Maternal Adverse Childhood Experiences and Mental Health Symptoms in Pregnancy: Behavioural and Social Mediators

by

Hope Alayne Walker
B.Sc., University of British Columbia, 2005
M.A., University of British Columbia, 2009

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We acknowledge with respect the Lekwungen peoples on whose traditional territory the university stands and the Songhees, Esquimalt and WSÁNEĆ peoples whose historical relationships with the land continue to this day.

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Abstract

Pregnancy is a unique developmental period in a woman's life, characterized by numerous psychological, behavioural, and biological changes. How a biologically female woman experiences her pregnancy is impacted by her previous life experiences, including early experiences of adversity. In particular, maternal history of Adverse Childhood Experiences (ACEs) before age 18, has been shown to exert distal effects on mental health and behaviour in pregnancy. The current study explored the associations between ACEs and mental health symptoms in pregnancy via structural equation modelling within a sample of 330 Canadian women. This statistical approach permitted the use of a latent ACE variable comprised of abuse, neglect, and household dysfunction as indicator variables, as well as a latent mental health variable comprised of symptoms of depression, anxiety, and fear of childbirth. A direct effect emerged whereby maternal ACEs predicted mental health symptoms. This permitted subsequent testing of the following mediating pathways: sleep, health-risk behaviours, resilience, and social support. In the mediation analyses, further support emerged for the total indirect effect of maternal ACEs on mental health symptoms in pregnancy, once mediation pathways were added. In reviewing individual indirect pathways, sleep and social support mediated the association between ACEs and mental health symptoms in pregnancy. However, health risk behaviours and resilience did not. In addition, social support mediated the relationship between resilience and mental health symptoms in pregnancy. This study contributes to the existing research on maternal ACEs and their relationship with mental health symptoms during pregnancy. The concurrent testing of several pathways in the structural model served to characterize possible mechanisms through which early adversity relates to

current mental health symptoms in pregnancy. Implications of these findings include identification of possible targets for intervention in pregnancy, in order to lessen the burden of ACEs on maternal mental health.

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Dedication

For my beautiful children, James and Evie.

Introduction

"Childbearing is certainly one of the most public, physically exposed, and emotionally challenging episodes in a woman's life, and how she experiences it is profoundly affected by previous events and relationships" (Simkin & Klaus, 2004, p.8). One such event, or events, is a maternal history of Adverse Childhood Experiences (ACEs) before age 18, as described by Felitti and colleagues in their seminal work two decades ago (Felitti et al., 1998). ACEs are defined as 10 discrete experiences including psychological, physical and sexual abuse, emotional and physical neglect, and indicators of household dysfunction (e.g., mother treated violently, parental separation and divorce, and mental illness, substance misuse, or incarceration of a family member). For an adult woman who is a survivor of adverse childhood experiences, her experience of childbearing and giving birth may be profoundly affected by having experienced these early adversities (Atzl, Narayan, Rivera, & Lieberman, 2019; Olsen, 2018; Smith, Gotman, & Yonkers, 2016; Wajid et al., 2019). In preparation for motherhood, pregnancy may be a time in which reflection on one's own childhood is particularly salient, and for women with a history of adverse childhood experiences, this time may be particularly challenging. In particular, mental health in pregnancy may be particularly affected by having a history of adversity in childhood. Research suggests that the sequelae of ACEs often linger into adulthood, and that they are manifest psychologically, socially, behaviourally and physiologically during pregnancy (Olsen, 2018; N. M. Racine, Madigan, Plamondon, McDonald, & Tough, 2018; N. Racine et al., 2018). This is a growing area of research, whereby significant efforts have been undertaken in the past two years in particular (Olsen, 2018), to characterize the relationship between maternal early adverse experiences and pregnancy outcomes. The current study sought to

explore associations between maternal ACEs and mental health symptoms during pregnancy. This study built on previous studies exploring correlates of ACEs and health and pregnancy outcomes, in a sample of adult women recruited across Canada, though primarily in British Columbia.

Pregnancy is a vulnerable time in a woman's life during which the distal impact of early adversity may re-emerge in the form of flashbacks, or new symptoms may emerge due to the novelty of this experience and its close connection to sexuality, in particular for those women with a history of child sexual abuse (CSA). During this time, the health of both the mother as well as the fetus are potentially affected by long-term consequences of ACEs, via psychological, behavioural, and biological processes. Each of these processes affected by adverse childhood experiences are potentially additionally affected by the pregnancy itself. Psychologically, abuse survivors may have a heightened fear of childbirth, they may fear their child will be abused as they were, and they may fear re-experiencing loss of control over their bodies as they did during the abuse (Bohn & Holz, 1996). An integrative review of the pregnancy health risks and outcomes associated with ACEs revealed associations between the following prenatal mental health symptoms and maternal ACEs: prenatal depression, pregnancy-related anxiety, prenatal stressful life events, and psychological distress during pregnancy (Olsen, 2018). Psychological correlates including anxiety and depression have both been shown to be possible sequelae of ACEs in pregnant women (Atzl, Narayan, et al., 2019; Choi & Sikkema, 2016; McDonnell & Valentino, 2016; Wajid et al., 2019; Young-Wolff et al., 2019), and fear of childbirth has been shown to be associated with both anxiety and depression (Storksen, Eberhard-Gran, Garthus-Niegel, & Eskild, 2012). Behavioural correlates of ACEs include smoking and alcohol use, as well

as sleep (Chang, Pien, Duntley, & Macones, 2010; Chung et al., 2010; Elsenbruch et al., 2007; Frankenberger, Clements-Nolle, & Yang, 2015; Kajeepeta, Gelaye, Jackson, & Williams, 2015; McDonald et al., 2019; Menke et al., 2019; Smith et al., 2016). These behaviours have been associated with adverse postnatal outcomes. Smoking during pregnancy has been shown to mediate the relationship between maternal ACEs and birth outcomes, whereby maternal ACEs predict lower birthweight and shorter gestation, as mediated by smoking during pregnancy (Smith et al., 2016). A dose-response relationship between maternal ACEs and alcohol consumption in pregnancy has been established (Frankenberger et al., 2015). These behaviours are harmful not only to the pregnant woman herself, but also to her fetus. Biologically, maternal ACEs have been linked to placental-fetal stress physiology (Moog et al., 2016), as well as changes in placental telomere length with implications for offspring autonomic nervous system development (C. W. Jones et al., 2019), both of which have highlighted novel biologic pathway whereby maternal ACEs may be intergenerationally transmitted. Decreases in gestational age and birth weight have been associated with each additional ACE. Among CSA survivors specifically, a number of problems have emerged as more likely to occur during pregnancy, including: spontaneous miscarriage, therapeutic abortion, hyperemesis, preterm labour, increased need for medical intervention and/or operative delivery, severe postpartum depression, and breastfeeding difficulties (C. W. Jones et al., 2019). Therefore, pregnancy is a time during which latent effects of adverse childhood experiences may either re-emerge or manifest for the first time, and it is critical to understand these psychological, behavioural and biological processes as they are occurring in order to prioritize the health of both the mother and her fetus.

The current study sought to explore in a sample of pregnant women in the third trimester of pregnancy, the direct effect of maternal ACEs on mental health symptoms, and potential mediators of this relationship. Social support has been identified as a possible resilience factor for pregnant women (Aktas & Yesilcicek Calik, 2015; Atzl, Grande, Davis, & Narayan, 2019; Cheong, Sinnott, Dahly, & Kearney, 2017; Elsenbruch et al., 2007; N. Racine et al., 2018), in addition to individual and relational resilience (Howell, Miller-Graff, Schaefer, & Scrafford, 2017; Young-Wolff et al., 2019). The ACE variable used in this study is a latent construct comprised of abuse, neglect and household dysfunction using the 10-item Felitti measure, and the mental health latent factor was comprised of anxiety, depression and fear of childbirth. Though previous research has primarily explored individual psychological, behavioural or social correlates of ACEs among pregnant women, variables representing each of these domains were measured concurrently in order to ascertain interrelationships among them. Proposed mediators of the direct effect relationship included the following, as indicated in the model outlined below in Figure 1: a latent health-promoting behaviour variable, comprised of prenatal behaviours, sleep, exercise and prenatal vitamin use; a latent health-risk behaviours variable comprised of smoking, alcohol and drug use; a measured resilience variable; and a social support latent variable comprised of partner and other support, support satisfaction, number of supporters, support from health care providers, and perceived health care quality.

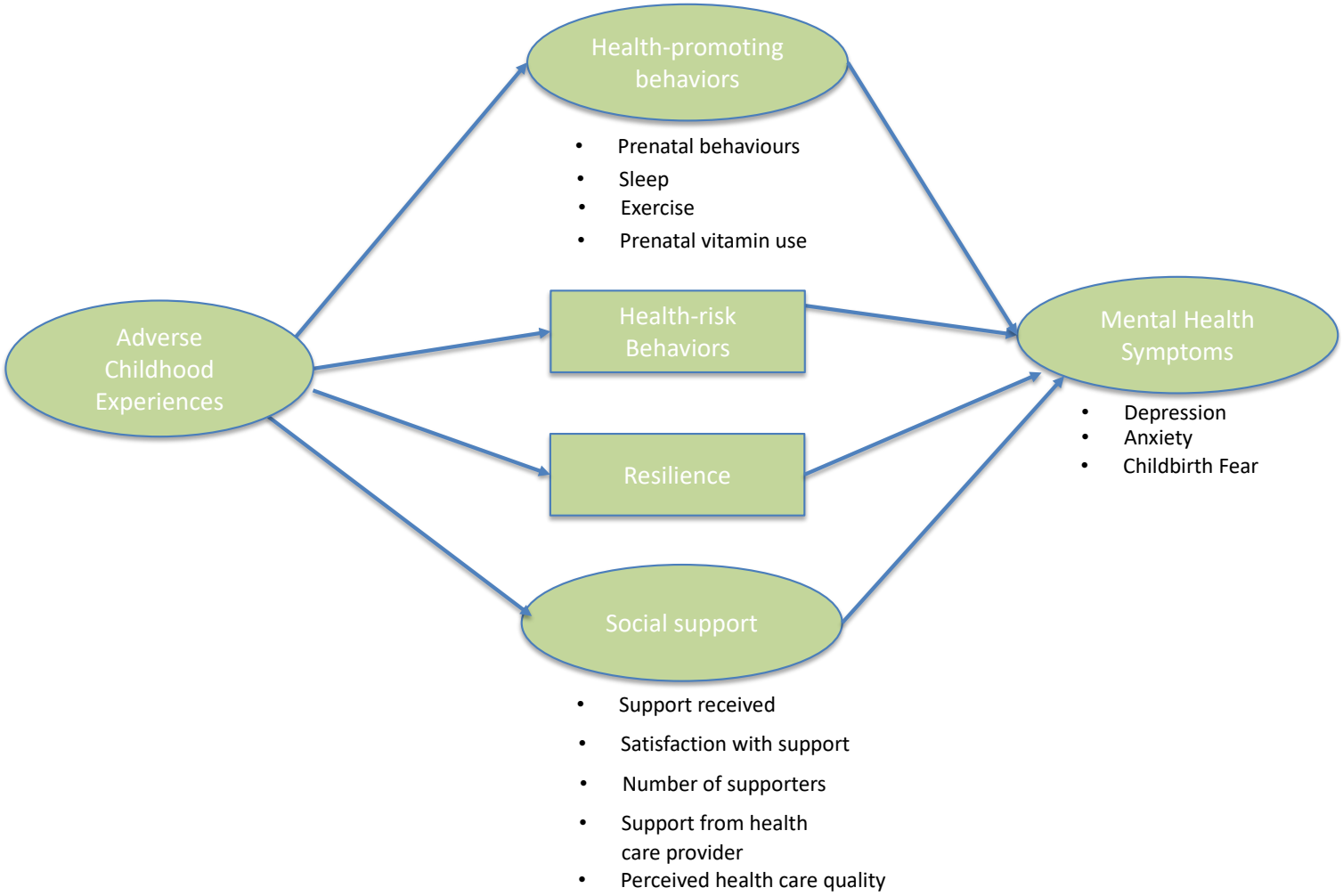

Figure 1. Theoretical model for the ACEs and Pregnancy Study.

What follows is a literature review of the evidence supporting each part of the model and what has been studied to date. At present, most of the research has explored individual parts of the model, and a strength of the current study will be to examine these variables concurrently, in a multi-community sample. To provide context for the current study, a brief review of the ACE construct and its correlates with physical, mental and behavioural health will first be presented, followed by a focused review of the literature examining the role of maternal ACEs during pregnancy, on a number of psychological and behavioural processes.

Literature Review

Adverse Childhood Experiences

Early research efforts endeavored to characterize the relationship between ACEs and adult health outcomes, illustrating the lasting effects of ACEs well into adulthood. In the original studies defining ACEs (Felitti et al., 1998), 8,056 adults completed standardized medical evaluations at the Health Appraisal Clinic of Kaiser Permanente in California. These complete health assessments were routinely completed for members of the Kaiser Health Plan, and in any 4-year period, most (81%) adults undergo this assessment. The ACE questionnaire was sent by mail within one week of the medical appointment, to assess for childhood abuse and household dysfunction. A total ACE score was created by summing all positive responses to each of seven categories. Medical charts were reviewed to assess risk factors contributing to morbidity and mortality, which included: smoking, severe obesity, physical inactivity, depressed mood, suicide attempts, alcoholism, any drug abuse, parental drug abuse, lifetime number of sexual partners greater than 50, and a history of having had a sexually transmitted disease (Felitti et al., 1998). Medical charts were also reviewed to assess the presence of the following

disease conditions, which are among leading causes of death in the United States: ischemic heart disease, cancer, stroke, chronic bronchitis or emphysema, diabetes, hepatitis or jaundice, skeletal fractures, and self-reported health. Among this sample, roughly halved by gender, and comprised of primarily middle-aged (mean age 56.1 years), Caucasian (79.4%) adults, most participants (52%) reported one or more ACEs and only 3.4% reported four or more ACEs. The ACE most frequently endorsed was substance abuse in the household (25.6%) during childhood, and having had an incarcerated household member was the least commonly endorsed ACE (3.4%). Findings from the study revealed a dose-response relationship between exposure to abuse or household dysfunction during childhood, with all 10 risk factors studies, as well as all disease conditions with the exception of history of stroke or diabetes. That is to say, the more childhood adversity experienced, the greater the odds for experiencing adverse outcomes in adulthood. Experiencing four or more categories of ACEs, compared to none, was the threshold associated with the greatest odds ratios for experiencing health risk factors and disease conditions. Taken together, the authors suggest the distal effect of ACEs on adult health outcomes is strong, and cumulative (Felitti et al., 1998). Since the time of the original ACE study publication, a second wave of data collection occurred, and two additional items to assess emotional and physical neglect were added to the questionnaire. The total sample size, including data from both waves one and two, and which was gathered between 1995 and 1997, was 17, 337. Overall, 36.1% of people reported no ACEs, 26.0% reported 1 ACE, 15.9% reported 2 ACEs, 9.5% reported 3 ACEs and 12.5% of the sample reported 4 or more ACEs ("About the CDC-Kaiser ACE Study |Violence Prevention|Injury Center|CDC," 2019). Prevalence rates for total ACE score were similar for men and women, though for individual ACEs, more women

than men reported emotional abuse (13.1% vs. 7.6%), sexual abuse (24.7% vs. 16%), household mental illness (23.3% vs. 14.8%), and emotional neglect (16.7% vs. 12.3%). Ongoing assessment of ACEs continues to occur via the annual, state-administered Behavioural Risk Factor Surveillance System (BRFSS), a random digit-dial telephone survey administered to American adults across 42 states since 2009 ("Behavioral Risk Factor Surveillance System ACE Data |Violence Prevention|Injury Center|CDC," 2019). The BRFSS questionnaire has been adapted from the original CDC-Kaiser ACE study, and does not include items pertaining to neglect. Prevalence rates of ACEs, as assessed by the BRFSS questionnaire, are consistent with the original measure, and the graded dose-response relationship between ACEs and adverse health outcomes persists.

