers (e.g., family physician, OBGYN, midwife) could do/have done during your pregnancy that may have helped manage this anxiety?” Some participants provided multiple answers to this question, resulting in a total of 31 responses. These responses were categorized into five themes. Listed in order of frequency, these themes include: (1) access to procedures/testing, (2) additional time and information, (3) a sensitive approach, (4) access to health care professionals, and (5) specific inquiry regarding mental health. See Table 22 for a frequency summary regarding these themes.

The most frequent theme that emerged was *access to procedures/testing*, with nine (29.0%) of the responses falling into this category. Several responses within this theme mentioned access to an ultrasound procedure specifically (e.g., “Offer ultrasounds
Table 22

*Recommendations for Health Care Providers*

<table>
<thead>
<tr>
<th>Themes</th>
<th>n (%)</th>
<th>Response Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to procedures/testing</td>
<td>9 (29.0)</td>
<td>&quot;Regular Doppler checks at scheduled appointments.&quot;</td>
</tr>
<tr>
<td>Additional time and information</td>
<td>7 (22.6)</td>
<td>&quot;Provide more time to discuss and answer questions and address concerns.&quot;</td>
</tr>
<tr>
<td>A sensitive approach</td>
<td>6 (19.4)</td>
<td>&quot;Being empathetic to my worry.&quot;</td>
</tr>
<tr>
<td>Access to health care professionals</td>
<td>5 (16.1)</td>
<td>&quot;Having an OBGYN to talk to would help.&quot;</td>
</tr>
<tr>
<td>Specific inquiry regarding mental health</td>
<td>4 (12.9)</td>
<td>&quot;Ask more questions. They asked the physical questions, but very rarely anything about my emotional health.&quot;</td>
</tr>
</tbody>
</table>

Total responses = 31
earlier” and “Another ultrasound would be nice!”). Other responses mentioned specific procedures (e.g., “Regular Doppler checks at scheduled appointments”, and “Hearing the heartbeat at every visit”) or access to testing, more generally, and receiving test results in a timely manner.

The second most frequently coded theme was additional time and information, which comprised seven (22.6%) of the responses. Within this category, participants mentioned access to additional time and information, generally (e.g., “Longer visits”, “More information”, and “Provide more time to discuss and answer questions and address concerns”). Some of the responses mentioned that specific information would have helped manage their anxiety, for example: “Talked with me about stillbirth, even though it is horrible – I think knowing about all the possibilities is better than not knowing” and “Explained that there is a difference between low lying placenta and placenta previa”.

The third theme that emerged was a sensitive approach, which comprised six (19.4%) of the responses. Responses within this category emphasized the importance of an open, sensitive approach when providing prenatal care. Examples of responses within this category include: “Being empathetic to my worry” and “Given me choice and control”.

The fourth theme that emerged was access to health care professionals. This category was comprised of five (16.1%) of the responses. Examples of responses that fell under this theme include: “Speed up the referrals” and “Having an OBGYN to talk to would help”.

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The final theme that emerged was specific inquiry regarding mental health. This category was comprised of four (12.9%) of the responses. Examples of responses that fell under this theme include: “Discussions about my worries and concerns”, “Mood worksheets”, and “Ask more questions. They asked the physical questions, but very rarely anything about my emotional health”.

3.3.5.5 Impact of fetal health worries. There were 28 participants who responded to the question: “How do your worries about your baby’s health impact your life, pregnancy, and day-to-day functioning?” Some participants provided multiple answers to these questions, resulting in a total of 31 responses. These responses were categorized into four themes. In order of frequency, these themes include: (1) consumes thoughts, (2) impacts functioning, (3) motivates healthy behaviours, and (4) limits activities. See Table 23 for a frequency summary regarding these themes.

The most frequent theme that emerged was consumes thoughts. This category was comprised of 11 (35.5%) of the responses. Examples of responses under this theme include: “I think about the baby’s health at all times. It affects nearly everything that I do”, “I can’t focus after I hear negative stories”, and “Constant worrying about the baby’s health. I am not concerned about my own health at all, just that we will have a healthy happy baby after delivery”.

The second theme was impacts functioning, with seven (22.6%) of the responses falling into this category. The participants from this sample mentioned that worrying about their developing baby’s health affected day-to-day functioning including impacting sleep, work, and personal relationships. One participant noted experiencing
Table 23

*Impact of Fetal Health Worries*

<table>
<thead>
<tr>
<th>Themes</th>
<th>n (%)</th>
<th>Response Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumes thoughts</td>
<td>11 (35.5)</td>
<td>&quot;I think about the baby’s health at all times.&quot;</td>
</tr>
<tr>
<td>Impacts functioning</td>
<td>7 (22.6)</td>
<td>&quot;Interrupted sleep thinking about it.&quot;</td>
</tr>
<tr>
<td>Motivates healthy</td>
<td>7 (22.6)</td>
<td>&quot;Thinking about my baby's health reminds me to eat healthy and be as active as my body will allow.&quot;</td>
</tr>
<tr>
<td>Limits activities</td>
<td>6 (19.4)</td>
<td>&quot;With work and house chores it makes me slow down my pace and think about what I am doing.&quot;</td>
</tr>
</tbody>
</table>

Total responses = 31
panic attacks and anxiety that make her daily functioning difficult. Example responses from this theme include: “Interrupted sleep thinking about it” and “Sometimes I stay home and don’t interact with people”.

The next theme, *motivates healthy behaviours*, was also mentioned in seven (22.6%) of the responses. This category was unique in that the participants described ways that their worries motivated positive health and lifestyle choices. Example responses from this theme include: “Thinking about my baby’s health reminds me to eat healthy and be as active as my body will allow”, “Helps with decisions I make day-to-day, for example, prenatal vitamins, eating enough omega fatty acids, etc.”, and “Make me focus on taking better care of myself”.

The final theme that emerged was *limits activities*, which was expressed in 6 (19.4%) of the responses. This theme differs from the theme *impacts functioning*, in that these responses mentioned limiting activities or a more cautious approach when engaging in activities in a seemingly less significant way (i.e., these responses did not mention an impact on sleep, health, relationships, or daily functioning). Example responses from this theme include: “With work and house chores it makes me slow down my pace and think about what I am doing”, “They limit my participation in the sports that I play. I do not play as competitively as I did prior to being pregnant as I do not want to harm my baby”, and “Spend a lot of time on internet message boards (reading about stillbirth)”.
4.0 Discussion

Limited research has assessed health anxiety in pregnant women. To date, only three published studies have examined health anxiety during pregnancy (i.e., Kowalyk et al., 2009; Prescott et al., 2018; Savron et al., 1989), two of which have yielded mixed results regarding the impact of pregnancy on health anxiety. The current investigation was designed to expand upon the limited research on health anxiety during pregnancy and was comprised of five main objectives: (1) to compare levels of health anxiety and associated constructs between a sample of pregnant and non-pregnant women; (2) to develop and utilize a comprehensive measure of fetal health anxiety in order to examine the association between fetal health anxiety and maternal health anxiety in pregnant women; (3) to examine the associations between health anxiety, associated constructs (i.e., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty), and the core health cognitions (i.e., likelihood of illness, awfulness of illness, difficulty coping with illness, medical service inadequacy) in both samples of women; (4) to examine the relationships between fetal health anxiety, the associated constructs, and the core health cognitions in the pregnant sample; and (5) to acquire further information about the experience of fetal health anxiety through inductive content analysis of open-ended survey questions. The results associated with the aforementioned study objectives are discussed below in sequence.

4.1 Summary of Quantitative Results

4.1.1 Is health anxiety elevated during pregnancy? Limited previous research has examined whether or not health anxiety increases during pregnancy (i.e., Kowalyk et
al., 2009; Savron et al., 1989) and has yielded mixed results. Savron and colleagues (1989) compared hypochondriacal symptoms between pregnant and non-pregnant women and found a significant increase in health anxiety in the women who were pregnant. More recently, Kowalyk and colleagues (2009) worked to examine health anxiety during the third trimester of pregnancy by designing a study with improved methodology (e.g., increased sample size, additional measure of health anxiety). The authors found that levels of health anxiety did not significantly differ between the group of pregnant women and a control group of non-pregnant women. Furthermore, pregnant women scored lower than the control group on a measure of disease phobia and reported lower health anxiety compared to normative samples in the literature.