Since the original ACE study was published, significant research efforts have been undertaken to ascertain links between ACEs and several health and mental health outcomes. Relevant to the current study, these include, but are not limited to: mental health (depression, suicidality, health anxiety, hallucinations and autobiographical memory disturbances); health risk behaviours (alcohol misuse, drug misuse, smoking, obesity, and risky sexual behaviours); sleep; reproductive health (adolescent pregnancy, fetal death, sexually transmitted infections, risky sexual behaviour in women, and unintended pregnancy); and some researchers have explored possible mediating pathways in the relationship between ACEs and health outcomes such as ischemic heart disease and teen pregnancy ("Adverse Childhood Experiences Journal Articles by Topic Area |Violence Prevention|Injury Center|CDC," 2019).

One theory which may help explain ways in which ACEs "get under the skin" and relate to distal outcomes, is the Allostatic Load Model (McEwen & Stellar, 1993). This model outlines

the physiological toll, or "hidden cost" to the body that accumulates due to chronic stress (in this case, ACEs), whereby the interaction of environmental factors and genetic predispositions lead to individual differences in stress susceptibility. The cumulative, and pervasive nature of ACEs contribute to "wear and tear" at the biological level (N. Racine et al., 2018). The allostatic model has been discussed in the context of ACEs, whereby adults with a history of maltreatment have shown smaller prefrontal cortex and hippocampal volumes, increased hypothalamic-pituitary-adrenal (HPA) axis activity, and increased inflammation (Danese & McEwen, 2012). Notably, hypothalamic-pituitary-adrenal (HPA) axis dysregulation has been demonstrated among sexually abused children (De Bellis, 2001; van voorhees & Scarpa, 2004). This system is activated in response to stress, whereby the hypothalamus releases corticotropin-releasing hormone (CRH), stimulating the pituitary gland to release adrenocorticotropic hormone (ACTH), which acts on the adrenal cortex to release the corticosteroid, cortisol. This final product of the HPA axis activation is most commonly measured in studies examining biological correlates of stress. Elevated cortisol serves several physiological functions, importantly including suppression of the immune response. As such, cortisol exerts anti-inflammatory effects within the body in response to stress. This may result in reduced immune functioning, because increased HPA reactivity suppresses immune activity, and this may result in adverse health (Wilson, 2010). It is thought that prolonged stress, in the example of child sexual abuse, results in hyperarousal and numbing responses as seen in post-traumatic stress disorder (PTSD), which over time produces hyperresponsiveness to future stressors (Springs & Friedrich, 1992). It is therefore plausible that the health effects of ACEs may be manifest directly via immune pathways or indirectly through psychopathological

pathways. Possible mechanisms by which ACEs exert effects on health are numerous and diffuse. Possible mechanisms include immune suppression due to stress; changes in health behaviours such as drug use due to dysfunctional coping strategies; chronic hyperarousal associated with PTSD; and physical sensations arising from body memories, again in the example of CSA (Bohn & Holz, 1996).

The following is a brief review of the literature to expand on key findings in the relationships between ACEs and mental health functioning, health risk behaviours, sleep, and reproductive health. This will be followed by a focused review on the literature exploring the relationship between ACEs and mental health outcomes among pregnant women, and the role of potential mediators in this relationship.

Health risks associated with ACEs. At this point in time, nearly 20 years after the original ACE study, sufficient research evidence has amassed (aided by systematic reviews and meta-analyses) to better understand the connection between early adversity and later behavioural and health risks. Notably, a recent systematic review and meta-analysis of 37 studies, including 253, 719 participants, revealed that the effect of four or more ACEs, compared to no ACEs, on 23 health behaviours and outcomes (Hughes et al., 2017). Odds ratios, indicating increased risk, were mild for physical inactivity, obesity and diabetes; moderate for smoking, heavy alcohol use, cancer, heart disease and respiratory disease; strong for risky sexual behaviour, depression, anxiety, and alcohol misuse; and very strong for illegal drug misuse, interpersonal violence, and attempted suicide. A recent systematic review exploring the health consequences of ACEs revealed consistent adverse physical and psychological health outcomes, in addition to health-risk behaviours, among individuals with a

history of ACEs (Kalmakis & Chandler, 2015). Physical health consequences included cardiovascular disease, chronic lung disease, headaches, autoimmune disease, sleep disturbances, early death, obesity, and general poor health. Psychological health consequences included depression, anxiety, PTSD, and suicidal ideation and attempts. Health risk behaviours associated with a history of ACEs included smoking, drinking, and substance misuse. Each of these physical, psychological and behavioural health consequences were found to be associated with a history of ACEs, and in some instances, this effect was seen more strongly among individuals with a higher total ACE score, or with specific ACEs (Kalmakis & Chandler, 2015).

Mental health outcomes associated with ACEs. ACEs have been found to confer increased risk in a graded fashion to recent and lifetime depressive disorders (Chapman et al., 2004), in a retrospective cohort study of 9640 adults, with a lifetime prevalence of depressive disorders equal to 23%. Women who endorsed emotional abuse in childhood, compared to women who did not endorse emotional abuse, were 3.1 times more likely to have had recently experienced depressive disorder, and 2.7 times more likely to have a lifetime history of depressive disorder. This specific ACE carried the highest risk. Further, among women who reported five or more ACEs, compared to women who reported no ACEs, there was a greater than six fold increased risk for recent depressive disorders, and a greater than fivefold increased risk for lifetime history of depressive disorders (Chapman et al., 2004). Others have expanded on this work and found similar results, whereby a graded dose-response relationship between total ACE score and likelihood for depressed affect, and attempted suicide, has been established (Merrick et al., 2017). In their exploration of the association of individual ACEs with depressed affect and attempted suicide, Merrick and colleagues found all ACEs except for

having had an incarcerated family member, were associated with depressed affect during adulthood, and all ACEs were associated with lifetime attempted suicide reported in adulthood (Merrick et al., 2017). Though most studies have focused on depression and PTSD, others have included a focus on anxiety. Increased exposure to ACEs has been associated with higher levels of health anxiety in adulthood, as mediated fully by both negative affect and trait anxiety (Reiser, McMillan, Wright, & Asmundson, 2014). Furthermore, among individuals presenting to a mental health outpatient clinic for depression and anxiety in the Netherlands, 22.8% of people reported no ACEs, 77.2% of people reported one ACE, and 35.6% of people reported four or more ACEs. These rates are higher than those reported in the original ACE study, and reflects the burden of ACEs among adults with anxiety and depression (van der Feltz-Cornelis et al., 2019).

Health risk behaviours associated with ACEs. Higher risk of alcohol misuse has been associated with each of the eight original ACEs, and multiple ACEs have been found to confer twofold to fourfold increased risk of heavy drinking, self-reported alcoholism, and marrying an alcoholic compared to those who reported no ACEs (Shanta R. Dube, Anda, Felitti, Edwards, & Croft, 2002). Reporting even one ACE was associated with increased risk of these adult alcohol outcomes, compared to individuals who reported no ACEs. A strong graded relationship emerged between total ACE score and each of the adult alcohol outcomes, for individuals with and without an alcoholic parent, and for both women and men (Shanta R. Dube et al., 2002). As evinced by the Dube study, Crouch and colleagues similarly found support for four or more ACEs conferring the greatest risk among both women and men for reporting binge and heavy drinking. And for women in particular, the emotional abuse item on the BRFSS has been

associated with the greatest odds of reporting binge and heavy drinking (Crouch, Radcliff, Strompolis, & Wilson, 2018). Other studies have included a focus on substance and alcohol misuse. Increased likelihood for drug use, and for moderate to heavy drinking, have been associated with a graded dose-response relationship with total ACE score (Merrick et al., 2017). In their investigation of the association of individual ACEs with self-reported lifetime drug use and moderate to heavy drinking, Merrick and colleagues found all ACEs but physical neglect were associated with drug use in adulthood, and all ACEs but incarcerated household member and parental separation/neglect were associated with moderate to heavy drinking during adulthood. However, others have reported contrasting findings, whereby only the verbal abuse item on the BRFSS was associated with binge drinking among women, and no association was found between binge drinking and other ACEs (Fang & McNeil, 2017). In this sample of 39,000 men and women, the dose-response relationship observed by Crouch and colleagues was not supported, though exposure to four or more ACEs did confer increased risk to heavy drinking.

Health-promoting behaviours associated with ACEs. Sleep is a critical physiological process, and a health behaviour consistently associated with a history of ACEs. Specifically, self-reported sleep disturbance has been shown to be associated with all eight of the original ACEs, in an analysis using the original ACE sample (Chapman et al., 2011). Again, a dose-response relationship emerged such that as total ACE score increased, so did the likelihood for two types of self-reported sleep disturbance, including difficulty falling or staying asleep, and reporting feeling tired even after a good night's sleep. In this study, having trouble falling asleep or staying asleep was more common in women than in men, and feeling tired even after a good night's sleep was more common in men. For people who endorsed even one ACE,

compared to those who endorsed none, they were more likely to report difficulty falling or staying asleep, as well as feeling tired even after a good night's sleep. Past a threshold of five or more ACEs, people were 2.1 times more likely to endorse difficulty falling or staying asleep, and 2.0 times more likely to reporting feeling tired even after a good night's sleep.

Protective factors ameliorating the burden of ACEs. Though much of the literature has focused on the deleterious sequalae of ACEs, some support has emerged for resilience factors associated with ACEs. From a review of the literature, it does not appear that previous work has explored the role of individual resilience as a construct in and of itself, in relation to ACEs. However, various resilience constructs have been identified, and social support has consistently emerged as a resilience construct across a variety of samples (Cheong et al., 2017; T. M. Jones, Nurius, Song, & Fleming, 2018; Karatekin & Ahluwalia, 2016; Logan-Greene, Green, Nurius, & Longhi, 2014). Social support has been shown to protect against mental health impairment in adulthood, in a structural model exploring the roles of low income, social support and adult adversity as mediators in the relationship between ACEs and mental health impairment (T. M. Jones et al., 2018). In this study, support emerged for the role of social support as a mediator, whereby ACEs predicted low social support, which was associated with mental health impairment. Older adults reporting moderate and high perceived social support had decreased odds of depressive symptoms associated with a history of ACEs (Cheong et al., 2017). In contrast, individuals reporting any ACE and low perceived social support had nearly three times the odds for depressive symptoms. In a sample of college students, those with higher total ACE scores reported less social support and more perceived stress than students with lower ACE scores, and both of these predicted poorer mental health (Karatekin & Ahluwalia, 2016).

Among American Indian older adults, social support was found to correlate negatively with depressive symptoms, which were found to correlate with ACEs, and it was theorized that social support may serve to protect against the deleterious sequelae of ACEs (Roh et al., 2015). Further, along with social support, life satisfaction and sleep quality have also been identified as resilience resources by Logan-Greene and colleagues, whereby all three of these resources moderated the effect of ACEs on physical and mental health outcomes across four different age cohorts, using Washington State BRFSS data from 2009 and 2010. Given the sleep disturbance associated with ACEs previously highlighted, this may limit the availability of sleep as an resilience resource, perhaps exacerbating the role of ACEs on health outcomes (Logan-Greene, Green, Nurius, & Longhi, 2014).

A new focus: The role of maternal ACEs among pregnant women

As the body of research around physical and mental health sequelae of ACEs has grown, research efforts have extended to special populations, and pregnancy has been identified as a developmental period worthwhile of study in which distal effects of ACEs may be manifest. Pregnancy is a discrete, unique time in a woman's life, characterized by physiological, emotional, behavioural, and social changes. It is a time whereby frequent assessment of health occurs via routine contact with health care providers, thus providing an opportunity to routinely screen for health risks and mental health functioning.

Though some investigators have assessed maternal ACEs in the postnatal period (e.g., N. M. Racine et al., 2018; N. Racine et al., 2018), support has also emerged for the feasibility of screening for maternal ACEs in pregnancy (Flanagan et al., 2018; Nguyen et al., 2019; Wajid et al., 2019). In one sample comprised of racially diverse, low-to-middle socioeconomic status,

most women (67%) reported exposure to at least one ACE, and nearly one-fifth of the sample (19%) reported exposure to four or more ACEs (Nguyen et al., 2019), thought to confer the greatest risk for adverse outcomes in non-pregnant samples (Felitti et al., 1998). The most commonly endorsed ACE was parental separation or divorce. In contrast, in a racially-diverse sample comprised of pregnant women with a neighborhood median income of $80,000 to $110,000, less than half of the sample (46%) endorsed one or more ACE (Flanagan et al., 2018). Nearly one-third (28%) reported one to two ACEs, and 18% reported three or more ACEs. In this feasibility study of maternal ACE screening in pregnancy, 88% of eligible participants completed screening and almost all patients (93%) reported feeling somewhat or very comfortable discussing ACEs with their clinician. Among the participants who completed screening, those women who endorsed one or more ACEs reported feeling less comfortable completing the questionnaire, than women who reported no ACEs. Overall, patients and clinicians found screening for ACEs acceptable and worthwhile as part of routine prenatal care.

In the literature exploring sequelae of ACEs in pregnant women, studies have varied in their definition of ACEs (using the full 10-item scale or the 8-item version which excludes neglect), in the trimester in which data is collected, and whether ACE data is collected during pregnancy or at a later time point, and connected to pregnancy variables of interest. Studies have also differed in whether ACEs are studied individually or as abuse/neglect/household dysfunction categories, by ACE threshold score (e.g., three or more events, four or more events, five or more events), and by delineating maltreatment ACEs (abuse and neglect) from household dysfunction. Therefore, some unique findings, but also some consistencies have emerged in the literature, as outlined below.

ACEs and mental health outcomes in pregnancy. Mental health in pregnancy is of considerable clinical significance, and has been identified as a significant health issue (BC Reproductive Mental Health Program & Perinatal Services BC, 2014). Although earlier research indicates that perinatal depression is more commonly studied and diagnosed than perinatal anxiety, in an assessment of anxiety disorders and depression in pregnant women, Fairbrother and colleagues found that the prevalence of anxiety disorders in pregnancy were higher than that of major depression (15.8% vs. 3.9%; Fairbrother, Janssen, Antony, Tucker, & Young, 2016). The authors note that given how much more common anxiety disorders are than depression among pregnant women, they have been neglected in clinical care and in the research (Fairbrother et al., 2016). Others have found higher rates of depression in pregnancy, whereby a systematic review found the prevalence of depression in pregnancy to be 12.8% in the second trimester, and 12.0% in the third trimester (Bennett, Einarson, Taddio, Koren, & Einarson, 2004). As described in the practice guidelines, there are risks of untreated depression to the mother (e.g., terminating breastfeeding early, having negative views of herself and baby, and increased risk of future depressive episodes); to the baby (e.g., behaviour disturbance, developmental delays and social issues); and to partners and families (e.g., increased risk of separation/divorce; BC Reproductive Mental Health Program & Perinatal Services BC, 2014).

The relationship between maternal ACEs and mental health outcomes has received increasing research attention in recent years. Maternal ACEs may indirectly relate to infant functioning through increased mental health symptoms in pregnancy (McDonnell & Valentino, 2016). The majority of studies have included a focus on depression, though others have included PTSD, anxiety, and psychiatric diagnoses or mental health problems more broadly

(Olsen, 2018). In their assessment of the association between total ACE score and symptoms of prenatal depression, Wajid and colleagues found support for the ACE threshold of $\geq$4 being associated with a 2.4-fold increase in the odds of prenatal depression (Wajid et al., 2019). In their study of 110 low-income women, using the 10-item ACE scale and exploring the differential role of maltreatment (abuse and neglect) versus household dysfunction ACEs on symptoms of depression and PTSD in pregnancy, Atzl and colleagues found that both the total ACE score and maltreatment ACEs were associated with increased symptoms of depression and PTSD in pregnancy (Atzl, Narayan, et al., 2019). In contrast, the family dysfunction ACE domain – including violence toward mother, substance abuse or mental illness among family members, parental separation or divorce, and incarcerated family member - did not predict these adverse mental health outcomes. The authors also examined whether there were differences in mental health outcomes depending on when the ACEs occurred, and found that PTSD symptoms in pregnancy were associated with maltreatment in early childhood. Maltreatment occurring in other developmental periods (e.g., middle childhood or adolescence) was not associated with symptoms of depression or PTSD. Others have similarly assessed differential contributions of maltreatment ACEs versus household dysfunction ACEs toward predicting prenatal depressive symptoms (McDonnell & Valentino, 2016). It was found that childhood maltreatment predicted higher levels of prenatal and postnatal symptoms of depression than did household dysfunction ACEs. Further, a smaller reduction in depressive symptoms from the prenatal to the postnatal period was associated with childhood maltreatment ACEs compared to household dysfunction ACEs (McDonnell & Valentino, 2016). In a study by Menke and colleagues (2019), in their sample of 578 perinatal women seeking psychiatric care, most women (65%) met criteria for

major depression, nearly one quarter met criteria for generalized anxiety disorder (23%), and 4% met criteria for PTSD. Nearly all women (98.2%) reported poor sleep quality and 30% reported 4 or more ACEs. Sleep quality was found to be associated with depression and anxiety, though not with PTSD. Total ACE score was associated with prenatal depression and PTSD, but not with anxiety. Therefore, in this sample of women presenting with mental health needs during pregnancy, it appears that both depression and anxiety, as well as poor sleep were prominent. Furthermore, a significant proportion of the sample were above the higher-risk threshold of having experienced four or more ACEs. In their study examining associations between maternal ACEs and mental health in pregnancy, Young-Wolff and colleagues found support for a dose-response relationship whereby increasing number of ACEs was associated with increased likelihood of mental health problems (Young-Wolff et al., 2019). Specifically, compared to women who reported no ACEs, those who endorsed one or two ACEs were 2.42 times more likely to have an anxiety disorder, 2.49 times more likely to have a depressive disorder, and 3.12 times more likely to report intimate partner violence (IPV). Women who endorsed three or more ACEs, were even more likely to endorse each of these; anxiety was 3.08 times more likely, depression was 3.98 times more likely, and IPV was 4.71 times more likely. Comparing those with no ACEs to those reporting three or more ACEs, prevalence rates were as follows for: anxiety disorder (7.3% vs. 19.1%), depressive disorder (5.7% vs. 19.1%) and IPV (3.6% vs. 14.3%).

In addition to depression and anxiety, childbirth fear is an important psychological experience occurring during pregnancy, which may also be related to adversity in childhood. The prevalence rate of serious childbirth fear, defined as scoring greater than 100 on the Wijma

Delivery Expectancy/Experience Questionnaire (W-DEQ, a commonly used measure of FOC; Wijma, Wijma, & Zar, 1998) has been shown to be 5.5% in a large sample of Norwegian women (*n* = 1452; Heimstad, Dahloe, Laache, Skogvoll, & Schei, 2006). More recent research has provided similar estimates: in an Irish sample using a W-DEQ cutoff of 85 to define severe childbirth fear, 5.3% of women met this criteria, and 36.7% of women met criteria for high childbirth fear (W-DEQ $\geq$ 66; O'Connell, Leahy-Warren, Kenny, O'Neill, & Khashan, 2019). These rates are also comparable to those reported in an Australian sample, whereby 4.8% of pregnant women reported severe fear of childbirth (Toohill, Fenwick, Gamble, & Creedy, 2014). Nulliparous women report higher levels of childbirth fear than multiparous women (Storksen et al., 2012; Toohill et al., 2014). Childbirth fear has been identified as a common reason for requesting cesarean section (Nilsson et al., 2018), though not consistently (Heimstad et al., 2006). Support for associations between childbirth fear and anxiety and depression have emerged (Rouhe, Salmela-Aro, Gissler, Halmesmäki, & Saisto, 2011; Storksen et al., 2012). Women with childbirth fear have been shown to have greater psychiatric morbidity than non-fearful controls, and depression and anxiety were found to be twice as common for fearful women (Rouhe et al., 2011). Further, among primiparous women, a history of childhood emotional, physical or sexual abuse has been shown to significantly increase the likelihood of experiencing severe childbirth fear (Lukasse et al., 2010). A graded response between childbirth fear and the number of abuse types endorsed by women emerged, such that childbirth fear was greater among women who reported more childhood abuse (Lukasse et al., 2010). For multiparous women, the primary association with childbirth fear was previous negative birth experience, and not history of abuse. Others have not found differences in

childbirth fear among primiparous versus multiparous women (Heimstad et al., 2006). Additionally, a history of child sexual or physical abuse was associated with childbirth fear and more complicated deliveries. That is, child sexual or physical abuse was associated with lower rates of uncomplicated vaginal delivery (54-57%) compared to women without a history of abuse (75%; Heimstad et al., 2006). However, childbirth fear was not associated with mode of delivery (Heimstad et al., 2006). Birth outcomes (birthweight, gestational age) have not been associated with severe childbirth fear (O'Connell, Leahy-Warren, Kenny, & Khashan, 2019), perhaps reassuringly for women and their health care providers.

Health risk behaviours. Smoking has been identified as a mechanism through which maternal adversity predicts birth outcomes, namely birthweight and gestational age (Smith et al., 2016). In fact, in a multiple mediation model including several other candidate variables (marital status, education, illicit substance use, SRI use, psychiatric disorder diagnosis, and social support), the strongest relationship emerged for the role of smoking in the mediation of ACEs and adverse birth outcomes. In addition to smoking, a dose response relationship for alcohol use in pregnancy has emerged, such that increasing number of ACEs has predicted higher odds of alcohol use during pregnancy (Frankenberger et al., 2015). In this sample of 1,987 women using data from 2010 BRFSS survey conducted in Nevada, 6% of all pregnant women endorsed alcohol use during pregnancy since learning they were pregnant. It is also worth noting that this effect remained, after controlling for pre-pregnancy alcohol use, as well as smoking status and demographic factors. In a sample of 1,472 young, low-income, single, African American pregnant women, a similar percentage of participants (7%) endorsed alcohol use since knowing they were pregnant, 23% endorsed smoking, and 7% reported illicit drug use

(Chung et al., 2010). This study used a different questionnaire to assess ACEs, and mapped the study-specific ACE categories onto 6 of those ACE domains defined by Felitti, and included an additional ACE regarding witnessing a shooting. Findings supported a dose response relationship, whereby women who reported 3 or more ACEs had more than 2.5 times the risk of smoking, 3.7 times the risk of alcohol use, and 6.1 times the risk of illicit drug use in pregnancy, compared to women who reported no ACEs (Chung et al., 2010).

Health-promoting behaviours. To my knowledge, health-promoting behaviours related to pregnancy in and of themselves, such as taking prenatal vitamins, seeking prenatal education, and engaging in regular exercise during pregnancy, have not been studies in the context of maternal ACEs. However, it is plausible that engaging in such health-promoting behaviours during pregnancy, may serve to buffer deleterious effects of maternal ACEs on mental health, within a resilience framework. One health promoting behaviour which has been studied along with the effects of ACEs among pregnant women, is sleep. As mentioned earlier, sleep is a critical physiological process, and a behavioural target for intervention. Alterations to typical sleep have been reported by some in all trimesters of pregnancy, characterized by short sleep duration, insomnia, poor sleep quality, and poor sleep efficiency with increased wake time during the night (Palagini et al., 2014). Others have described changes in sleep patterns over the course of pregnancy, as described by increased daytime sleepiness and increased total sleep time during the first trimester, which is in contrast to a decrease in sleep time in the third trimester and an increase in night waking (Chang et al., 2010). Age and trimester have been associated with poorer sleep, whereby sleep quality decreases from the second to the third trimester, and older women report poorer sleep in pregnancy (Sedov, Cameron, Madigan, &

Tomfohr-Madsen, 2018). Chronic sleep loss in pregnancy has been identified as both a result of stress, and as a physiological stressor in and of itself, perhaps in keeping with the allostatic load hypothesis (Palagini et al., 2014). This hypothesis outlines the physiological toll, or "hidden cost" to the body that accumulates due to chronic stress, whereby the interaction of environmental factors and genetic predispositions lead to individual differences in stress susceptibility (McEwen & Stellar, 1993). Sleep deprivation in pregnancy is common due to the physical and hormonal changes of pregnancy, and it has been hypothesized that this may increase susceptibility to adverse maternal and fetal outcomes including preterm and longer labour, increased pain during labour, and greater rates of cesarean section deliveries (Chang et al., 2010), as well as prenatal depression, gestational diabetes, pre-eclampsia, and intrauterine growth restriction (Palagini et al., 2014). Psychobiological mechanisms thought to underlie this association between poor sleep and depression includes alteration to the hypothalamic-pituitary-adrenal (HPA) axis, or increased proinflammatory system activity (Palagini et al., 2014). Research has not clearly identified the directionality of the relationship between poor sleep and depression, such that poor sleep may lead to depressive symptoms, or else the reverse may be true. However, given the link between depression and poor sleep in pregnancy, it is conceivable that efforts to improve sleep as a behavioural target for intervention, may have a positive impact on depressed mood in pregnancy. Others have explored the relationship between sleep and anxiety in pregnancy, and have found that sleep duration and levels of anxiety were associated cross-sectionally, but the hypothesized association between changes in anxiety over the course of pregnancy, and changes in sleep duration, were not found (van der Zwan et al., 2017).

Resilience. This characteristic has been described simply, as positive adaptation in the face of adversity (Fleming & Ledogar, 2008). To elaborate, Rutter has defined resilience as "the dynamic process involving interaction between risk and protective processes – internal and external to the individual – that act to modify the effects of adverse life events" (Rutter, 1990, p.119). Resilience can be thought of as a personal characteristic, or as environmental or systems factors serving to mitigate adversity. In their study exploring the role of resilience in the relationship between ACEs and depression among pregnant women, this heterogenous construct has been defined in terms of individual, contextual, and relational resilience (Howell et al., 2017). The authors identified the importance of resilience as a possible mediator in the relationship between adversity and mental health, and they tested each of the three types of resilience in a multiple mediation model predicting depressed mood in the past week from total ACE score, in a sample of low-income pregnant women. Results revealed an association between higher total ACE scores and depressed mood, and between higher total ACE scores and lower levels of relational resilience, but not individual or contextual resilience. Only relational resilience was negatively associated with depressed mood, and a significant indirect effect of relational resilience was found on the association between ACEs and depression, thus lending support to mediation (Howell et al., 2017). In addition to studying feasibility of screening for maternal ACEs in a prenatal population, Flanagan and colleagues also assessed resilience, which was shown to be greater among women who reported no ACEs, compared to women who reported 1 or more ACE (Flanagan et al., 2018). In their study of pregnant women screened for ACEs and resilience as part of their prenatal care, in which Young-Wolff and colleagues found support for a dose-response relationship whereby increasing number of ACEs

was associated with increased likelihood of mental health problems, they also explored differences in mental health outcomes among women with low versus high resilience (Young-Wolff et al., 2019). Interestingly, they found that having 1 or more ACE, compared to women who reported no ACEs, was associated with worse mental health outcomes among women with low resilience, including higher prevalence of anxiety disorders, depressive disorders, depression symptoms, and intimate partner violence. For women with high resilience, reporting one or more ACEs versus reporting no ACEs, was not associated with higher prevalence of anxiety disorders, depressive disorders, depression symptoms, and intimate partner violence. Interestingly, the opposite effect emerged for substance use, whereby high resilience was associated with a higher prevalence of substance use among women reporting 1 or more ACE, compared to those reporting no ACEs.