Consistent with the results from Kowalyk and colleagues (2009), pregnant women in the present investigation did not report elevated levels of health anxiety compared to a non-pregnant control sample of women. In fact, pregnant women reported lower scores on the SHAI supplemental subscale perceived negative consequences of having an illness, the HCQ subscale perceived likelihood of illness, and measures of general anxiety and anxiety sensitivity. Taken together, the current results support the notion that pregnancy may serve a protective function against health anxiety (Kowalyk et al., 2009). The current results contrast previous results (i.e., Savron et al., 1989), possibly due to limitations in the prior study (e.g., small sample size of pregnant women \([n = 26]\), the use of the IAS in a pregnant sample) and/or demographic and cultural factors (e.g., the study by Savron and colleagues was conducted in Italy).
Kowalyk and colleagues (2009) hypothesized that reduced health anxiety in pregnancy may be the result of unusual bodily sensations being attributed to the process of pregnancy as opposed to an illness. Their hypothesis aligns with the cognitive-behavioural model of health anxiety, which proposes that health anxiety is caused by the misinterpretations that harmless bodily sensations are indications of serious illness (Salkovskis & Warwick, 2001). Considering the physiological changes that occur throughout pregnancy, women may have the opportunity to attribute bodily sensations and symptoms to the process of pregnancy as opposed to illness, decreasing health anxiety during pregnancy. In addition, the frequent health care appointments that often accompany pregnancy may act as exposure for women with health anxiety who tend to engage in avoidance behaviours (e.g., avoidance of health clinics, hospitals, medical labs), which is a prominent form of safety behaviours for some individuals with high health anxiety (Rachman, 2012). Exposure to medical settings and procedures may serve to decrease health anxiety in some pregnant women. These possible explanations warrant future investigation, as evidence for these ideas may provide novel support for the cognitive-behavioural model of health anxiety.

In the current study, relevant background variables did not demonstrate a statistically significant relationship with health anxiety; however, the relationship between complications with the current pregnancy and increased health anxiety was approaching significance. This is consistent with the results from the Kowalyk and colleagues (2009) study, which found that complications during the current pregnancy was the only background variable associated with increased health anxiety. In contrast,
Prescott and colleagues (2018) found that *medical complications in this pregnancy* was not a significant predictor of health anxiety during pregnancy, while *medical complications in a previous pregnancy* was a significant predictor. Taken together, the existing evidence suggests that experiencing complications during the current or a previous pregnancy may increase the risk of health anxiety; further research appears warranted to clarify the impact of these factors on levels of health anxiety in pregnant women.

### 4.1.2 The relationship between health anxiety and fetal health anxiety.

Kowalyk and colleagues (2009) also theorized that reduced health anxiety during pregnancy may be due to the woman’s focus of attention shifting to the health of her unborn infant, perhaps diminishing the focus on her own health concerns. A primary objective of the current study was to empirically examine this notion. In order to facilitate an examination of the relationship between maternal health anxiety and fetal health anxiety during pregnancy, a comprehensive measure of fetal health anxiety was created and utilized (i.e., FHAI). The development of the FHAI for the purpose of the current investigation was necessary, as a comprehensive measure of fetal health anxiety did not previously exist.

Using the newly developed FHAI, and the PRAQ-R subscale (which provided a brief, additional measure of fetal health anxiety), we hypothesized there would be a statistically significant, inverse correlation between health anxiety scores and fetal health anxiety scores in the pregnant sample. Contrary to our hypothesis, a strong, positive association between the SHAI and both measures of fetal health anxiety were observed,
indicating that as levels of health anxiety increase, levels of fetal health anxiety also increase. This study is the first of its kind to examine the relationship between health anxiety and fetal health anxiety during pregnancy and findings suggest that health anxiety may pose a risk factor for fetal health anxiety and/or vice versa. Further investigation regarding the temporal relationship between health anxiety and fetal health anxiety would help to delineate how these experiences influence one another. It is important to note that fetal health anxiety also demonstrated a significant, negative correlation with age, indicating that younger participants in the pregnant group reported higher levels of fetal health anxiety. Therefore, young age may also pose a risk factor for elevated fetal health anxiety.

4.1.3 Relationships between health anxiety and associated constructs. Based on previous research (e.g., Abramowitz, Olatunji, et al., 2007; Fergus, 2013; Scarella et al., 2016), we hypothesized that there would be significant, positive associations between health anxiety and the associated constructs (i.e., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty) in both the pregnant and non-pregnant samples. Consistent with this hypothesis, results demonstrated significant relationships between health anxiety and the associated constructs in both samples of women. More specifically, levels of health anxiety were positively associated with measures of general anxiety, depression, anxiety sensitivity, and intolerance of uncertainty. These findings are consistent with previous research that demonstrated an association between health anxiety and depression and anxiety (e.g., Noyes et al., 1994; Scarella et al., 2016), anxiety sensitivity (e.g., Abramowitz, Olatunji, et al., 2007; Stewart & Watt, 2000), and
intolerance of uncertainty (e.g., Boelen & Carleton, 2012; Fergus & Valentiner, 2011; Wright et al., 2016).

Overall, the relationships patterns across the two samples were similar; however, some differences between the two samples were observed. For example, health anxiety demonstrated a strong association with the cognitive dimension of anxiety sensitivity in the non-pregnant sample compared to a moderate association in the pregnant sample, and a small association with the prospective dimension of intolerance of uncertainty in the non-pregnant sample compared to a moderate association in the pregnant sample. The current results suggest that the influence of the lower order factors of anxiety sensitivity and intolerance of uncertainty on health anxiety may differ between pregnant and non-pregnant women. The current study is the first to examine the relationships between health anxiety and the construct of intolerance of uncertainty in a pregnant sample, which may be of particular relevance as this life stage can be a period of heightened uncertainty for women (Jones et al., 2005) and requires further examination. An examination of associated constructs related to health anxiety during pregnancy expands the limited research in the area of health anxiety during pregnancy.

We expected that the associated construct (i.e., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty) would account for significant variance in health anxiety in both the pregnant and non-pregnant samples. When evaluated simultaneously to control for one another, general anxiety accounted for significant unique variance in health anxiety in both samples and anxiety sensitivity also accounted for significant unique variance in the non-pregnant sample. The current results are
consistent with previous research that has found general anxiety (e.g., Kellner, Hernandez, & Pathak, 1992) and anxiety sensitivity (e.g., Stewart, Sherry, Watt, Grant, & Hadjistavropoulos, 2008) to be associated with health anxiety. The results suggest that intolerance of uncertainty and depression demonstrate less influence on health anxiety when controlling for the other variables of interest in both pregnant and non-pregnant women. The current results indicated that intolerance of uncertainty accounted for significant variance in health anxiety when entered into the model independently, particularly in the pregnant sample; accordingly, targeting intolerance of uncertainty, especially during pregnancy, may produce clinically significant effects in the treatment of health anxiety. Additional research may yet identify other variables associated with additional variance that may be targeted for additional reductions in health anxiety.

Unlike the results with the non-pregnant sample, anxiety sensitivity did not account for significant unique variance in health anxiety in the pregnant sample of women when controlling for the other associated constructs. The difference suggests that anxiety sensitivity may function differently in relation to health anxiety in pregnancy. The results from the non-pregnant sample are consistent with the view that anxiety sensitivity is a risk factor for the development of health anxiety (e.g., Abramowitz & Braddock, 2008); however, anxiety sensitivity appears to be less of a risk factor for health anxiety in pregnancy. When considering this difference, it is plausible that pregnancy-related experiences and symptoms alter an expectant mother’s focus on and/or interpretation of the dimensions of anxiety sensitivity. It is possible, for example, that pregnant women could interpret cognitive components of anxiety sensitivity (e.g.,
When I have trouble thinking clearly, I worry that there is something wrong with me) as lapses in attention and memory that are often self-reported in pregnancy (e.g., Casey, Huntsdale, Angus, & Janes, 1999) and physical components of anxiety sensitivity (e.g., when my stomach is upset, I worry that I might be seriously ill) could be attributed to the numerous somatic sensations and symptoms associated with pregnancy.

Based on the speculation that pregnancy might alter one’s experience of anxiety sensitivity, future research should further explore women’s interpretations of the cognitive, physical, and social dimensions of anxiety sensitivity during pregnancy. In addition, future research should examine the utility of lower-order anxiety sensitivity factors (i.e., cognitive, physical, and social dimensions) in accounting for variance in health anxiety during pregnancy, which would help delineate whether particular components of anxiety sensitivity are of specific relevance to elevated health anxiety in pregnancy. Previous research has found that the physical dimension of anxiety sensitivity was the only dimension to evidence incremental specificity in relation to health anxiety in a sample of healthy adults (Fergus & Bardeen, 2013), indicating that certain components of anxiety sensitivity may be of particular relevance to health anxiety in specific samples.

4.1.4 Relationships between health anxiety and the core health cognitions.

The cognitive-behavioural model of health anxiety highlights the importance of specific, underlying health-related cognitions (Salkovskis & Warwick, 2001). Previous research (i.e., Hadjistavropoulos et al., 2012) has examined differences in the core health cognitions (i.e., likelihood of illness, awfulness of illness, difficulty coping with illness,
inadequacy of medical services) between a self-reported medical sample and a non-medical sample and found that individuals in the medical group had relatively higher scores on the majority of subscales (i.e., likelihood of illness, difficulty coping, and medical service inadequacy). In addition, different subscales were found to account for significant unique variance in health anxiety in the medical compared to non-medical sample (i.e., likelihood of illness, awfulness of illness, and medical service inadequacy in the medical sample; likelihood of illness and difficulty coping in the non-medical sample).