Social Support. Among pregnant women, social support has frequently been studied as a resilience factor, or alternatively, low social support has been considered a risk factor for maternal well-being and child outcomes. In their review, Biaggi and colleagues identified lack of social support, history of abuse or domestic violence, and adverse life events, among other factors (Biaggi, Conroy, Pawlby, & Pariante, 2016) as the main risk factors involved in the onset of antenatal anxiety and depression. The role of low social support as a risk factor for the development of symptoms of depression in pregnancy has received further empirical support (Elsenbruch et al., 2007; Wajid et al., 2019). Among women who smoked in pregnancy, the effects of low social support were particularly salient, and were associated with lower child body length and lower birthweight, as well as increased likelihood of pregnancy complications and preterm delivery (Elsenbruch et al., 2007). In a study including 266 pregnant women in

Turkey, in which 18% of the sample endorsed symptoms on the Beck Depression Inventory above a threshold suggestive of treatment, lack of social support from relatives was associated with severity of depressive symptoms (Aktas & Yesilcicek Calik, 2015). Though depression in pregnancy has been found to be associated with both total ACE score and decreased social support, Wajid and colleagues did not find support for their hypothesized mediating role of social support in the relationship between ACEs and depression (Wajid et al., 2019). In contrast, the moderating role of social support has emerged in the relationship between maternal ACEs and prenatal health risks, comprised of pre-pregnancy risk factors, past obstetric risk factors, problems in the current pregnancy, and other risk factors (N. Racine et al., 2018). In this sample of 1,994 Canadian women who comprised the All Our Babies/Families prospective pregnancy cohort, women who reported high levels of maternal ACEs and low levels of social support (1 standard deviation below the mean), had higher prenatal health risk scores; however, there was no impact on health risk for women with high levels of maternal ACEs and high levels of social support (1 standard deviation above the mean). It is therefore reasonable to infer that high levels of social support serve a buffering role in the relationship between ACEs and prenatal health risk. Others have delineated various types of support in an effort to better understand whether differences in outcome emerge by support type (tangible, emotional, information; Appleton, Kiley, Holdsworth, & Schell, 2019). Specifically, the protective effect of social support on the relationship between ACEs and infant birth size has emerged, for those women with 0 to 3 ACEs, but not for women with 4 or more ACEs. This is somewhat counter to the typical threshold effect of ACEs, though the authors postulated that among women who reported 4 or more ACEs, their severity of adversity experienced was

greater, thus the protective effect of social support may emerge with less severe forms of adversity (Appleton et al., 2019). Though social support has been hypothesized as a protective factor to buffer against adverse birth outcomes such as preterm birth, a recent systematic review and meta-analysis did not find support for a direct relationship between social support and preterm birth (Hetherington et al., 2015).

Purpose of the Study

The literature reviewed above established links between early adversity as defined by abuse, neglect, and household dysfunction, and prenatal mental health symptoms, with most research support for the role of depression. Pregnancy-specific anxiety and childbirth fear have also been shown to relate to depression in pregnancy. Furthermore, support has emerged for candidate mediating variables in the relationship between ACEs and mental health symptoms in pregnancy, including poor sleep, risky health behaviours such as substance use, low resilience, and low levels of social support. Given the findings discussed above, the current study enrolled a sample of 330 Canadian pregnant women in the third trimester of pregnancy, to explore interrelationships of all the study variables. Specifically, this study explored pathways predicting mental health symptoms in pregnancy from adverse experiences in childhood, as well as possible behavioural and social mediators. Although some research has been conducted to explore many of the individual pathways in the model, the current study employed structural equation modeling to simultaneously assess the proposed theoretical pathways. This approach allowed for the exploration of the relationship between maternal ACEs and mental health symptoms in pregnancy, and whether a latent health-promoting behaviour factor, a latent health-risk behaviour factor, resilience, and/or a social support latent

factor mediate this relationship. Specific study aims were twofold. The first aim of the study was to determine the relationship between a maternal ACE factor, and a latent prenatal mental health factor comprised of anxiety, depression and fear of childbirth. The second aim of the study was to test for hypothesized mediating pathways of this relationship. Strengths of the current study include its broad online sampling approach which included women living across Canada, as well as its use of the 10-item ACEs scale which includes neglect as well as abuse and household dysfunction, and the inclusion of both risk and protective factors. Further strengths include the concurrent assessment of maternal ACEs and mental health symptoms in pregnancy, and a structural equation model approach to test both latent and measured variables, in a large model permitting the simultaneous testing of pathways. Further, the current study included novel foci on prenatal health-promoting behaviours, the individual resilience construct, and the inclusion of childbirth fear.

Study Hypotheses

The major hypotheses which follow from the study aims are outlined below.

1. Higher maternal ACE scores, reported prenatally, are predictive of greater mental health symptoms (anxiety, depression and fear of childbirth) in pregnancy.
2. Higher maternal ACE scores are associated with more health risk behaviours and poor sleep, and fewer health-promoting behaviours. Each of these are in turn, associated with poorer mental health in pregnancy. ACEs are mediated by health-risk and health-promoting behaviours on mental health symptoms in pregnancy.
3. Similarly, social support mediates the impact of maternal ACEs on mental health symptoms in pregnancy.

4. There is not a clear hypothesis about the relationship between maternal ACEs and resilience, though it is expected that resilience will be negatively predictive of mental health symptoms in pregnancy. That is to say, women high on resilience will report fewer mental health symptoms in pregnancy. This will lend support to a stress-buffering role of social support and resilience, on mental health in pregnancy.

Methods

Participants

The current study, also known as the ACEs and Pregnancy Study, was conducted as an optional, second part to the larger Childbirth Fear Study led by Dr. Nichole Fairbrother, with the University of British Columbia Island Medical Program. Data collection for the Childbirth Fear Study started in fall 2016, which was primarily a validation study for the Childbirth Fear Questionnaire (Fairbrother, Thordarson, & Stoll, 2018). Women were asked to complete an online questionnaire that included the CFQ, as well as questionnaires assessing stressful life events, sexual victimization in adulthood, and symptoms of depression and post-traumatic stress disorder. A semi-structured interview (the Diagnostic Assessment Research Tool: Specific Phobia Section, McCabe et al., 2016) to assess for tokophobia (specific phobia, childbirth fear) was conducted by telephone with each participant subsequent to questionnaire completion. Data collection for the current study occurred between June 2017 through February 2018, after data collection for the Childbirth Fear Study had already commenced. Women who agreed to participate in the ACEs and Pregnancy Study who had recently completed the Childbirth Fear Study, were given additional questions ("Part 2"), which were unique to the ACEs and Pregnancy Study. From June 2017 onwards, all participants completed the full questionnaire, which included Part 1 (The Childbirth Fear Questionnaire study questions) and Part 2 (The ACEs and Pregnancy Study questions). The final sample for the current study was comprised of 330 pregnant women in their third trimesters (gestational age 33+ weeks). Women of various socioeconomic and cultural backgrounds were included. Participants for both studies were recruited via online advertisements and flyers posted in doctors' offices in Vancouver, B.C., and

through the Midwives Association of British Columbia. In-person recruitment for the study occurred at B.C. Women's Hospital in Vancouver, B.C., with permission granted by the hospital ethics review board. Eligibility criteria to complete the questionnaire included pregnancy in the third trimester, and proficiency in English. Ethical approval for the ACEs and Pregnancy study was first granted by the Ethics Board of the University of Victoria and by the Behavioural Research Ethics Board of the University of British Columbia for the Childbirth Fear Study, resulting in a harmonized ethics board approval held by UBC once data collection for both studies merged.

Procedure

As described above, the current (ACEs and Pregnancy) study was an extension of the existing UBC Island Medical Program's Childbirth Fear Study. Women were informed about both studies (the primary Childbirth Fear Study and the secondary ACEs and Pregnancy Study), and invited to register for the online questionnaire via the FluidSurveys survey software program, at any time during their pregnancy. At 33 weeks' gestation, registered participants were automatically sent a link to complete the full questionnaire. Participants were able to access the survey from their personal computers and they completed the survey on their own time in a setting of their choice. All questionnaires were completed after 33 weeks' gestation. Consent forms and an explanation of the online questionnaire, including both the Childbirth Fear Study ("Part 1") and the ACEs and Pregnancy Study ("Part 2") were presented at the beginning of the survey. A contact phone number and email address were provided for participants to phone or email the primary investigator if they had any questions about the study. If they did not choose to begin the questionnaire after reading the consent form, they

were able to exit the survey program. Upon completion of Part 1 of the survey, which included the Childbirth Fear Study measures – fear of childbirth, depression, trauma events and symptoms, ratings of past events, and unwanted sexual experiences in adulthood – participants were invited to proceed to Part 2 of the questionnaire, which included the ACEs and Pregnancy measures. These additional questions which comprised the current study, were related to adverse childhood experiences, health behaviours, sleep, social support, relationship with medical care provider, resilience, and pregnancy-specific anxiety. Upon completion of Part 1 of the questionnaire, all participants were offered the chance to enter into a draw for a 1 in 100 chance to win a prize of $150. Upon completion of Part 2 of the questionnaire, participants were eligible to enter into a draw for 1 of 3 brand-new 16 GB iPad Airs. For those women who did not wish to complete Part 2, the survey directed them to a debriefing form after completing Part 1, and participants were thanked for their time. The entire questionnaire comprised of Parts 1 and 2 took approximately one hour to complete. On its own, Part 2 took approximately 30-40 minutes to complete.

Measures

The following measures were included in the current study. The origin of each questionnaire is noted to signify if it was included in Part 1 or Part 2 of the research. Only those measures included in the ACEs and Pregnancy Study are presented below.

Retrospective assessment of adverse experiences in childhood.

Adverse Childhood Experiences (ACEs, Part 2). Participants completed the 10-item Adverse Childhood Experiences questionnaire, to report whether they had experienced any of the following experiences before age 18: emotional, physical, or sexual abuse, emotional or

physical neglect, violence toward mother/stepmother, substance misuse among family members, mental illness in the household, separation or divorce between parents, and family incarceration (Felitti et al., 1998). This measure has been used extensively with thousands of participants, primarily in the United States, as part of the Adverse Childhood Experiences Study conducted by the Centers for Disease Control and Prevention, and Kaiser Permanente. The original large-scale study was conducted between 1995 to 1997, across two waves of data collection, and examined the relationship between childhood abuse and neglect, and later life health outcomes. A total ACE score, used to assess cumulative childhood stress, is generated from summing the 10 items which were each scored *yes* = 1 or *no* = 0. This 10-item scale was derived in part from the Conflict Tactics Scale (psychological and physical abuse items; Straus & Gelles, 1990), from Wyatt (sexual abuse item; Wyatt, 1985), and from the 1988 National Health Interview Survey (Schoenborn, 1991). A three-factor structure of the BRFSS version of the ACE questionnaire (which excludes neglect) has been identified, and yielded the following three factors: Emotional/Physical Abuse, Sexual Abuse, and Household Dysfunction (Ford et al., 2014). To my knowledge, the factor structure of the 10-item ACE questionnaire has not been identified. In the current study, three ACE subscales were also created by domain as described by Felitti, and included: Abuse (3 items, questions 1 through 3), Neglect (2 items, questions 4 and 5), and Household Dysfunction (5 items, questions 6 through 10). Total summary scores were calculated for each domain. Cronbach's alpha calculated for the total scale was .74 in the current sample, reflecting acceptable internal consistency (Multon & Coleman, 2010).

Child sexual abuse (Part 2). The third item of the 10-item ACE questionnaire queries sexual abuse which occurred before the age of 18 (Child Sexual Abuse; CSA). If a participant

endorsed this item on the ACE questionnaire, a set of follow up questions were presented (these were developed by Runtz and used in several other CSA studies).

Mental health symptoms.

The Edinburgh Perinatal/Postnatal Depression Scale (EPDS, Part 1). This 10-item self-report measure of depression was developed for use with a postnatal population (Cox, Holden, & Sagovsky, 1987) and its validity for use with a pregnant population has been established (Murray & Cox, 1990). In their systematic review of perinatal depression, the Agency for Healthcare Research and Quality (AHRQ) found the EPDS to be one of the measures with the highest level of specificity and sensitivity to screen for depression during pregnancy (Gaynes et al., 2005). It is one of the most commonly used measures used to screen for perinatal depression, and its use is recommended to screen for depression in the perinatal period by Perinatal Services BC (BC Reproductive Mental Health Program & Perinatal Services BC, 2014), and by the National Perinatal Association (National Perinatal Association, 2018). The EPDS is comprised of 10 items on a 4-point Likert-type scale, ranging from 0 = "*no, not at all*" or "*never*" to 3 = "*yes, most of the time*" or "*yes, quite often*" to reflect frequency of depressive symptoms experienced in the past 7 days. Somatic symptoms of depression (such as fatigue and change in appetite) are not included on the EPDS given the expectation that these may be impacted by pregnancy. A total score, out of 30, is calculated. The following cutoff scores have been established to reflect probability of depression: less than 8 = depression not likely, 9 – 11 = depression possible, 12 – 13 = fairly high possibility of depression, and 14 and higher = probable depression. Internal consistency of the EPDS in the current sample was very good (α = .88).

Childbirth Fear Questionnaire (CFQ, Part 1). This 40-item self-report scale assesses a range of labour and childbirth situations that some women may find frightening (Fairbrother et al., 2018). Examples of potentially fearful situations include experiencing pain during contractions, being seen naked by others during labour/birth, and the baby suffocating during labour/birth. Each item is rated on a 5-point Likert-type scale ranging from 0 (*Not at All*) to 4 (*Extremely*). A recent factor analysis of this measure revealed the following nine factors: Fear of Loss of Sexual Pleasure/Attractiveness, Fear of Pain from a Vaginal Birth, Fear of Medical Interventions, Fear of Embarrassment, Fear of Harm to Baby, Fear of Cesarean Birth, Fear of Mom or Baby Dying, Fear of Insufficient Pain Medication, and Fear of Body Damage from a Vaginal Birth. To score this measure, mean scores for each factor are calculated, and a total childbirth fear score is created by summing all 40 items. Internal consistency for each of these subscales, as well as for the total score, has been shown to be good or excellent in a sample of 643 pregnant women (Cronbach's alphas range from .76 to .94; alpha for the total score = .94; Fairbrother et al., 2018). In the current study, reliability for the total scale was excellent (α = .96). The authors of this measure have defined threshold values for *Moderate to High* levels of childbirth fear (scores ranging from 83 – 104, corresponding to the top 25% of study responses), as well as *Extreme* levels of childbirth fear (cutoff score 105, corresponding to the top 10% of respondents). This is consistent with the W-DEQ, a commonly used measure of childbirth fear (Fairbrother et al., 2018; Wijma et al., 1998). The CFQ additionally includes an Interference scale consisting of 8 items which inquire about the degree to which these fears of childbirth interfere with daily life among respondents. The Interference scale was not used in the current study.

Stress in Pregnancy Scale (SIPS, Part 2). This 48-item self-report scale assessed the degree of pregnancy-related stress felt during the past 2 weeks, ranging from 0 (*no stress*) to 4 (*very high stress*), to assess pregnancy-related anxiety (Fairbrother, personal communication, February 24, 2017). Sample items include, "pregnancy complications I am experiencing", "whether my baby's life is as risk", and "what unusual symptoms mean in terms of my pregnancy". A total score was calculated, and ranged from 0 to 192. Factor analysis has revealed the following subscales: Care Related (α = .96), Pregnancy Related (α = .94), Baby Related (α = .86), and Relationship Related (α = .84; personal communication with N. Fairbrother, March 31, 2019). The overall scale demonstrated excellent reliability in the current sample (Cronbach's alpha = .97). The current study used the total SIPS score as an indicator of pregnancy-specific anxiety, to be included as one of three indicators of the Mental Health Symptoms latent variable in the larger SEM model as described in the Introduction (see Figure 1).

Health-risk and health-promoting behaviours during pregnancy.

Alcohol and Substance Use (Part 2). Participants were asked to report their typical alcohol consumption in the past 12 months before pregnancy, ranging from "no drinks during an average week", followed by "less than one drink during an average week", and "1 to 3 drinks a week", to "15 to 17 drinks per week," and "18 or more drinks per week". The following definition of a standard drink was used: a 341ml (12 oz) bottle of 5% strength beer, cider or cooler; or a 43 ml (5 oz) glass of 12% strength wine, or a 43 ml (1.5 oz shot) of 40% strength spirit (Canadian Centre on Substance Abuse, 2018). Participants were also asked to report on how many occasions they consumed 3 or more drinks in one sitting, and 11 or more drinks in

one week, during her first, second, and third trimesters, as well as in the first trimester before she knew she was pregnant. These are considered problem levels of drinking for women outside of pregnancy, and the Canadian Centre on Substance Abuse guidelines specify zero consumption is safest during pregnancy (Butt & Canadian Centre on Substance Abuse, 2012). Participants were also asked whether they had consumed any alcohol since knowing they were pregnant (0 = no, 1 = yes), and how many drinks they had consumed in the past week.

A modified version of the National Institute on Drug Abuse-ASSIST measure, as included in the Online Assessment Measures of the American Psychiatric Association website, assessed smoking and substance use (other than alcohol) during pregnancy (American Psychiatric Association, 2019, p. 2). Specifically, participants were asked to report how many days per week they typically consumed each of the following, within each trimester: cigarettes/cigars/pipes/chewing tobacco/snuff; painkillers (like Vicodin or codeine, etc.); Stimulants (like Ritalin, Adderall); Sedatives or tranquilizers (like sleeping pills of Valium); Marijuana; and other illicit drugs. Response options ranged from none, to daily use, and the questions specified that use was outside of prescriptions used according to their doctor's directions. Participants were also asked to indicate whether they had changed their level of substance use consumption since becoming pregnant.

A total score to reflect engagement in health risk behaviours – alcohol use, smoking, and drug use – was derived from a combination of the alcohol use measure, along with the smoking and substance use measure. A score of one was assigned to each of the following three behaviours: 1) If a participant reported drinking at any point since knowing she was pregnant, 2) If she endorsed any smoking in pregnancy, and 3) If she reported any drug use in pregnancy.

Each of these were dichotomized due to low overall rates of each health risk behaviour endorsed. This yielded a health risk behaviour score ranging from 0 to 3, with higher numbers reflecting engagement in more health risk behaviours as defined by alcohol, smoking and substance use.

Physical Activity (Part 2). To assess participants' levels of physical activity during pregnancy, exercise habits across their pregnancy was queried. A modified version of Paffenbarger's measure of physical activity to assess health effects in community samples was used (Paffenbarger, Blair, Lee, & Hyde, 1993). This measure has been validated in previous research, and it has predicted objective measures of fitness (Siconolfi, Lasater, Snow, & Carleton, 1985). Participants also reported any pregnancy-related exercise changes in a series of questions developed for this study. Participants in the current study reported whether over the course of a typical week, they engaged in any regular activity (such as walking, jogging, cycling, etc.), long enough to work up a sweat. Their response on this measure was scored 1 for "yes", and 0 for "no". Participants were also asked whether or not they believed they engaged in enough exercise to be healthy, in order to ascertain a glimpse of exercise-related beliefs during pregnancy. Again, this question was assigned a value of 1 for women who endorsed this item, and 0 for those who did not. A total exercise score was calculated from summing these two items, and ranged from 0 to 2.

Prenatal Health Care Behaviours (Part 2). A series of questions were developed for the current study in order to assess the extent to which participants endorsed performing prenatal behaviours relevant to pregnancy. Examples of such behaviours include: taking pregnancy-specific supplements, taking a prenatal health course, self-educating about pregnancy and

childbirth, making changes to diet and nutrition, and engagement in relaxation activities. These questions were developed from a health-promotion perspective, such that women who reported engaging in these behaviours are thought to be enhancing or promoting good health during pregnancy. Participants were assigned a score of "1" for each of these items, and a total score ranging from zero to five was calculated to reflect prenatal health behaviours. Reliability for this scale created for the purposes of the current study was low (α = .23). An additional question regarding prenatal vitamin use queried typical weekly consumption (i.e., the number of days per week a participant typically takes a prenatal vitamin), and ranged from zero to seven.

Sleep (Part 2). The 21-item General Sleep Disturbance Scale (GSDS) assessed disrupted sleep in the past week (Lee, 1992). These items pertain to specific sleep problems during the past week, ranging from zero (*not at all*) to seven (*every day*). Items included problems with sleep onset and night waking, late insomnia (early waking), sleep quality and quantity, daytime fatigue and substance use to induce sleep (Shahid, Wilkinson, Marcu, & Shapiro, 2011). A cutoff mean score of 3 corresponds to DSM-IV criteria for insomnia three or more times per week, and internal consistency has been adequate (Cronbach's alpha > .75) among samples of childbearing women (K. Lee, personal communication, August 2017). Mean scores are also recommended for use among pregnant women who likely do not endorse many of the medication-related questions (K. Lee, personal communication, August 2017).

***Resilience (Part 2)*.** Developed by Wagnild, the short form of the Resilience Scale (RS-14; Wagnild, 2009) was developed to reduce participant burden while still capturing the five characteristics of resilience (self-reliance, purpose, equanimity, perseverance, and

authenticity). This measure includes 14 items that have been shown to share a common underlying dimension. The RS-14 correlates very strongly with the 25-item Resilience Scale (r = .97, p < .001), and it has been shown to have excellent internal consistency (Cronbach's alpha = .93). In their work developing this questionnaire, the RS-14 authors have found resilience correlates with age, such that older people report more resilience, and with self-reported health status, whereby higher resilience is associated with better health. Women report greater resilience than men, and resilience was lower among people who reported current or prior symptoms of depression. In a multiple regression analysis, variance in resilience was significantly predicted by independent contributions of age, depression, and self-reported health status scores (Wagnild, 2009). In a separate study, the authors found an association between individuals scoring high on resilience being more likely to exercise, eat nutritiously, be within five pounds of their ideal weight, endorse minimal or no alcohol use, and be less likely to use tobacco. The authors have established six resilience levels based on RS-14 total scores, ranging from *Very Low* through *High*. In a sample of 1,161 adults (71.1% women), the mean resilience score on the RS-14 was 76.17 (*SD* = 13.9), corresponding to the *Moderate* category.

Formal and informal support during pregnancy.

Prenatal Social Support Instrument (PSSI, Part 2). Developed by the Stony Brook Pregnancy Project, the PSSI is an interview used to assess partner as well as other support received by family, friends or others. Satisfaction with partner and other support was also queried. The PSSI is based on a measure developed for use with a pregnant population, and has been shown to have adequate reliability (Cronbach's alpha = .81 for partner support, and .58 for other support), and sufficient predictive validity (Collins, Dunkel-Schetter, Lobel, &

Scrimshaw, 1993). Permission was granted by the author of the PSSI to adapt this measure for questionnaire administration, and the current study used a selection of the interview questions. The current study assessed four types of support received from the participant's partner, and from another person ("Other Support"), since being pregnant. The types of support included material, instrumental, emotional, and informational. After indicating whether or not (*yes/no*) each type of support was provided, the participant indicated how satisfied she was with the support she received (or did not receive) from her partner/other person, ranging from zero (*not at all*) to three (*very much*). A total support score, ranging from zero to eight, was calculated by summing the four Partner Support items and the four Other Support items. Reliability for these items in the current study was poor (α = .45). Average satisfaction with support from partner and other was also calculated from the eight support items and ranged from zero to three. Reliability for these eight satisfaction items was good (α = .83).

Health care provider support (Part 2). In addition to reporting perceived support from partner and close others, participants will be asked to report their perceived support from their health care providers during pregnancy. This includes support from their primary care provider (midwife, general practitioner or obstetrician) as well as any supportive others (e.g., doulas). These questions were developed for the purpose of this study, and were phrased as the following: "How confident are you, that your health care provider (doctor, midwife or obstetrician) will provide the support you need during the delivery?" Response choices ranged from 0 (not very confident) to 2 (very confident). Participants were also asked to indicate who they intended to have support them during the labour and delivery, and a total number of supporters score was calculated by summing the number of people they selected. In addition

to the study-specific questions, the Quality from the Patient's Perspective (QPP) modified short-form questionnaire was administered to assess more specific characteristics of the care provider-patient relationship (Larsson & Larsson, 2002). This 10-item short form was developed for use with medical patients of primary health care centers in Sweden in order to examine attitudes toward visiting the same care provider again. This measure assesses service quality perceptions of interactions with care providers, on a scale from 1 = *do not agree at all* to 4 = *completely agree*, based on what the patient experienced. Sample items include: "the doctor was respectful toward me", "I received the best possible treatment (as far as I could tell)", and "I had good opportunity to participate in the decisions that pertain to my care." Cronbach's alpha estimates ranged from .65 to .91 for the three quality-of-care dimensions of this scale (medical-technical, identity-oriented, and socio-cultural atmosphere; Larsson & Larsson, 2002). A total QPP score was calculated by summing all 10 items, and ranged from 10 to 40. Reliability for the total scale in the current sample was excellent (α = .93).

Potential Covariates.

Demographics and Socioeconomic Status (SES). In addition to measuring the primary study variables of interest, a number of potential covariates were assessed. Relevant demographic information assessed included age, ethnicity, marital status, number of previous pregnancies, and number of children currently. SES variables assessed included education level, income, and occupation. These questions were developed by the Perinatal Anxiety Research Lab, Department of Psychiatry, University of British Columbia.

Data Analysis

Data analyses proceeded in four steps: 1) examining demographic characteristics and prevalence rates of main study variables in the sample; 2) examining zero-order associations among all variables; 3) testing relationships between a latent adverse childhood experiences variable and a latent mental health symptoms variable; and 4) testing potential mediators of the relationship between ACEs and mental health symptoms in pregnancy. In order to accomplish the first two steps, descriptive information and frequencies, as well as zero-order correlations were computed using IBM SPSS Statistics version 25. Preliminary analyses explored the demographic characteristics of the sample and for each measure, ranges, means, and standard deviations were calculated. Next, Structural Equation Modeling (SEM), using AMOS 25.0, was conducted to complete steps 3 and 4 above. The main study hypotheses were thus tested in these two steps. SEM is a theory-driven statistical analytic technique incorporating elements of factor analysis, whereby latent (unmeasured) factors are thought to underlie or drive scores on observed indicators of the factor, and path analysis, in which directional paths are specified and tested between factors. SEM is considered structural due to its directionality of specified paths, and the relationships examined between factors. Identifying factors by combining information across three or more measured indicators, and using the shared variance across indicators, accounts for and attenuates measurement error inherent in each indicator (though indicators selected should still be reliable and valid). Another advantage to SEM is its ability to simultaneously specify, estimate, and test hypothesized relationships among variables. A number of overall fit indices are provided, to

ascertain whether the specified model is a good fit to a data-implied matrix. SEM is thus suited to models including broad constructs perhaps difficult to measure or difficult to define.

Results

The findings of the current study will be presented in three sections: first, descriptive characteristics of the study will be presented; followed by a presentation of the first-order associations between study variables; and concluded with a systematic unfolding of the SEM analyses which will address each of the study hypotheses.

Characteristics of the Sample

The current study was comprised of 330 pregnant women in their third trimester. Table 1 includes descriptive information for the sample:

Table 1

Sample Characteristics

	n (%)	*M*	*SD*	Range	*n* (Missing %)
Age (years)		32.6	4.1	21 – 49	330 (0)
Education (years)		17.5	2.6	11.0 – 30.0	318 (3.6)
Gestation (weeks)		34.7	1.9	32 - 41	329 (0.3)
Marital Status					330 (0)
Single	5 (1.5)				
Married	248 (75.2)				
Cohabitating	68 (20.6)				
Non-cohabitating	5 (1.5)				
Separated	1 (0.3)				
Divorced	1 (0.3)				
Other	2 (0.6)				
Parity					326 (1.2)
Primiparous	106 (32.1)				
Multiparous	220 (66.7)				
Ethnicity (Origins) – n = 366					328 (0.6)
European	286 (77.8)				
N. American Aboriginal	22 (6.2)				
Caribbean	3 (0.8)				
Latin, Central and S. American	7 (1.9)				
African	2 (0.5)				
Middle Eastern	3 (0.8)				
South Asian	8 (2.4)				
East Asian	17 (4.6)				
Southeast Asian	5 (1.4)				
Oceanic	1 (0.3)				

Other	12 (3.2)	
Mixed (>1 category selected)	33 (10.0)	
Occupation		329 (0.3)
Student	8 (2.4)	
Full-time employed	207 (62.7)	
Part-time employed	59 (17.9)	
Full-time homemaker	41 (12.4)	
Unemployed, seeking work	1 (0.3)	
Disabled	2 (0.6)	
Unemployed/other	11 (3.3)	
Family income		321 (2.7)
$20,000 - $30,000	15 (4.5)	
$30,000 – $40,000	10 (3.0)	
$40,000 – $50,000	10 (3.0)	
$50,000 – $60,000	29 (8.8)	
$70,000 – $80,000	29 (8.8)	
$80,000 - $90,000	39 (11.8)	
$90,000 - $100,000	29 (8.8)	
More than $100,000	160 (48.5)	
Number of babies carried in current pregnancy (1)	326 (98.8)	328 (0.6)
Primary Care Provider		324 (1.8)
Family Physician	69 (20.9)	
Midwife	175 (53.0)	
Obstetrician	80 (24.2)	
Intent to hire doula (yes)	117 (35.8)	

As seen in Table 1, the mean age of participants in the study was 32.6 years, which is slightly higher than the national average age of all pregnant women most recently published by

Statistics Canada, which was age 30.8 in 2016 (Provencher, Milan, Hallman, & D'Aoust, 2018). Three quarters of participants reported European ethnic origins, and the remaining women indicated a variety of ethnic origins. Three quarters of participants were married, which is also greater than the national average reported in 2018, which was 46.2% (Statistics Canada, 2018). The sample reported a mean of 17.5 years of education, reflecting post-secondary education or greater, and nearly half of the sample reported family income greater than $100,000. Most (62.7%) were employed full time. In terms of pregnancy-specific characteristics of the sample, this was the first pregnancy for one third of women, and most participants were early in their third trimester (*M* = 34.7 weeks). Almost all (98.8%) were singleton pregnancies. Half of the sample was receiving prenatal care from a midwife. The proportion of women choosing midwifery care was much higher than typically found among Canadian women in general (10.8% of births in Canada in 2016-17), and greater than the proportion of women in British Columbia who choose midwife-attended births (22.4% in 2016-17; "Midwifery-led births," 2018). Just over one third of the current sample intended to seek the support of a doula during childbirth.