One of the main objectives of the current study was to extend the existing research by investigating the core health cognitions in a sample of pregnant women and examine the differences in core health cognitions between pregnant and non-pregnant women. Given that medical and non-medical samples report some differences in core health cognitions an examination of these beliefs in pregnant women is of particular interest, as pregnancy is a unique period that can be viewed as a non-medical state (i.e., a natural process), a medical condition, or both, depending on culture, personal philosophies, and individual circumstances related to the pregnancy (Mullin, 2005). We predicted that, in both samples, positive associations would be demonstrated between the core health cognitions and health anxiety, the core health cognitions would account for statistically significant unique variance in health anxiety after controlling for general anxiety and depression, and the core health cognitions as a group would account for statistically significant variance in health anxiety.
Results demonstrated that the pattern of associations between HCQ subscales across both samples were comparable except that *awfulness of illness* was associated with *likelihood of illness* and *medical service inadequacy* in the pregnant sample, but not in the non-pregnant sample. In both the pregnant and non-pregnant samples, health anxiety was correlated with all four HCQ subscales, with the exception of the awfulness of illness subscale in the pregnant sample. The current results demonstrating positive associations between HCQ subscales and health anxiety are consistent with previous findings in both medical and non-medical samples (Hadjistavropoulos et al., 2012). Although *awfulness of illness* was not significantly associated with health anxiety in the full pregnant sample \((n = 96)\), *awfulness of illness* and health anxiety did demonstrate a significant, positive association when examining the relationship in the healthy pregnant women only \((n = 73)\). These results suggest that the relationship between *awfulness of illness* and health anxiety was impacted by the inclusion of pregnant participants with a self-reported medical condition. This is consistent with previous findings that support some differences in core health cognitions between medical and non-medical samples (Hadjistavropoulos et al., 2012). Notably, the pregnant sample scored lower on the *likelihood of illness* subscale compared to the non-pregnant sample; there were no other significant between-group differences across subscales. This finding supports the notion that pregnancy may be a protective factor, such that women who are pregnant report feeling less likely to develop an illness compared to women who are not pregnant. This is consistent with previous research that has found pregnancy to potentially serve a
protective function against psychological disorders (Leach et al., 2014; Vesga-Lopez et al., 2008), including health anxiety (Kowalyk et al., 2009).

To further examine the relationships between the core health cognitions and health anxiety, hierarchical regression analyses were conducted to examine whether the HCQ subscales would still be associated with health anxiety when controlling for depression and general anxiety. In both the pregnant and non-pregnant samples, the four subscales accounted for significant unique variance in health anxiety even when controlling for depression and general anxiety, with the exception that awfulness of illness was only approaching statistical significance in the non-pregnant sample. Overall, these results corroborate previous findings in medical and non-medical samples, with the exception that in a non-medical sample in previous research, medical service inadequacy did not account for significant unique variance in health anxiety once depression and general anxiety were controlled (Hadjistavropoulos et al., 2012).

Next, we conducted regression analyses to assess whether the HCQ subscales as a group would account for significant variance in health anxiety. In the pregnant sample, the subscales explained 26% of the variance in health anxiety and only the likelihood of illness subscale accounted for significant unique variance in health anxiety, indicating that beliefs regarding perceived likelihood of illness appear to be the health-related cognitions that have the most influence on health anxiety during pregnancy. In the non-pregnant sample, the subscales explained 38% of the variance in health anxiety and likelihood of illness, awfulness of illness, and medical service inadequacy all accounted for significant unique variance in health anxiety. Notably, the health cognitions as a
group explained less variance in health anxiety in the pregnant sample compared to the non-pregnant sample, suggesting that levels of health anxiety in healthy, pregnant women may be influenced by different or additional factors. In addition, fewer subscales (i.e., only one) accounted for significant unique variance in health anxiety in the pregnant sample compared to the non-pregnant sample, and also medical and non-medical samples in previous research (Hadjistavropoulos et al., 2012). Considering the dynamic nature of pregnancy and the complexities of navigating health during pregnancy (e.g., Maher & Lowe, 2015) it is reasonable to speculate that the factors influencing health anxiety in pregnancy may also be unique to this period.

Furthermore, in the non-pregnant sample, the health cognitions that accounted for significant unique variance in health anxiety (likelihood of illness, awfulness of illness, and medical service inadequacy) are similar to previous findings in a medical sample, where the same three subscales were unique predictors of health anxiety (Hadjistavropoulos et al., 2012). This is an unexpected similarity, as it might be anticipated that our healthy, non-pregnant sample would demonstrate results comparable to the non-medical sample in the previous study. However, differences in demographics between the samples may account for the lack of similarity between the non-medical sample in previous research and the healthy non-pregnant sample in the current research (i.e., our non-pregnant sample was comprised of all women, from a restricted age range). Based on the current findings, and previous recommendations (Hadjistavropoulos et al., 2012), future research should examine the relationships between the core health cognitions and health anxiety in various populations.
Overall, these results support the notion that the core health cognitions are uniquely related to health anxiety even after controlling for general anxiety and depression. These results also indicate that the health cognitions related to health anxiety in pregnant and non-pregnant women may be different. These findings may be pertinent to assessment and treatment strategies for health anxiety in pregnant versus non-pregnant women. Particularly, different subscales accounted for significant unique variance in health anxiety in the pregnant sample compared to the non-pregnant sample. While likelihood of illness, awfulness of illness, and medical service inadequacy accounted for significant unique variance in health anxiety in the non-pregnant sample, only the likelihood of illness subscale accounted for significant unique variance in health anxiety in the pregnant sample. This suggests that clinicians may benefit from targeting beliefs related to likelihood of illness in pregnant women with elevated health anxiety. Also of clinical significance, pregnancy may play a protective function as pregnant women endorsed a lower level of perceived likelihood of developing an illness compared to the women who were not pregnant.

4.1.5 Relationships between fetal health anxiety and associated constructs.

Another objective of the current investigation was to examine the associations between fetal health anxiety and the associated constructs (i.e., anxiety, depression, anxiety sensitivity, intolerance of uncertainty) in the pregnant sample. Results demonstrated statistically significant, positive relationships between fetal health anxiety and general anxiety, one measure of depression, anxiety sensitivity total score (and all three subscales), and intolerance of uncertainty total score (and only the prospective
intolerance of uncertainty subscale). Unlike health anxiety in both the pregnant and non-pregnant women, fetal health anxiety was not significantly associated with an additional measure of depression or inhibitory intolerance of uncertainty. Notably, while health anxiety during pregnancy appeared to be equally associated with both dimensions of intolerance of uncertainty, fetal health anxiety was only associated with one dimension. Prospective intolerance of uncertainty (e.g., *I always want to know what the future has in store for me*) appears to increase as fetal health anxiety increases during pregnancy. While inhibitory intolerance of uncertainty (e.g., *I must get away from all uncertain situations*) does not appear to increase along with elevated fetal health anxiety during pregnancy. This finding suggests that the cognitive component of intolerance of uncertainty may influence levels of fetal health anxiety, while the behavioural component does not have the same effect.

The finding that fetal health anxiety was not associated with a measure of depression (i.e., HADS-D) reflects a discussion in related literature regarding the impact of depression on worries about one’s unborn baby (Statham et al. 1997). It remains unclear whether or not depression and associated apathy might be linked to worrying less about one’s developing baby. In contrast to this notion, Statham and colleagues (1997) examined the relationship between negative mood (i.e., women were asked to select words that described their current feelings from a list of adjectives) and one item querying worries about one’s developing baby during pregnancy and found a positive relationship between the two variables. More research is necessary to further understand the relationship between fetal health anxiety and depression.
The current study expands upon the limited research in the area of fetal health anxiety. It is the first of its kind to examine the associations between a comprehensive measure of fetal health anxiety and associated constructs such as general anxiety, depression, anxiety sensitivity, and intolerance of uncertainty. The findings highlight important ways that fetal health anxiety may differ from health anxiety and offers novel information regarding particular constructs associated with this experience.

The current investigation examined whether the associated constructs (i.e., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty) would account for significant variance in fetal health anxiety in the pregnant sample. When evaluated simultaneously to control for one another, the only variable that accounted for significant unique variance was general anxiety. The finding that general anxiety accounts for unique variance in fetal health anxiety is consistent with previous research that has found trait anxiety to be a strong predictor of women’s worries about their developing baby (Statham et al., 1997). Statham and colleagues (1997) found that groups with lower trait anxiety did not necessarily endorse less baby worry, but those with relatively high trait anxiety consistently endorsed more worries about their baby throughout pregnancy. In addition, the current results reflect the finding that general anxiety was the only associated construct that predicted maternal health anxiety during pregnancy, indicating that general anxiety may underlie both maternal health anxiety and fetal health anxiety during pregnancy.