Descriptive Data

Descriptive analyses were conducted to better characterize the primary constructs of interest in the current study, including: ACEs, health-promoting behaviours, health-risk behaviours, resilience, social support, and mental health symptoms in pregnancy.

Adverse Childhood Experiences. The latent Adverse Childhood Experiences (ACE) variable was comprised of three indicators of adversity in childhood, including abuse, neglect, and household dysfunction. The ACE measure used in this study included all ten ACE items

(Shanta R. Dube et al., 2002; Felitti et al., 1998) and the following prevalence rates were reported in the sample, presented by ACE domain.

Table 2

Characteristics of Adverse Childhood Experiences

ACE domain	ACE item	frequency *n* (%)	n (Missing %)
Abuse	1. Emotional abuse	100 (30.3)	329 (0.3)
	2. Physical abuse	59 (17.9)	328 (0.6)
	3. Sexual abuse	65 (19.7)	325 (1.5)
Neglect	4. Emotional neglect	95 (28.8)	329 (0.3)
	5. Physical neglect	29 (8.8)	329 (0.3)
Household Dysfunction	6. Parental separation/divorce	119 (36.1)	326 (1.2)
	7. Mother treated violently	32 (9.7)	328 (0.6)
	8. Household substance misuse	83 (25.2)	329 (0.3)
	9. Household mental illness	117 (35.5)	329 (0.3)
	10. Incarcerated household member	21 (6.4)	328 (0.6)

As seen in Table 2, parental separation or divorce was reported most frequently, followed by household mental illness, emotional abuse, and neglect. The total ACE score, out of ten, reflects the accumulation of adverse childhood experiences. In the current sample, three quarters of participants reported having experienced one or more adverse childhood experiences, and 22.9% of the sample reported four or more ACEs (see Figure 2).

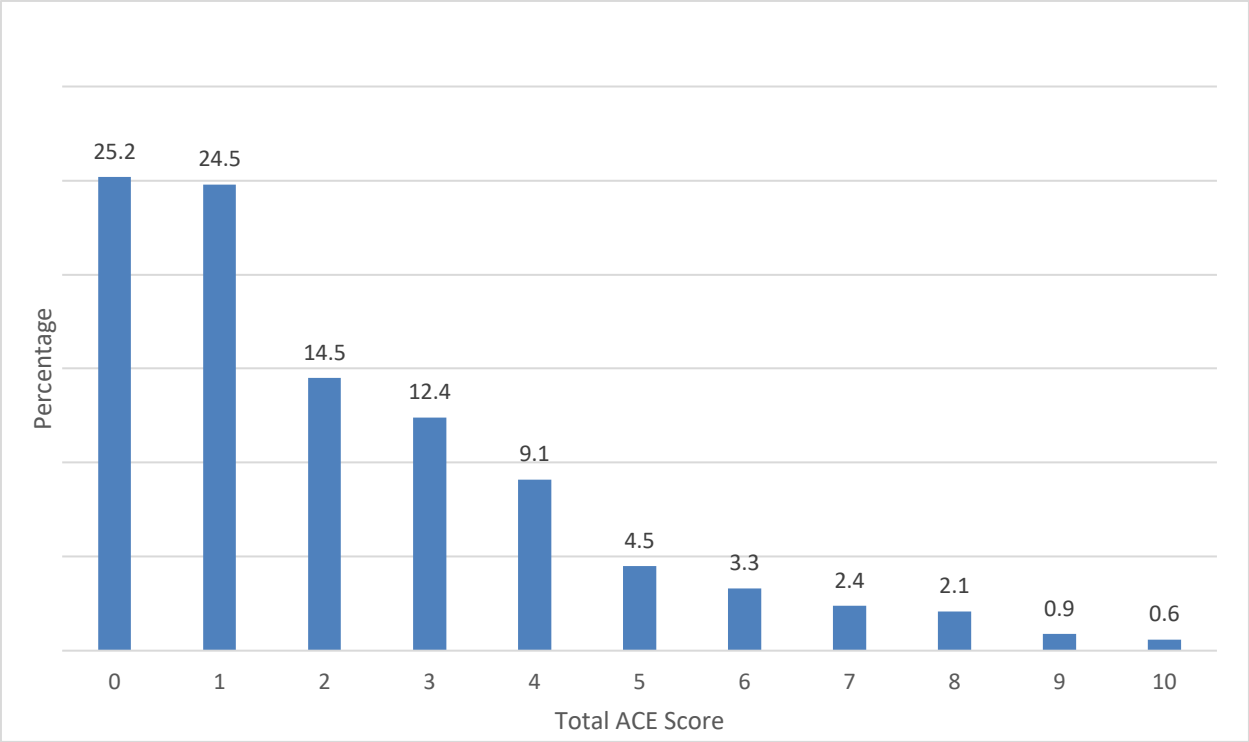

Figure 2. Total ACE scores reported by participants.

Health-promoting behaviours. The latent health-promoting behaviours variable was comprised of four indicators, including prenatal health behaviours, sleep, exercise, and prenatal vitamin use. Each of these are described below in further detail.

Prenatal health behaviours. For each of the following behaviours, participants were assigned a score of "1" if they reported engaging in the behaviour. These included: 1) whether a participant had read books or websites about pregnancy (95.2% *yes*); 2) whether she had taken a prenatal health course (71.5% *yes*); 3) whether she took additional supplements/medications specific to the health of the baby (52.4% *yes*); 4) whether she had made beneficial changes to her diet (70.0 % *yes*); and 5) whether she had made beneficial changes to the amount of relaxation or sleep during pregnancy (52.4 % *yes*). A total score out of five was calculated, to comprise the *prenatal health behaviours* indicator variable of the Health Promoting Behaviours

latent variable in the overall SEM model. Higher scores reflected greater engagement with prenatal health promoting behaviours; the mean score for the sample was 3.43 (*SD* = 1.07).

Prenatal vitamin use. Approximately half (46.7%) of the sample endorsed daily prenatal vitamin use, 13.3% reported use six days per week, 10.9% reported use five days per week, 7.9% reported use four days per week, 6.7% reported use three days per week, 1.2% reported use two days per week, 1.5% reported use one day per week, and 11.8% of women reported taking no prenatal vitamins. This continuous variable, ranging from zero to seven, comprised the *prenatal vitamin use* indicator variable loading onto the Health Promoting Behaviours latent variable in the overall SEM model.

Sleep. In the current sample, the mean GSDS score was 2.68 (*SD* = .91) and 41.5% of the sample (n = 137) endorsed levels of sleep disturbance above this threshold. This continuous variable ranged from zero to five in the current sample and comprised the *sleep* indicator variable loaded onto the Health Promoting Behaviours latent variable in the SEM model.

Exercise. Around one third of participants reported whether they thought they engaged in enough exercise to be healthy (34.5% *yes*) and whether they engaged in regular exercise at least once a week (54.8% *yes*). Each of these items were scored such that 0 = *no* and 1 = *yes*. A sum score of these two items comprised the *exercise* variable loading onto the Health Promoting Behaviours latent factor, and ranged from zero to two to reflect exercise during pregnancy.

Health-risk behaviours. Close to one quarter (24.8% *yes*, *n* = 82) of participants reported consuming alcohol since knowing they were pregnant. Many fewer reporting smoking cigarettes (2.4%, *n* = 8) or using illicit substances (8.8%, *n* = 29) while pregnant. Again, each of

these variables were assigned a value of "1" if the participant reported engaging in the behaviour, and a summary score out of three was calculated to comprise the Health Risk Behaviours observed variable in the structural model. In the current sample, 67.3% (*n* = 222) of participants scored zero on the total health-risk behaviour variable, 28.8% scored one (*n* = 95), and 3.6% of the sample scored two (*n* = 12). No individuals reported all three health risk behaviours (alcohol use, smoking, and drug use) during their current pregnancy.

Resilience. The majority of the sample reported resilience levels in the range from moderate to high, as indicated by the following:

Table 3

Resilience Levels as Measured by the RS-14

Resilience level	Frequency (%)
Very Low	21 (6.4)
Low	23 (7.0)
On the Low End	59 (17.9)
Moderate	77 (23.3)
Moderately High	80 (24.2)
High	61 (18.5)
Missing	9 (2.7)

As seen in Table 3, two thirds of the sample reported resilience levels ranging from moderate to high. Total resilience scores on the RS-14 were calculated, and ranged from 18.0 to 98.0 in the sample, with a mean of 78.09 (*SD* = 14.17), which is in the Moderate range. This total score comprised the Resilience observed variable in the SEM model.

Social support. This latent factor was comprised of five indicators, including: levels of Partner and Other support, satisfaction with Partner and Other support, number of supporters

planned to be at the birth of the participant's baby, confidence in the level of support of the participant's care provider, and quality from the patient's perspective about their medical care.

Partner and Other Support. The mean total Partner support score was 3.77 (*SD* = .57, range 1.0 – 4.0) and the mean total Other support score was 2.44 (*SD* = 1.0, range 0.0 – 4.0). A summary score out of 8 was calculated to reflect total support received from her partner and other, and comprised the *Partner and Other Support* indicator variable loading onto the Social Support latent factor in the overall SEM model. The mean value for this indicator was 6.21 (SD = 1.18, range from 1.0 – 8.0).

Satisfaction with Partner and Other Support. The average amount of satisfaction with support received from Partner was 2.52 (*SD* = .62, range .00 to 3.00), and the average amount of satisfaction with support received from Other was 2.48 (*SD* = .71, range .00 to 3.00). A total satisfaction score (*M* = 4.99, *SD* = 1.08) created by summing these two averages, comprised the *Support Satisfaction* indicator variable of the Social Support latent factor.

Number of supporters. When asked who they intend to support them during childbirth, most women chose their romantic partner (96.1%, *n* = 317), followed by their primary care provider (77.9%, *n* = 257), nurse (32.7%, *n* = 108), doula (32.1%, *n* = 106) or a family member (30.0%, *n* = 99). Fewer women indicated they intended to be supported by a friend (9.4%, *n* = 31), or someone else (8.2%, *n* = 27). A sum score was calculated to reflect the number of supporters the participant intended to have with her during childbirth, with a mean of 2.89 (*SD* = 1.02). This variable comprised the *number of supporters* indicator variable loading onto the Social Support latent variable.

Support from health care provider. When asked how confident they were that their care provider would be able to provide the support needed during the delivery, most women reported feeling very confident (70.6%, *n* = 233). One quarter of the sample reported feeling moderately confident (*n* = 81) and 4.8% of the sample reported feeling not very confident (*n* = 16). This variable was also included as an indicator loading onto the Social Support latent variable.

Perceived Health Care Quality. On average, participants reported positive perceptions of the quality of care they received from the primary care provider during their pregnancy (*M* = 37.8, *SD* = 4.56, range 10.0 – 40.0). Of the three domains assessed by the Quality from the Patient's Perspective (QPP) measure, participants endorsed the highest scores in the Socio-Cultural Atmosphere domain (*M* = 3.83), followed by Identity-Oriented Approach (*M* = 3.78), and Medical Technical Competence (*M* = 3.77). The total QPP score, reflecting perceptions of quality of care, was included in the overall model as an indicator of Social Support.

Mental health symptoms. This latent factor was comprised of three indicators of mental health in pregnancy, including depression, pregnancy-specific anxiety, and childbirth fear.

Depression. Participants reported symptoms of depression in the past 7 days, with a sample mean equal to 7.62 (*SD* = 5.02, range = 0 to 24). To help interpret this score, the Edinburgh Postnatal Depression Scale (EPDS) threshold for "depression not likely" is less than 8. In the sample, 59.1% scored in this range, 17.9% scored in the "depression possible" range, 9.4% scored in the "fairly high probability of depression", and 11.5% scored in the "probable depression" range (n = 323, 2.1% missing data). Therefore, although the majority of the

women did not endorse significant symptoms of depression, nearly 40% of the sample did report symptoms of depression ranging from possible to probable. The total EPDS score was used as the *depression* indicator loading onto the Mental Health Symptoms latent variable in the overall SEM model.

Anxiety. On the 48-item Stress in Pregnancy Scale (SIPS), participants in the sample reported a mean total anxiety score of 39.63 (*SD* = 27.03, range = 0 to 126). Cut-off scores have not been established for this measure to establish ranges of severity. However, the following factors for this scale have been identified, and mean scores for each factor were the following: Care-Related (17 items, *M* = 9.88, *SD* = 10.8), Baby-Related (4 items, *M* = 4.5, *SD* = 3.31), Pregnancy-Related (12 items, *M* = 12.83, *SD* = 8.47), and Relationship-Related (3 items, *M* = 2.24, *SD* = 2.17). Of these four domains, participants reported the most anxiety regarding their pregnancy, rather than their prenatal care, about their baby, or about their relationship. The total SIPS score calculated by summing the 48 items comprised the *Anxiety* indicator variable loading onto the Mental Health Symptoms latent factor in the overall model.

Childbirth Fear. Table 4 outlines the childbirth fear factors included in the Childbirth Fear Questionnaire (CFQ), as reported in the current sample.

Table 4

Levels of Childbirth Fear as Measured by the CFQ

Childbirth Fear domain	Mean (*SD*)	Range	# of items
Fear of loss of sexual pleasure/attractiveness	.78 (.75)	0 – 3.83	6
Fear of pain from a vaginal birth	1.35 (1.02)	0 – 4.0	5
Fear of medical interventions	1.04 (.74)	0 – 3.14	7
Fear of embarrassment	.60 (.62)	0 – 3.40	5
Fear of harm to baby	1.52 (.98)	0 – 4.0	3
Fear of caesarean birth	1.71 (1.07)	0 – 4.0	3
Fear of mom or baby dying	1.29 (1.07)	0 – 4.0	3
Fear of insufficient pain medication	.56 (.77)	0 – 3.67	3
Fear of body damage from a vaginal birth	1.58 (.90)	0 – 4.0	5
Interference score	2.93 (3.35)	0 – 20.0	7
Total score	44.72 (23.25)	2.0 – 120.0	40

Note. The total score is a sum of the 40 CFQ items, excluding the interference items.