4.1.6 Relationships between fetal health anxiety and the core health cognitions. The relationships between the core health cognitions and fetal health anxiety
were exploratory in nature, as there is no previous research investigating these relationships. In the pregnant sample \((n = 96)\), fetal health anxiety was significantly correlated with the same three HCQ subscales that were associated with maternal health anxiety, namely, likelihood of illness, difficulty coping, and medical service inadequacy. A significant association was not observed between the FHAI and the awfulness of illness subscale; this finding is in contrast to the significant, positive relationships demonstrated between this subscale and the non-pregnant sample in the current investigation and both medical and non-medical samples in previous research (Hadjistavropoulos et al., 2012). These results suggest that pregnancy appears to be a unique period where thoughts regarding the perceived awfulness of illness are not associated with levels of health anxieties.

To further examine potential relationships between the core health cognitions and fetal health anxiety, four hierarchical regression analyses were conducted to examine whether the HCQ subscales would still be associated with health anxiety when controlling for depression and general anxiety. In the pregnant sample, only one subscale – difficulty coping – approached significance in accounting for significant unique variance in fetal health anxiety when controlling for depression and general anxiety. The other core health cognitions (i.e., likelihood of illness, awfulness of illness, medical service inadequacy) did not account for unique variance in fetal health anxiety. The results from analyzing the core health cognitions are a departure from the other study results related to health anxiety, insofar as all four subscales accounted for significant unique variance in health anxiety in the same sample. For fetal health anxiety,
general anxiety accounted for significant unique variance in all four of the regression analyses, suggesting that general anxiety, as opposed to the core health cognitions or depression, may have more influence on levels of fetal health anxiety.

Next, a regression analysis was employed to assess whether the HCQ subscales as a group would account for significant variance in fetal health anxiety. In the pregnant sample, the subscales explained 13% of the variance in fetal health anxiety, although there were no unique contributors. These findings suggest that the core health cognitions as a group are less related to fetal health anxiety compared to health anxiety as they account for less variance in this construct. These results indicate that the cognitions underlying health anxiety and fetal health anxiety may be different. Fetal health anxiety appears to be more strongly related to general anxiety as opposed to the core health cognitions. Based on these results, although associated, fetal health anxiety does not appear to be an extension or manifestation of maternal health anxiety.

These finding suggest that targeting general anxiety and cognitions related to difficulty coping with illness may be useful in the assessment and treatment of pregnant women presenting with elevated fetal health anxiety. The current findings also provoke an important question: If not the core health cognitions, then what cognitions underlie fetal health anxiety? Future research and theory development focused on potential underlying cognitions is imperative for an understanding of key factors that may contribute to the development and maintenance of fetal health anxiety.
4.2 Summary of Qualitative Results

Limited research exists regarding fetal health anxiety. As such, the current investigation employed inductive content analysis of open-ended survey questions that queried pregnant women’s personal experiences of fetal health anxiety. The open-ended questions were intended to facilitate a more comprehensive understanding of women’s experiences with fetal health anxiety and queried the content of fetal health worries, what increased and decreased these worries, recommendations for health care providers in managing fetal health anxiety, and the personal impact of this anxiety.

4.2.1 Content of fetal health worries. The current study provides a novel investigation of the content of fetal health worries that reflects women’s experiences as described in their own words. Eight themes emerged regarding the content of fetal health worries. In order of frequency, these themes include: (1) physical health condition or defect, (2) general health and development, (3) mental health/cognitive challenges, (4) complications during delivery, (5) loss of baby, (6) prematurity and birth weight, (7) causing inadvertent harm, and (8) difficulty feeding. Previous research examining the specific content of fetal health worries is extremely sparse. Harpel (2008) used qualitative methods to examine experiences of fetal health anxiety associated with ultrasound procedures and reported that, overall, specific fears and anxiety about fetal health related to questions such as “Was the baby okay? Did it have all it’s parts? Was it growing?” This brief summary appears to be consistent with themes that emerged in the current study including general health and development and prematurity and birth
weight. The focus of the Harpel study was on fetal health anxiety, more generally, and not to examine the specific content of the worries.

Previous research has also conceptualized fetal health worries as separate from fear of miscarriage (e.g., Statham et al., 1997) and worries about infant feeding (e.g., Stadley et al., 1979); however, women in the current study described fear of miscarriage and stillbirth and worries related to feeding as components of their fetal health anxiety. The findings from this analysis highlight the complexity of fetal health anxiety. The women described concerns related to the integrity of their fetus including development, disease, death, and growth. In addition, some respondents described a focus on maternal factors that contribute to a healthy baby including the ability to breastfeed, highlighting the interconnectedness of the adjustment and well-being of the expectant mother and her developing baby. These findings also suggest that different women may understand and experience fetal health anxiety in unique and personal ways.

4.2.2 Experiences that may increase worries. Upon analysis, eight themes emerged regarding experiences, events, or circumstances that increased fetal health anxiety. In order of frequency, these themes include: (1) maternal condition or accident, (2) news of/knowing children with negative outcomes, (3) concerning procedure or test results, (4) exposure to potential environmental risks, (5) family history, (6) pregnancy-related symptoms, (7) difficulty becoming pregnant/pregnancy loss, and (8) previous perinatal experience. Consistent with the current findings, Statham and colleagues (1997) found that a history of unsuccessful pregnancies (i.e., miscarriage, stillbirth, the birth of an ill or handicapped child, and termination for medical reasons) was associated
with increased fetal health worry. The variable unsuccessful pregnancies in the aforementioned study corresponds with the themes difficulty becoming pregnant/pregnancy loss and previous perinatal experience in the current study.

Also consistent with the current results, Harpel (2008) found that ultrasounds play a role in fetal health anxiety and the manner in which an ultrasound is conducted can contribute to fetal health anxiety. In the current study, some women reported that “long” ultrasound procedures increased worries about their baby’s health. The Harpel (2008) study, which specifically investigated the impact of ultrasound procedures on fetal health anxiety, expanded on this finding and determined that in addition to “long” ultrasounds, other procedural factors contributed to elevated fetal health anxiety including the technician’s affect, periods of silence, and the arrangement of the room (e.g., whether the woman had a view of the ultrasound screen). In addition, ultrasound results created anxiety about fetal health when an expectant mother was told of a potential problem with the fetus, which is also consistent with the current results.

Concerning results from other prenatal assessments were mentioned as a catalyst for increasing worries about fetal health in the current study; for example, receiving positive results on the maternal screening for Down syndrome. This finding is consistent with previous research on the psychological impact of screening for Down syndrome in pregnancy (e.g., Lou, Mikkelsen, Hvidman, Petersen, & Nielsen, 2015). A recent review found that women’s anxiety levels significantly increased upon receiving a positive screening result for Down syndrome; however, upon receiving a subsequent normal diagnostic result, anxiety levels declined to the same level as women who received a
negative screening result (Lou et al., 2015). This finding highlights an important consideration about whether events that increase fetal health anxiety have a temporary or enduring effect. Although the current study summarizes factors that were described as contributing to an increase in fetal health anxiety, the findings do not delineate between factors that caused a temporary increase in worries and factors that contributed to significant, longstanding fetal health anxiety throughout pregnancy. Whether the resulting anxiety is transient or persistent may be of significance, as the timing and duration of anxiety symptoms may be associated with the severity of adverse maternal and child health outcomes (Bayrampour et al., 2016). Future research would benefit from querying the timeline and personal impact of experiences associated with increased fetal health anxiety as it may be of particular importance to identify factors that increase or maintain fetal health anxiety and impact subsequent postpartum and child outcomes.

In addition to corroborating previous findings in the literature, the current study also identified additional experiences that expectant mothers described as increasing their worries about fetal health including maternal condition or accident, news of/knowing children with negative outcomes, exposure to potential environmental risks, family history, and pregnancy-related symptoms. An understanding of the factors that increase fetal health anxiety during pregnancy may help inform prevention, assessment, and treatment strategies for women who present with elevated fetal health anxiety during pregnancy.

4.2.3 Experiences/strategies that may decrease worries. Seven themes emerged regarding easing/decreasing fetal health anxiety. In order of frequency, these
themes include: (1) health care appointments and assessment, (2) coping behaviours, (3) cognitive strategies, (4) social support, (5) connecting with/feeling the baby, (6) information seeking, and (7) previous positive experiences. Consistent with the most frequently reported theme in the current study, Harpel (2008) found that, while fetal health anxiety tends to increase before and during an ultrasound procedure, ultimately the ultrasound relieved fetal health anxiety for pregnant women. In addition, Statham and colleagues (1997) found that, while unsuccessful pregnancies increased fetal health worries, experiencing at least one successful pregnancy decreased these worries; this is consistent with pregnant women in the current study describing that personal experiences with a previous healthy pregnancy and/or giving birth to a healthy baby helped to decrease fetal health worries.