As indicated in Table 4, participants in the sample reported the most fear regarding cesarean birth, body damage from a vaginal birth, and harm to the baby. The total score, a sum of all 40 CFQ items, comprised the *childbirth fear* variable loading onto the Mental Health Symptoms latent factor in the SEM model. Among participants in this study, the significant majority (93%) endorsed average levels of childbirth fear, 18 women endorsed fear in the *Moderate to High* range (5.6% of women), and only four women (1.2% of the sample) endorsed *Extreme* levels of childbirth fear (Fairbrother et al., 2018).

Demographic Variables

Zero-order correlations between demographic variables (age, family income, education) and all variables included within the structural model were computed to explore associations

among continuous variables. Associations were also tested between ethnicity and parity, both categorical variables, with primary study variables, using one-way ANOVAs. All significant findings are reported below.

Age. Age was found to correlate only with Support Satisfaction (r = .11, p < .05), and with no other support variables, nor the ACE total score, health promoting behaviours (sleep, exercise, prenatal health behaviours, prenatal vitamin use), health risk behaviours, resilience, or mental health variables (depression, pregnancy-specific anxiety, childbirth fear).

Income. Family income was found to correlate with several study variables, including: ACE total score (r = -.17, p = .002), mean sleep score (r = .15, p = .006), Resilience total score (r = .14, p = .011), Support Satisfaction (r = .26, p < .001), Confidence in Care Provider Support (r = .17, p = .003), Depression total score (r = -.30, p < .001), Pregnancy-specific Anxiety total score (r = -.23, p < .001), and Childbirth Fear total score (r = -.19, p < .001).

Education. Total number of years of education was found to correlate with ACE total score (r = -.17, p = .003), mean Sleep score (r = .14, p = .013), Resilience total score (r = .17, p = .002), Support Satisfaction (r = .21, p = .002), and Depression total score (r = -.12, p = .028). Education and family income were found to correlate modestly (r = .26, p = < .001).

Parity. First pregnancy, or primiparity, was associated with more disturbed sleep in a point-biserial correlation (r = .24, p < .001) as well as higher scores on the exercise variable (r = .13, p = .015) and childbirth fear (r = .23, p < .001).

Ethnicity. One-way ANOVAs revealed significant associations between ethnicity and Confidence in Care Provider Support [F (9, 326) = 2.26, p = .02]. Games-Howell post-hoc tests revealed several differences between women of different ethnic origins, with no consistent

pattern. Similarly, significant associations between ethnicity and childbirth fear emerged [F (9, 326) = 2.42, p = .01], though post hoc tests did not reveal differences between specific ethnic groups.

Associations Among Measures

To proceed with the second step of data analysis, zero-order correlations were calculated between study variables, including indicator variables of the latent constructs depicted in Figure 1. Associations between latent constructs are presented below in the section on Structural Equation Modelling. Table 5 includes correlations between ACEs and health-promoting behaviours, health-risk behaviours, resilience, social support variables, and mental health outcome variables, as well as intercorrelations between variables.

Table 5

Correlations between Predictor (Adverse Childhood Experiences), possible mediators (Health-Promoting Behaviours, Health-Risk Behaviours, Resilience, and Social Support) and outcomes (Depression, Anxiety, and Childbirth Fear)

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. ACE	-														
2. Sleep	-.19**	-													
3. Pren. Beh.	-.04	.04	-												
4. Exercise	-.05	.25**	.15**	-											
5. Vit. Use	-.03	.07	.10	.07	-										
6. Risk Beh.	.15**	-.05	.06	-.05	-.04	-									
7. Resilience	-.04	.18**	.01	.22**	-.02	.00	-								
8. P & O Supp.	-.14**	.06	.07	.03	-.04	-.01	.13*	-							
9. Supp. Sat.	-.21**	.30**	-.02	.12*	.12*	.01	.22**	.46**	-						
10. No. Supp.	-.02	.05	.20**	.09	.02	.10	.06	.18**	.03	-					
11. HCP Supp.	-.12*	.23**	.01	.12*	-.03	.02	.10	.15**	.29**	.11*	-				
12. QPP	-.11*	.13*	.03	.06	-.07	-.05	.10	.16**	.26**	.08	.54**	-			
13. EPDS	.14*	-.46**	.01	-.13*	-.10	.08	-.34**	-.04	-.40**	-.01	-.26**	-.16**	-		
14. SIPS	.10	-.37**	.10	-.11*	-.06	-.00	-.28**	-.07	-.44**	.01	-.34**	-.36**	.64**	-	
15. CFQ	.08	-.27**	.00	-.12*	-.07	.05	-.21**	.05	-.25**	-.04	-.26**	-.10	.37**	.55**	-

Note. ACE = Adverse Childhood Experience scale total score; Pren. Beh. = Prenatal Behaviours; Vit. Use = Prenatal Vitamin Use; Risk Beh. = Health Risk Behaviours; P & O Supp. = Partner and Other Support; Supp. Sat = Support Satisfaction; No. Supp. = Number of Supporters; HCP Supp. = Support from Health Care Provider; QPP = Quality from the Patient's Perspective; EPDS = Edinburgh Postnatal Depression Scale; SIPS = Stress in Pregnancy Scale; and CFQ = Childbirth Fear Questionnaire.

*$p < .05$, **$p < .01$

In reviewing the overall pattern of correlations presented in Table 5, all significant findings were consistent with predicted directionality. That is, higher total ACE scores were associated with more health risk behaviours and symptoms of depression, as well as poorer sleep quality, less partner and other support, lower support satisfaction, less confidence in support from health care provider, and poorer perceptions about quality of health care provided. The mean sleep score was associated with most variables, including exercise, resilience, support satisfaction, confidence in provider support, and perceptions about healthcare quality. Poor sleep was related to more symptoms of depression, pregnancy-specific anxiety, and childbirth fear. Greater resilience was associated with more partner and other support as well as support satisfaction, and fewer symptoms of depression, pregnancy-specific anxiety, and childbirth fear. Greater support satisfaction also predicted fewer mental health symptoms in all three domains. Prenatal behaviours, exercise, and prenatal vitamin use were most weakly associated with all other study variables, in addition to the number of supporters. All three mental health variables were associated with most study variables, with primarily moderate effect sizes, though pregnancy-specific anxiety and childbirth fear were not associated with ACEs. However, combining these three variables into a latent factor permits a potentially more sophisticated analysis of the relationship between ACEs and mental health symptoms in pregnancy, and Structural Equation Modelling analyses were subsequently undertaken.

Structural Equation Modeling

To undertake SEM analyses, AMOS version 25.0 was used. Some features of the AMOS program require complete data (e.g., tests for normality, bootstrapping); therefore, a

preliminary analysis explored the percentage of missing data in the overall sample on the variables included in the present analysis, which was calculated to be less than 5% of cases. Therefore, regression imputation was employed to impute values for missing data for each participant, thus creating a complete dataset. For each case, the unobserved (missing) values were regressed on the observed (measured) variables, assuming that the population means and covariances of all variables were equal to their maximum likelihood estimates (Arbuckle, 2017). Once the dataset was complete, with no more missing data, tests of normality and bootstrapping were permitted (see below). Tests of normality in AMOS indicated multivariate non-normality among the indicators (Mardia's coefficient = 50.89), requiring the implementation of bootstrapped estimates and standard errors. The imputed data were used to calculate zero-order correlations among all variables as above (see Table 5).

To address the research questions for the present sample, a structural equation model (SEM) approach was required to evaluate the hypothesized structural model. Fit indices were calculated in AMOS to demonstrate how well (or how poorly) the model-implied matrix fit the data matrix generated by the present sample. The following fit indices were considered: 1) Chi-square (χ^2) goodness-of-fit test (Loehlin, 1998) – this indicates the discrepancy between covariances in the data matrix to those in the model-implied matrix (Hoyle & Panter, 1995). A non-significant value indicates good fit between the data matrix and the model-implied matrix, though large samples sizes often yield significant values; 2) Relative chi-square fit index [χ^2/df; (Bollen, 1989)] – adjusted according to the number of degrees of freedom; values < 3 indicate acceptable model fit (Schreiber, Stage, King, Nora, & Barlow, 2006); 3) Comparative fit index [CFI; (Bentler, 1990)] – compares the hypothesized model to a model that assumes

independence among all variables (and covariances are specified to equal zero). Values range from zero to one and values > .95 indicate exceptional model fit (Hu & Bentler, 1999); 4) Root mean square error of approximation [RMSEA; (Steiger, 1990)] – this estimates the lack of model fit per estimated parameter compared to a saturated model whereby the number of parameter estimates and data points are equal. Values < .05 indicate good fit, .05 - .08 indicates adequate fit, .08 - .10 indicates mediocre fit, and values > .10 reflect poor model fit.

When testing multiple nested models, χ^2 difference tests are conducted to determine which model is the best fit to the data; differences are calculated between each χ^2 value and number of degrees of freedom (*df*), and if the difference is significant (as per the χ^2 distribution table based on *df*), then the model which has the lower χ^2 value is preferred.

Confirmatory factor analysis. The measurement model consisted of four latent variables, as shown below in Figure 3. Note that latent factors are depicted by ovals, and measured indicator variables are depicted by rectangles. Error variances associated with each indicator are labelled with an 'e' and disturbances associated with latent variables are labelled with a 'd'. The ACE latent variable was comprised of three indicators (child abuse, neglect, and household dysfunction); health-promoting behaviours was comprised of four indicators (sleep quality, prenatal behaviours, exercise, and prenatal vitamin use; social support included five indicators (amount of support received, satisfaction with support, number of supporters, confidence in care provider support, and perceived quality of care from provider); and mental health symptoms was comprised of three indicators (depression, pregnancy-specific anxiety, and childbirth fear).

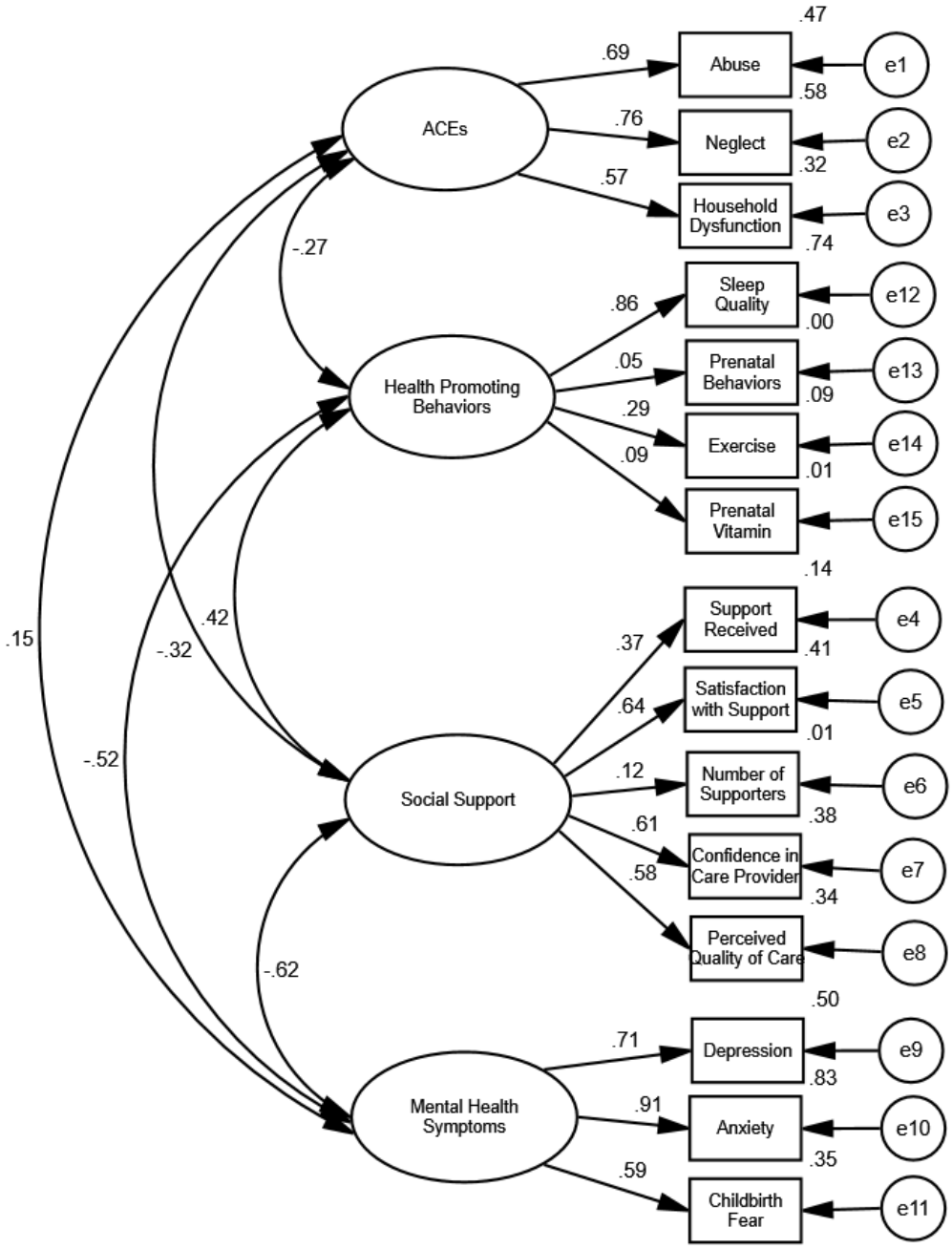

Figure 3. Measurement Model 1: Associations between Adverse Childhood Experiences, Health-Promoting Behaviours, Social Support, and Mental Health Symptoms.