Women in the current study also reported that connecting with/feeling the baby, largely through attention to fetal movement, decreased fetal health worries. This is consistent with research findings that counting fetal movement (e.g., Saastad, Winje, Israel, & Froen, 2012) or a focus on the quality of the movements (Akselsson, Georgsson, Lindgren, Pettersson, & Radestad, 2017) are associated with decreased worry about one’s unborn baby. Consistent with the current findings, a recent study also found an association between low social support and chronic anxiety during pregnancy (Bayrampour et al., 2016). Related research found coping strategies such as acceptance, positive reframing, active coping, and seeking emotional support to be associated with a decrease in worries and state anxiety during pregnancy (Gourounti, Anagnostopoulos, &
Lykeridou, 2013), which overlaps with the current themes including coping behaviours, cognitive strategies, and social support.

The theme information seeking relates to the above-mentioned theme news of/knowing children with negative outcomes, which was described as a category that increased fetal health worries. The pregnant women in our study described gaining information or news related to their concerns, often via the Internet, as both helpful and detrimental. This finding reflects the literature in the area of online information seeking and health anxiety (e.g., Muse, McManus, Leung, Megreblian, & Williams, 2012). Research indicates that individuals commonly use the Internet to seek health information; however, those with relatively high health anxiety search for health information on the Internet more frequently and for significantly longer periods of time (Muse, McManus, Leung, et al., 2012). A recent examination of online health-related information seeking in pregnant women found that knowing when you have enough information and repeat searches for information were significant predictors of health anxiety (Prescott et al., 2018). These findings may provide insight into how the behaviour of online information seeking may differ between pregnant women who report the strategy as helpful versus harmful.

The current analyses serve as foundations for understanding strategies to decrease fetal health anxiety in pregnancy. Our sample described several types of experiences and strategies that helped ease their worries about their unborn baby’s health. This knowledge may be helpful in the development of targeted interventions for elevated fetal health anxiety.
4.2.4 Recommendations for health care providers. There were five themes that emerged regarding recommendations for health care providers to help manage fetal health anxiety. In order of frequency, these themes include: (1) access to procedures/testing, (2) additional time and information, (3) a sensitive approach, (4) access to health care professionals, and (5) specific inquiry regarding mental health. The current study is the first of its kind to query specific recommendations for health care providers. As fetal health worry is among the most common and intense fears reported by women during pregnancy (Glazer, 1980; Light & Fenster, 1974; Ohman et al., 2003; Arizmendi & Affonso, 1987), prenatal health care providers are likely to encounter women with elevated fetal health anxiety. Given the substantial research indicating that anxiety (e.g., Graignic-Philippe et al., 2014) and pregnancy-specific anxiety, in particular (e.g., Dunkel Schetter & Tanner, 2012), is associated with adverse maternal and child outcomes, it is critical to gain an understanding of ways to improve support for women with fetal health anxiety and provide tailored assessment and intervention strategies during the prenatal period. In addition, elevated anxiety during pregnancy has been linked to elevated anxiety following childbirth (e.g., Moss et al., 2009); therefore, early and effective management of fetal health anxiety may prevent significant anxiety from continuing postpartum.

4.2.5 Impact of fetal health worries. Four themes emerged regarding the impact of fetal health worries. In order of frequency, these themes include: (1) consumes thoughts, (2) impacts functioning, (3) motivates healthy behaviours, and (4) limits activities. In a review of the literature on pregnancy anxiety (which often includes
worries about fetal health), Bayrampour and colleagues (2016) examined the consequences of pregnancy anxiety for women’s daily lives. This review indicated that while some anxiety is helpful in motivating health behaviours, elevated anxiety had adverse consequences including negative attitudes (e.g., impatience, distress) and difficulty concentrating, excessive reassurance-seeking behaviour, and avoidance behaviour (Bayrampour et al., 2016). These consequences are consistent with themes that emerged in the current investigation including consumes thoughts and limits activities. The consequences described by the authors in the category excessive reassurance seeking reflect some of the responses in the aforementioned theme access to procedures/testing in the section querying recommendations for health care professionals. Bayrampour and colleagues (2016) described requests for additional ultrasounds and other medical procedures as a negative consequence of pregnancy anxiety, which may be reflected in the current responses recommending additional procedures and testing to help manage fetal health anxiety. The current analysis provides important insight into the impact of fetal health worries, both positive and negative, as described by pregnant women. Knowledge regarding the impact of worries is an important factor in delineating typical or expected levels of worry from excessive, clinically significant anxiety that impacts functioning.

4.3 Theoretical Implications

Cognitive-behavioural models of health anxiety implicate the association between health anxiety and associated constructs such as anxiety, depression, anxiety sensitivity, and intolerance of uncertainty (e.g., Abramowitz & Braddock, 2008). The
current results provide support for these associations in both pregnant and non-pregnant samples of women. General anxiety accounted for significant unique variance in health anxiety in both samples and anxiety sensitivity also accounted for significant unique variance in the non-pregnant sample. The current results suggest that anxiety sensitivity may have a lesser influence on the development and maintenance of health anxiety during pregnancy; this may be due to experiences in pregnancy altering an expectant mother’s focus on and/or interpretation of the dimensions of anxiety sensitivity (i.e., physical, cognitive, social). Although anxiety sensitivity appears to play a lesser role in health anxiety in pregnant women compared to non-pregnant women, the results suggested that anxiety sensitivity still accounted for significant additional variance in health anxiety for both the pregnant and non-pregnant samples. The results suggest that targeting anxiety sensitivity in women, whether they are pregnant or not pregnant, may produce clinically significant effects in the treatment of health anxiety (although, the current results suggest that the effects would be greater in non-pregnant women).

The four core health cognitions are theorized to relate, specifically, to health anxiety (Salkovskis & Warwick, 2001). The results of the current investigation demonstrate that the core health cognitions accounted for significant variance in health anxiety in both samples (with the exception of awfulness of illness in the non-pregnant sample), even after controlling for general anxiety and depression, providing support for the cognitive-behavioural model of health anxiety. The current results also suggest that the cognitions underlying health anxiety may differ between pregnant and non-pregnant women. Moreover, the core health cognitions demonstrated relatively small utility in
accounting for significant variance in fetal health anxiety, providing support for the notion that the core health cognitions are uniquely related to health anxiety, as opposed to other mental health concerns. Fetal health anxiety demonstrated a strong, positive association with maternal health anxiety during pregnancy; however, it does not appear to be an extension of maternal health anxiety, as they do not appear to share the same underlying core health cognitions. The primary cognitions underlying fetal health anxiety require further examination.

4.4 Limitations and Directions for Future Research

The limitations of the current investigation warrant consideration and highlight important areas for future research in the areas of health anxiety and fetal health anxiety during pregnancy. First, although the study included a similarly aged control group, the samples were not matched on other demographic variables (e.g., education level, ethnicity, marital status). In addition, most women in our sample were Caucasian, from a major city, and highly educated. Future research should utilize more diverse samples to increase the generalizability of the findings. Second, the examination of fetal health anxiety is limited by the use of a recently developed measure (i.e., FHAI). A recent evaluation (Reiser & Wright, 2018) provided preliminary support for the psychometrics properties of the FHAI; however, replication and further psychometric analysis (e.g., confirmatory factor analysis, test-retest reliability) is necessary to establish the reliability and validity of the FHAI. The development of the FHAI in the current study may provide a foundation from which future examinations of this instrument and fetal health anxiety can be based. Third, although the pregnant sample included women from all
trimesters of pregnancy, the cross-sectional nature of the study precludes an analysis of potential fluctuations in health anxiety and fetal health anxiety throughout the course of pregnancy. Future research is needed that examines these experiences in longitudinal studies. Fourth, the current investigation examined the relationships between pregnancy, health anxiety, fetal health anxiety, and constructs of interest (e.g., general anxiety, depression, anxiety sensitivity, intolerance of uncertainty, pregnancy anxiety, core health cognitions); however, there may be additional extraneous variables (e.g., personality factors) that were not considered in this investigation due to time constraints. Fifth, the use of inductive content analysis as a qualitative research technique is intended to facilitate concept development (Lindkvist, 1981) and is limited in both theory development and explanation of a lived experience (Hsieh & Shannon, 2005). In addition, the open-ended text questions did not allow for follow-up questions or probes related to participants’ comments. Future qualitative research in the area of fetal health anxiety may benefit from employing additional methods such as grounded theory or phenomenology, which go beyond content analysis to develop theory or a more sophisticated understanding of an experience (Hsieh & Shannon, 2005).

4.5 Conclusions

The current investigation represents the first study to examine the relationship between health anxiety and fetal health anxiety during pregnancy. To facilitate this examination, it was necessary to develop and utilize a comprehensive measure of fetal health anxiety (i.e., FHAI). In addition, the current study compared health anxiety between pregnant women (from all trimesters of pregnancy) and similarly aged non-
pregnant women to extend the limited research on health anxiety during pregnancy. To further advance the research in this area, this study is the first of its kind to examine related constructs of interest (i.e., intolerance of uncertainty, core health cognitions) in a pregnant sample. The results indicated that targeting intolerance of uncertainty, particularly in the pregnant sample, may produce clinically significant effects in the treatment of health anxiety. The current study also conducted novel assessments of the relationships between fetal health anxiety, associated constructs, and the core health cognitions. Inductive content analysis of open-ended survey questions provided further information on women’s unique experiences with fetal health anxiety during pregnancy.

Results of the current investigation indicated that there was not a significant difference in levels of health anxiety between pregnant and non-pregnant women. In addition, pregnant women scored lower on measures closely related to health anxiety, suggesting that pregnancy may serve a protective function against health anxiety. In the pregnant sample, general anxiety accounted for unique variance in health anxiety; in the non-pregnant sample, both general anxiety and anxiety sensitivity accounted for unique variance in health anxiety. The four core health cognitions accounted for significant variance in health anxiety in both the pregnant and non-pregnant samples (with the exception of awfulness of illness in the non-pregnant sample), although findings suggested that the cognitions that underlie health anxiety may differ between pregnant and non-pregnant women.

Within the pregnant sample health anxiety and fetal health anxiety demonstrated a strong, positive association. General anxiety accounted for significant unique variance
in fetal health anxiety. The four health cognitions showed minimal utility in accounting for variance in fetal health anxiety, indicating that the core health cognitions underlying health anxiety and fetal health anxiety may differ. Inductive content analysis of responses querying details regarding fetal health anxiety facilitated a more comprehensive understanding of this complex experience. Such findings extend the current knowledge of health anxiety and fetal health anxiety during pregnancy and may help to inform tailored prevention, assessment, and treatment strategies for pregnant women. The current investigation provides a platform for additional research examining underlying factors that contribute to elevated health anxiety or fetal health anxiety during pregnancy. A more thorough understanding of maternal health anxiety and fetal health anxiety during pregnancy is critical in order to provide comprehensive and effective prenatal care.
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Zafeiriou


Research Ethics Board
Certificate of Approval

PRINCIPAL INVESTIGATOR
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DEPARTMENT
Psychology

REB# 2015-029

SUPERVISOR
Dr. Krist D. Wright - Psychology

FUNDER[S]
Unfunded

TITLE
Examing Health Anxiety and Anxiety about Fetal Health during Pregnancy

APPROVAL OF
Application for Behavioural Research Ethics Review
Appendix A – Recruitment Poster [pregnant group]
Appendix B – Recruitment Poster [control group]
Appendix C – Consent Form
Appendix D – Demographics Information Form
Appendix E – Short Health Anxiety Inventory
Appendix F – Fetal Health Anxiety Inventory
Appendix G – Pregnancy-Related Anxiety Questions
Appendix H – Hospital Anxiety and Depression Scale
Appendix I – Depression Scale (CES-D-14)
Appendix J – Scale of Perceived Social Support
Appendix K – Anxiety Sensitivity Index – 3
Appendix L – Intolerance of Uncertainty Scale – Short Form
Appendix M – Health Cognitions Questionnaire
Appendix N – Open Ended Survey Questions
Appendix O – Debriefing Form

APPROVED ON
April 2, 2015

RENEWAL DATE
April 2, 2016

CERTIFICATION
The University of Regina Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol, consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

ONGOING REVIEW REQUIREMENTS
In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion.
Please refer to the following website for further instructions: http://www.uregina.ca/research/REB/main.shtml

Dr. Larena Hoeber, Chair
University of Regina Research Ethics Board

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Appendix B.

Demographics Information Form

1. How old are you?
   
   Age: _______

2. What is your date of birth? (Month, Day, Year)
   
   Birthday: MM DD YY

3. Where do you live?

   _____ Rural farm/Rural community       _____ Town (population 500 to 4,999)
   _____ Small city (population 5,000 to 49,999)   _____ Major city (more than 50,000)
   _____ Other (please specify)

4. What is your ethnicity?

   _____ White/Caucasian       _____ Black/African       _____ Hispanic
   _____ Asian               _____ Aboriginal/First Nations  _____ Middle Eastern
   _____ Mixed Ethnicity    _____ Other (please specify)

5. What is your highest level of education?

   _____ Less than high school       _____ High school diploma
   _____ College certificate/some university  _____ University degree(s)
   _____ Other (please specify)

6. What is your current relationship status?

   _____ Single               _____ Common law            _____ Married
7. Do you have an existing health condition?

YES  NO

If YES, please list:

8. Have you previously experienced a serious health condition?

YES  NO

If YES, which condition(s)? And how old were you?

9. Do you have an existing mental health condition (e.g., ADHD, depression, panic disorder, schizophrenia)?

YES  NO

If YES, please list:

10. Have you previously had a mental health condition?

YES  NO

If YES, which condition(s)? And how old were you?

11. In your childhood did you experience any of the following abuse experiences?

______ physical abuse  ______ sexual abuse  ______ emotional abuse or neglect

12. As an adult (age 18 years or older) have you ever experienced any of the following abuse experiences?

______ physical abuse  ______ sexual abuse  ______ emotional abuse

13. Are you currently pregnant?

YES  NO

If NO, please choose from the following (choose all that apply to you) –
____ I have never been pregnant
____ I have previously experienced a pregnancy loss (e.g., miscarriage or abortion)
____ I have previously been pregnant and have given birth
____ I plan to become pregnant (or pregnant again) at some point in the future
____ I do not plan on becoming pregnant (or pregnant again) in the future
____ Other (please specify or explain)

12. How many biological children do you have? _____

13. How many non-biological children do you have? ______

Please answer the following questions if you are currently pregnant:

1. Are you expecting multiples?

YES       NO

2. Are you expecting your first child?

YES       NO

If NO, how many biological children do you have (not including your current pregnancy)? _____

How many non-biological children do you have? _____

3. How many weeks pregnant are you? ______ (e.g., 28 weeks)

4. Do you have a history of miscarriage?

YES       NO

5. Have you experienced any complications with your current pregnancy to date?

YES       NO

If YES, please list:

6. If this is not your first pregnancy, have you had complications (not including miscarriage) with a previous pregnancy (e.g., preeclampsia, caesarean section)?
7. Have you completed or are you currently enrolled in prenatal classes?

YES NO Not applicable

If YES, please list:

8. Was your current pregnancy planned?

YES NO Other (please specify)

9. If you are currently in a relationship, generally, how emotionally supported do you feel by your partner?

______ not well supported

______ somewhat supported

______ well supported

10. Who is/are your primary prenatal/labour caregiver(s)?

______ Obstetrician/Gynecologist (OB/GYN) ______ Midwife

______ Doula ______ Family Physician ______ Other (please specify)

11. Where do you plan to give birth?

______ Hospital ______ At home ______ Other (please specify)

12. Did you use any special measures to become pregnant (e.g., in vitro fertilization)?

YES NO

If YES, please list:
Appendix C.

Short Health Anxiety Inventory

Instructions: Each question in this section consists of a group of four statements. Please read each group of statements carefully and then select the one that best describes your feelings, over the past week. Identify the statement by choosing the letter next to it, i.e., if you think that statement (a) is correct, choose statement (a).

1. (a) I do not worry about my health.
   (b) I occasionally worry about my health.
   (c) I spend much of my time worrying about my health.
   (d) I spend most of my time worrying about my health.

2. (a) I notice aches/pains less than most other people (of my age).
   (b) I notice aches/pains as much as most other people (of my age).
   (c) I notice aches/pains more than most other people (of my age).
   (d) I am aware of aches/pains in my body all the time.

3. (a) As a rule I am not aware of bodily sensations or changes.
   (b) Sometimes I am aware of bodily sensations or changes.
   (c) I am often aware of bodily sensations or changes.
   (d) I am constantly aware of bodily sensations or changes.

4. (a) Resisting thoughts of illness is never a problem.
   (b) Most of the time I can resist thoughts of illness.
   (c) I try to resist thoughts of illness but am often unable to do so.
   (d) Thoughts of illness are so strong that I no longer even try to resist them.

5. (a) As a rule I am not afraid that I have a serious illness.
   (b) I am sometimes afraid that I have a serious illness.
   (c) I am often afraid that I have a serious illness.
   (d) I am always afraid that I have a serious illness.

6. (a) I do not have images (mental pictures) of myself being ill.
   (b) I occasionally have images of myself being ill.
   (c) I frequently have images of myself being ill.
   (d) I constantly have images of myself being ill.

7. (a) I do not have any difficulty taking my mind off thoughts about my health.
   (b) I sometimes have difficulty taking my mind off thoughts about my health.
   (c) I often have difficulty in taking my mind off thoughts about my health.
   (d) Nothing can take my mind off thoughts about my health.
8. (a) I am lastingly relieved if my doctor tells me there is nothing wrong.
(b) I am initially relieved but the worries sometimes return later.
(c) I am initially relieved but the worries always return later.
(d) I am not relieved if my doctor tells me there is nothing wrong.

9. (a) If I hear about an illness I never think I have it myself.
(b) If I hear about an illness I sometimes think that I have it myself.
(c) If I hear about an illness I often think I have it myself.
(d) If I hear about an illness I always think that I have it myself.

10. (a) If I have a bodily sensation or change I rarely wonder what it means.
(b) If I have a bodily sensation or change I often wonder what it means.
(c) If I have a bodily sensation or change I always wonder what it means.
(d) If I have a bodily sensation or change I must know what it means.

11. (a) I usually feel at very low risk for developing a serious illness.
(b) I usually feel at fairly low risk for developing a serious illness.
(c) I usually feel at moderate risk for developing a serious illness.
(d) I usually feel at high risk for developing a serious illness.

12. (a) I never think that I have a serious illness.
(b) I sometimes think that I have a serious illness.
(c) I often think that I have a serious illness.
(d) I usually think that I have a serious illness.

13. (a) If I notice an unexplained bodily sensation I don’t find it difficult to think about other things.
(b) If I notice an unexplained bodily sensation I sometimes find it difficult to think about other things.
(c) If I notice an unexplained bodily sensation I often find it difficult to think about other things.
(d) If I notice an unexplained bodily sensation I always find it difficult to think about other things.

14. (a) My family/friends would say I do not worry enough about my health.
(b) My family/friends would say I have a normal attitude about my health.
(c) My family/friends would say I worry too much about my health.
(d) My family/friends would say I am a hypochondriac.

For the following questions, please think about what it might be like if you had a serious illness of a type which particularly concerns you (such as heart disease, cancer, multiple sclerosis and so on). Obviously you cannot know for definite what it would be like; please give your best estimate of what you think might happen, basing your estimate on what you know about yourself and serious illness in general.
15. (a) If I had a serious illness I would still be able to enjoy things in my life quite a lot.
(b) If I had a serious illness I would still be able to enjoy things in my life a little.
(c) If I had a serious illness I would still be almost completely unable to enjoy things in my life.
(d) If I had a serious illness I would be completely unable to enjoy life at all.

16. (a) If I developed a serious illness there is a good chance that modern medicine would be able to cure me.
(b) If I developed a serious illness there is a moderate chance that modern medicine would be able to cure me.
(c) If I developed a serious illness there is a very small chance that modern medicine would be able to cure me.
(d) If I developed a serious illness there is no chance that modern medicine would be able to cure me.

17. (a) A serious illness would ruin some aspects of my life.
(b) A serious illness would ruin many aspects of my life.
(c) A serious illness would ruin almost every aspect of my life.
(d) A serious illness would ruin every aspect of my life.

18. (a) If I had a serious illness I would not feel that I had lost my dignity.
(b) If I had a serious illness I would feel that I had lost a little of my dignity.
(c) If I had a serious illness I would feel that I had lost quite a lot of my dignity.
(d) If I had a serious illness I would feel that I had totally lost my dignity.
Appendix D.

Fetal Health Anxiety Inventory

During pregnancy, women may have worries regarding the health of their developing baby including **concerns about the baby being sick, having a birth defect or disability, health problems during delivery, stillbirth, and/or other health-related concerns.**

Each question in this section consists of a group of four statements related to concerns about the health of your developing baby. Please read each group of statements carefully and then select the one that best describes your feelings regarding your **unborn baby** throughout your **current pregnancy.**

1.  
   (a) I do not worry about my baby’s health.  
   (b) I occasionally worry about my baby’s health.  
   (c) I spend much of my time worrying about my baby’s health.  
   (d) I spend most of my time worrying about my baby’s health.

2.  
   (a) If I notice pains/discomforts, I rarely worry about what this means for my baby.  
   (b) If I notice pains/discomforts, I sometimes worry about what this means for my baby.  
   (c) If I notice pains/discomforts, I often worry about what this means for my baby.  
   (d) If I notice pains/discomforts, I always worry about what this means for my baby.

3.  
   (a) As a rule I am not concerned about how my own bodily sensations/changes are related to my baby’s health.  
   (b) Sometimes I am concerned about how my own bodily sensations/changes are related to my baby’s health.  
   (c) I am often concerned about how my own bodily sensations/changes are related to my baby’s health.  
   (d) I am constantly concerned about how my own bodily sensations/changes are related to my baby’s health.

4.  
   (a) Resisting thoughts of my baby having a health problem is never a problem.  
   (b) Most of the time I can resist thoughts of my baby having a health problem.  
   (c) I try to resist thoughts of my baby having a health problem but am often unable to do so.  
   (d) Thoughts of my baby having a health problem are so strong that I no longer even try to resist them.
5. (a) As a rule I am not afraid that my baby has a serious health problem.
(b) I am sometimes afraid that my baby has a serious health problem.
(c) I am often afraid that my baby has a serious health problem.
(d) I am always afraid that my baby has a serious health problem.

6. (a) I do not have images (mental pictures) of my baby having a health problem.
(b) I occasionally have images of my baby having a health problem.
(c) I frequently have images of my baby having a health problem.
(d) I constantly have images of my baby having a health problem.

7. (a) I do not have any difficulty taking my mind off thoughts about my baby’s health.
(b) I sometimes have difficulty taking my mind off thoughts about my baby’s health.
(c) I often have difficulty taking my mind off thoughts about my baby’s health.
(d) Nothing can take my mind off thoughts about my baby’s health.

8. (a) I am lastingly relieved if my doctor tells me there is nothing wrong with my baby.
(b) I am initially relieved but the worries sometimes return later.
(c) I am initially relieved but the worries always return later.
(d) I am not relieved if my doctor tells me there is nothing wrong with my baby.

9. (a) If I hear about a health problem in developing babies I never think my baby has it.
(b) If I hear about a health problem in developing babies I sometimes think that my baby has it.
(c) If I hear about a health problem in developing babies I often think my baby has it.
(d) If I hear about a health problem in developing babies I always think that my baby has it.

10. (a) If I have a bodily sensation or change I rarely wonder what it means for my baby.
(b) If I have a bodily sensation or change I often wonder what it means for my baby.
(c) If I have a bodily sensation or change I always wonder what it means for my baby.
(d) If I have a bodily sensation or change I must know what it means for my baby.
11. (a) I usually feel at very low risk for my baby developing a serious health problem.
(b) I usually feel at fairly low risk for my baby developing a serious health problem.
(c) I usually feel at moderate risk for my baby developing a serious health problem.
(d) I usually feel at high risk for my baby developing a serious health problem.

12. (a) I never think that my baby has a serious health problem.
(b) I sometimes think that my baby has a serious health problem.
(c) I often think that my baby has a serious health problem.
(d) I usually think that my baby has a serious health problem.

13. (a) If I notice an unexplained bodily sensation that is (or could be) related to my baby’s development I don’t find it difficult to think about other things.
(b) If I notice an unexplained bodily sensation that is (or could be) related to my baby’s development I sometimes find it difficult to think about other things.
(c) If I notice an unexplained bodily sensation that is (or could be) related to my baby’s development I often find it difficult to think about other things.
(d) If I notice an unexplained bodily sensation that is (or could be) related to my baby’s development I always find it difficult to think about other things.

14. (a) My family/friends would say I do not worry enough about my baby’s health.
(b) My family/friends would say I have a normal attitude about my baby’s health.
(c) My family/friends would say I worry too much about my baby’s health.
(d) My family/friends would say I am extreme in my worries about my baby’s health.
Appendix E.

Pregnancy-Related Anxiety Questionnaire-Revised

1. I am afraid the baby will be mentally handicapped or will suffer from brain damage.
2. I am afraid our baby will be stillborn, or will die during or immediately after delivery.
3. I am afraid that our baby will suffer from a physical defect or worry that something will be physically wrong with the baby.
4. I am worried about the pain of contractions and the pain during delivery.
5. I am worried about the fact that I shall not regain my figure after delivery.
6. I sometimes think that our child will be in poor health or will be prone to illnesses.
7. I am concerned about my unattractive appearance.
8. I am anxious about the delivery because I have never experienced one before (nulliparous women only).
9. I am worried about not being able to control myself during labour and fear that I will scream.
10. I am worried about my enormous weight gain.

1 = absolutely not relevant
2 = hardly ever relevant
3 = sometimes relevant
4 = reasonably relevant
5 = very relevant
Appendix F.

Hospital Anxiety and Depression Scale

1. I feel tense or wound up:
   a. Most of the time
   b. A lot of the time
   c. From time to time, occasionally
   d. Not at all

2. I still enjoy the things I used to enjoy:
   a. Definitely as much
   b. Not quite so much
   c. Only a little
   d. Hardly at all

3. I get a sort of frightened feeling as if something awful is about to happen:
   a. Very definitely and quite badly
   b. Yes, but not too badly
   c. A little, but it doesn’t worry me
   d. Not at all

4. I can laugh and see the funny side of things:
   a. As much as I always could
   b. Not quite so much now
   c. Definitely not so much now
   d. Not at all

5. Worrying thoughts go through my mind:
   a. A great deal of the time
   b. A lot of the time
   c. From time to time, but not too often
   d. Only occasionally

6. I feel cheerful:
   a. Not at all
   b. Not often
   c. Sometimes
   d. Most of the time

7. I can sit at ease and feel relaxed:
   a. Definitely
   b. Usually
   c. Not often
d. Not at all

8. I feel as if I am slowed down:
   a. Nearly all the time
   b. Very often
   c. Sometimes
   d. Not at all

9. I get a sort of frightened feeling like ‘butterflies’ in the stomach:
   a. Not at all
   b. Occasionally
   c. Quite often
   d. Very often

10. I have lost interest in my appearance:
    a. Definitely
    b. I don’t take so much care as I should
    c. I may not take quite as much care
    d. I take just as much care as ever

11. I feel restless as if I have to be on the move:
    a. Very much indeed
    b. Quite a lot
    c. Not very much
    d. Not at all

12. I look forward with enjoyment to things:
    a. As much as ever I did
    b. Rather less than I used to
    c. Definitely less than I used to
    d. Hardly at all

13. I get sudden feelings of panic:
    a. Very often indeed
    b. Quite often
    c. Not very often
    d. Not at all

14. I can enjoy a good book or TV program:
    a. Often
    b. Sometimes
    c. Not often
    d. Very seldom
Appendix G.

Center for Epidemiologic Studies Depression Scale - 14

Below is a list of the ways you might have felt or behaved. Please choose the best option to indicate how often you have felt this way in the past week or so.

1. I was bothered by things that usually don’t bother me.
2. I did not feel like eating; my appetite was poor.
3. I felt that I could not shake off the blues, even with the help from family or friends.
4. I felt that I was just as good as other people.
5. I had trouble keeping my mind on what I was doing.
6. I felt depressed.
7. I felt that everything I did was an effort.
8. I felt hopeful about the future.
9. My sleep was restless.
10. I was happy.
11. I felt lonely.
12. I enjoyed life.
13. I felt sad.
14. I could not get “going”.

0 - rarely or none of the time (less than 1 day)
1 - some or a little of the time (1-2 days)
2 - occasionally or a moderate amount of time (3-4 days)
3 - most or all of the time (5-7 days)
Appendix H.

Anxiety Sensitivity Index – 3

For each statement below, please choose the response that best represents how well the statement describes you.

1. It is important for me not to appear nervous.
2. When I cannot keep my mind on a task, I worry that I might be going crazy.
3. It scares me when my heart beats rapidly.
4. When my stomach is upset, I worry that I might be seriously ill.
5. It scares me when I am unable to keep my mind on a task.
6. When I tremble in the presence of others, I fear what people might think of me.
7. When my chest feels tight, I get scared that I won’t be able to breathe properly.
8. When I feel pain in my chest, I worry that I’m going to have a heart attack.
9. I worry that other people will notice my anxiety.
10. When I feel “spacey” or spaced out I worry that I may be mentally ill.
11. It scares me when I blush in front of people.
12. When I notice my heart skipping a beat, I worry that there is something seriously wrong with me.
13. When I begin to sweat in a social situation, I fear people will think negatively of me.
14. When my thoughts seem to speed up, I worry that I might be going crazy.
15. When my throat feels tight, I worry that I could choke to death.
16. When I have trouble thinking clearly, I worry that there is something wrong with me.
17. I think it would be horrible for me to faint in public.
18. When my mind goes blank, I worry there is something terribly wrong with me.

0 = Agree very little
1 = Agree a little
2 = Somewhat agree
3 = Agree a lot
4 = Agree very much
Appendix I.

Intolerance of Uncertainty Scale – Short Form

1. Unforeseen events upset me greatly.
2. It frustrates me not having all the information I need.
3. Uncertainty keeps me from living a full life.
4. One should always look ahead so as to avoid surprises.
5. A small unforeseen event can spoil everything, even with the best of planning.
6. When it’s time to act, uncertainty paralyses me.
7. When I am uncertain I can’t function very well.
8. I always want to know what the future has in store for me.
9. I can’t stand being taken by surprise
10. The smallest doubt can stop me from acting.
11. I should be able to organize everything in advance.
12. I must get away from all uncertain situations.

1= Not at all characteristic of me
2= A little characteristic of me
3= Somewhat characteristic of me
4= Very characteristic of me
5= Entirely characteristic of me
Appendix J.

Health Cognitions Questionnaire

Instructions: The following questions have been designed for people who both have and do not have a health condition at the present time. Read each statement listed below and indicate how strongly you agree with the statement based on your beliefs. Select a number between 1 and 5 to indicate whether you strongly disagree, disagree, neither agree or disagree, agree, or strongly agree with the statement. Please select one answer for each question, answering every question without skipping any.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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</table>

<table>
<thead>
<tr>
<th>If you do not have a diagnosed medical condition</th>
<th>If you have a diagnosed medical condition</th>
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</thead>
<tbody>
<tr>
<td>1. Having a serious health condition would be awful.</td>
<td>Having a serious health condition is awful.</td>
</tr>
<tr>
<td>2. If faced with a health problem, I feel I am prepared to cope with it.</td>
<td>If faced with worsening of my health problem, I feel I am prepared to cope with it.</td>
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<tr>
<td>3. I believe it is likely that I will experience a chronic health condition at some point in the future.</td>
<td>I believe it is likely that my health problem will worsen significantly in the future.</td>
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<tr>
<td>4. I feel I could manage any health problem that I may develop in the future.</td>
<td>I feel I can manage any health problems that I may develop in the future.</td>
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<tr>
<td>5. I feel I am likely to experience health problems.</td>
<td>I feel I am likely to experience further health problems.</td>
</tr>
<tr>
<td>6. I am not sure that I can handle any serious health problem that I might develop in the future.</td>
<td>I am not sure that I can handle serious health problems that might develop in the future.</td>
</tr>
<tr>
<td>7. I generally have confidence that my family physician will be able to effectively diagnose any health problems that arise.</td>
<td>I generally have confidence that my family physician will be able to effectively diagnose health problems that arise.</td>
</tr>
<tr>
<td>8. I believe my chances of developing a health problem are higher than for other people I know.</td>
<td>I believe my chances of developing health problems are higher than for other people I know.</td>
</tr>
<tr>
<td>9. If I were to develop a health problem, I don’t think it would ruin my life.</td>
<td>If I were to develop other health problems, I don’t think it would ruin...</td>
</tr>
<tr>
<td></td>
<td>If I experience a serious health problem in the future, I feel prepared to deal with whatever happens.</td>
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<tr>
<td>---</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>10.</td>
<td>I do not have confidence in the health care system.</td>
</tr>
<tr>
<td>11.</td>
<td>I believe my chances of developing health problems are higher than for the majority of people.</td>
</tr>
<tr>
<td>12.</td>
<td>It would be alarming if I experienced a significant health problem.</td>
</tr>
<tr>
<td>13.</td>
<td>Developing a health problem would be very distressing.</td>
</tr>
<tr>
<td>14.</td>
<td>I generally have confidence that my family physician will be able to help me deal effectively with any health problems that arise.</td>
</tr>
<tr>
<td>15.</td>
<td>If I developed a chronic health problem, I would no longer be in control of my life.</td>
</tr>
<tr>
<td>16.</td>
<td>If I were to experience a health problem, it would be dreadful.</td>
</tr>
<tr>
<td>17.</td>
<td>I don’t think my family physician would be very helpful if I developed a serious health condition.</td>
</tr>
<tr>
<td>18.</td>
<td>Even if I had a serious health problem, I would still be able to enjoy my life.</td>
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<tr>
<td>19.</td>
<td>I know I would be able to get through any health problems I may experience in the future.</td>
</tr>
</tbody>
</table>
Appendix K.

For the following questions we are interested in learning about your personal experiences and encourage you to share your experiences. Please respond thoughtfully with as much detail as you feel comfortable providing.

**Did you/do you experience elevated anxiety about your unborn baby’s health during your current pregnancy? If yes, please answer the following questions:**

1. What are you most anxious about regarding your baby’s health?

2. List any additional worries/fears related to your baby’s health.

3. List any experiences, events, or circumstances that increase(d) your worries about your baby’s health during your pregnancy?

4. Is there anything that eases/eased your worries about your baby’s health?

5. Do you have any strategies to help you cope with worries about your baby’s health? If so, please list.

6. Is there anything you think your health care providers (e.g., family physician, OBGYN, midwife) could do/have done during your pregnancy that may have helped manage this anxiety?

7. How do your worries about your baby’s health impact your life, pregnancy, and day-to-day functioning?