Measurement Model 1 was specified in order to test whether the measurement model fit the data well, and to determine the strength of the associations between latent factors and their

indicator variables. In order to scale the latent factors, one regression coefficient was fixed to 1 per factor. Fit indices for Model 1 were as follows: χ^2 (84, N = 330) = 268.585, p = .000, χ^2/df = 3.197, CFI = .816, RMSEA = .082; CI = .071-.093. Overall, the model was not an adequate fit to the data, given the fit indices and due to the low path loadings (standardized regression coefficients) of Health-Promoting Behaviours → Prenatal Behaviours, Health-Promoting Behaviours → Prenatal Vitamin Use, and Social Support → Number of Supporters. Further, path coefficients for each of these paths were not significant, though all other path coefficients in Model 1 were significant at the p < .001 threshold except for the pathway from Health-Promoting Behaviours → Exercise (p = .003). A review of modification indices for Measurement Model 1 revealed high values for e4 <-> e5 (*MI* = 40.570) and for e7 <-> e8 (*MI* = 35.356), therefore covariances were drawn between each of these pairs of errors terms due to the probable shared variance between the Support Received and Satisfaction with Support variables, as well as the Confidence in Care Provider and Perceived Quality of Care variables. Further, these are conceptually similar variables, which theory also supports correlating their error terms (Byrne, 2016).

These model modifications were made and a second model was tested (Measurement model 2, Figure 4) to assess whether eliminating these three paths, and drawing these two covariances, would provide a better fit to the data. Fit indices for this second model were excellent: χ^2 (46, N = 330) = 86.654, p = .000, χ^2/df = 1.884, CFI = .958, RMSEA = .052; CI = .035-.068. To assess which of the measurement models was a better fit to the data, a χ^2 difference test yielded χ^2 (38) = 181.931. Compared to a critical value of χ^2 (38) = 53.38, based on a conventional p < .05 standard, Measurement Model 2 was preferred due to its smaller χ^2 value.

Therefore, Measurement Model 2 was retained and the latent variable structures were identified, to be incorporated into the larger structural model after testing a direct effects model.

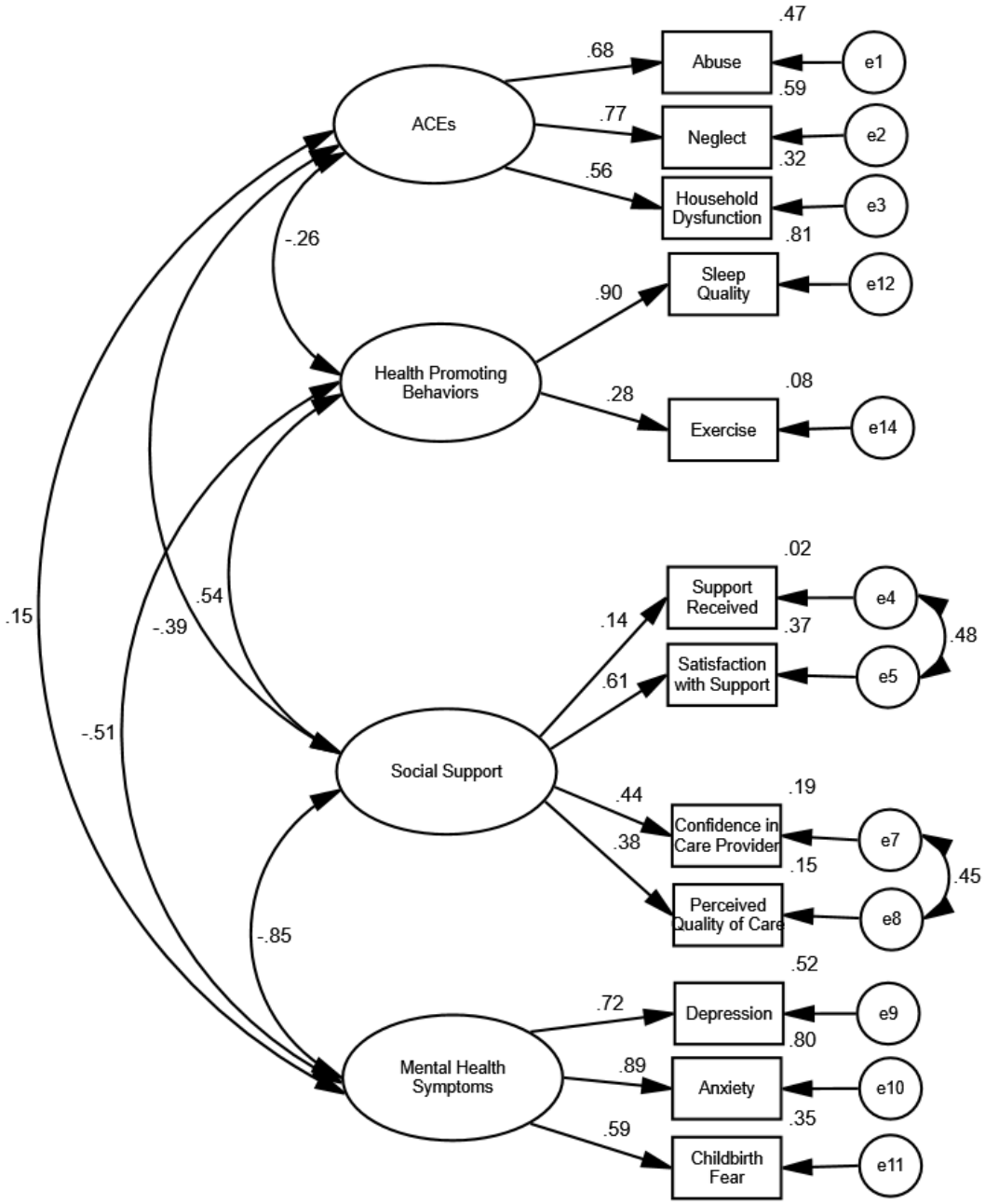

Figure 4. Measurement Model 2: Associations between Adverse Childhood Experiences, Health-Promoting Behaviours, Social Support, and Mental Health Symptoms, revised.

Support for Hypothesis 1: The Direct Effect of ACEs on Mental Health in Pregnancy

Path analysis. Following specification of the measurement model, the direct effects model was tested to determine the association between the predictor and outcome latent variables, before proceeding with building the full structural model including potential mediators of the direct relationship between ACEs and mental health. Figure 5 depicts the direct effects model tested, predicting the latent Mental Health Symptoms variable from the latent ACEs variable. This tested the first study hypothesis, that maternal ACEs predict mental health symptoms in pregnancy.

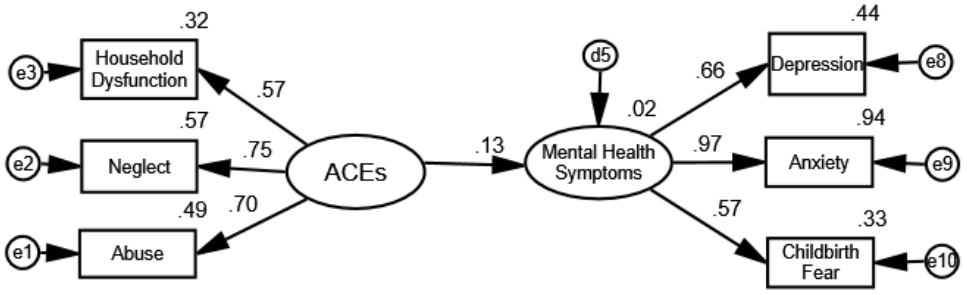

Figure 5. Direct Effects Model: Associations between ACEs and Mental Health Symptoms in pregnancy.

Fit indices for this model were excellent: χ^2 (8, N = 330) = 8.516, p = .385, χ^2/df = 1.064, CFI = .999, RMSEA = .014; CI = .000 - .067. All path coefficients were significant at the $p < .001$ level, except for ACE → Mental Health Symptoms (p = .05). As indicated in Figure 5, there was a weak, but significant association between ACEs and Mental Health Symptoms in pregnancy, such that higher latent ACE scores were associated with more mental health symptoms. Given this support for the direct effects model, the next step was to build the full SEM model,

including all potential mediators of the relationship between ACEs and mental health symptoms. These next steps allowed for testing of the remaining study hypotheses.

In addition to the Health-Promoting Behaviours and Social Support latent variables, Health-Risk Behaviours and Resilience were also theorized to be possible mediators of the relationship between ACEs and mental health symptoms in pregnancy. Each of these were manifest variables, such that they were each measured variables in the SEM model, rather than latent variables, and were therefore not included earlier in the testing of the measurement model which includes only latent variables. Figure 6 depicts the full structural model including path coefficients for all individual pathways.

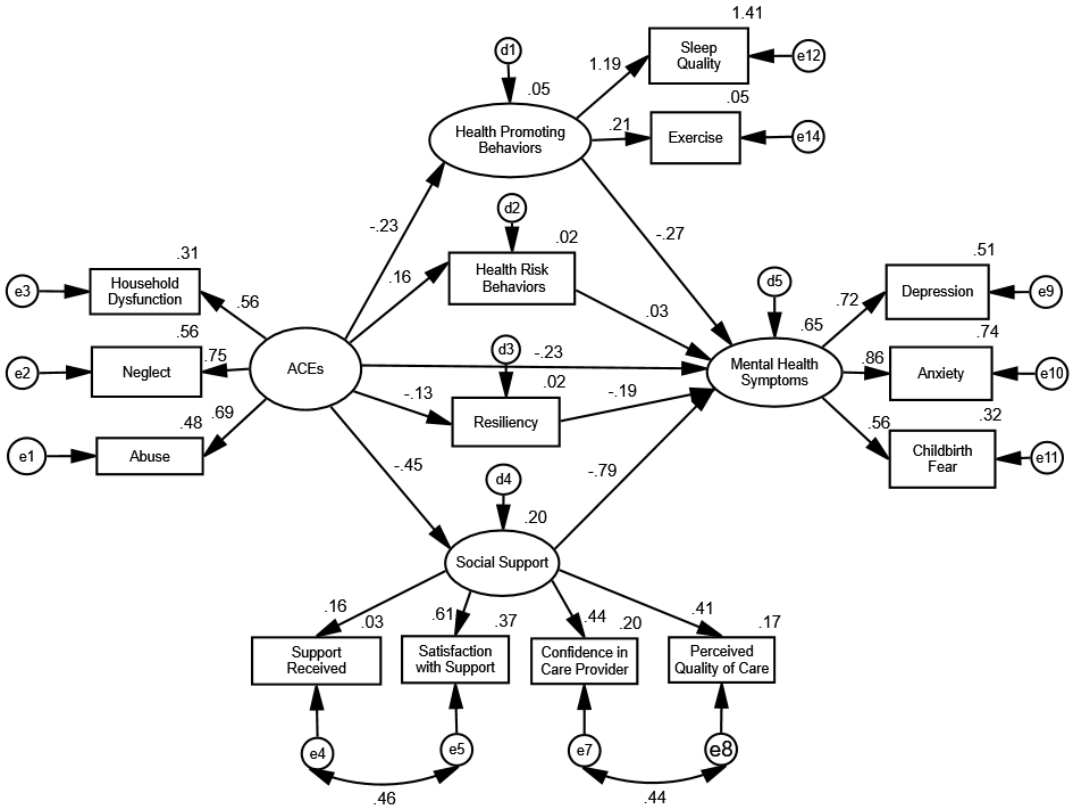

Figure 6. Structural Equation Model 1: Associations between ACEs and Mental Health Symptoms in pregnancy, and potential mediators of this relationship.

Upon review of this model, there was negative variance associated with e12, and the path coefficient for the sleep indicator variable was greater than one, therefore the solution for this model was not admissible. Looking closely at the two factor loadings for indicators of the Health-Promoting Behaviours latent variable (Sleep and Exercise), it appears these variables are too disparate and should not be included within the same latent variable, in the context of the other variables of the model. Therefore, due to this as well as the low path coefficient for the exercise variable, it was eliminated and the trimmed Structural Equation Model 2 was run, as seen in Figure 7.

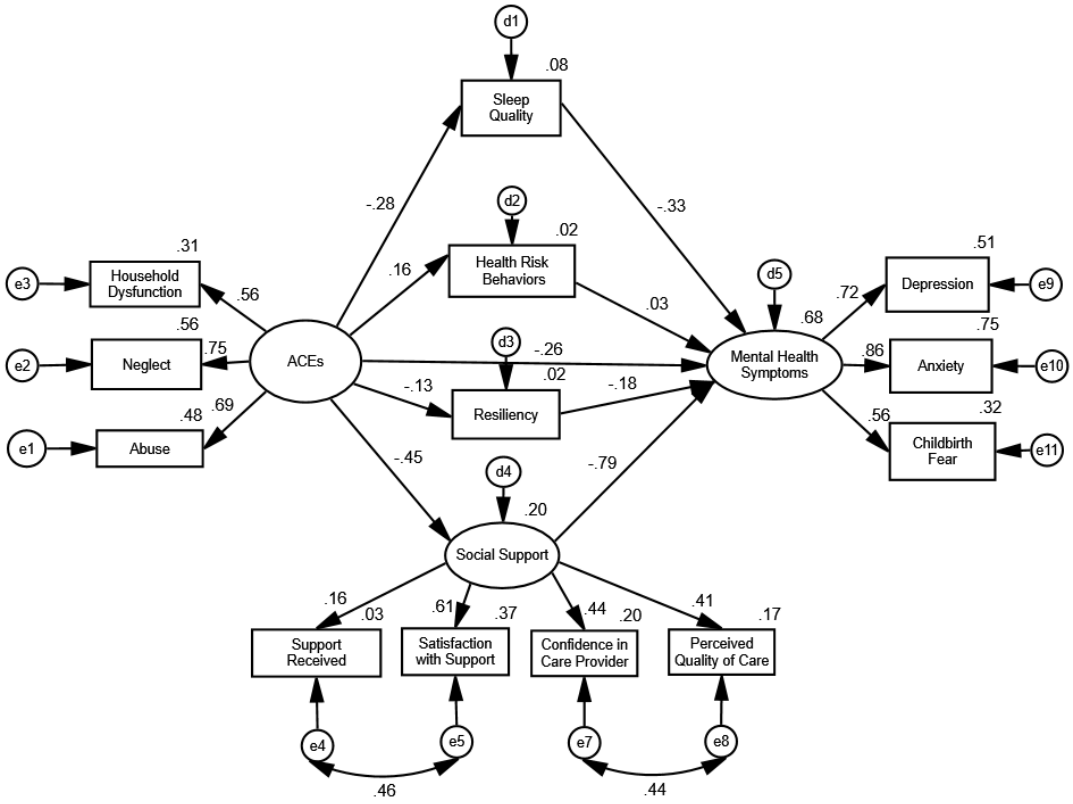

Figure 7. Structural Equation Model 2: Associations between ACEs and Mental Health Symptoms in pregnancy, and potential mediators of this relationship, revised.

By eliminating the exercise variable, the solution to the revised model was admissible, and yielded the following fit indices: χ^2 (57, *N* = 330) = 178.245, *p* = .000, χ^2/df = 3.127, CFI = .880, RMSEA = .080; CI = .067 - .094. In this model, all path cofficients were significant at the *p* < .001 level except for ACE → Health Risk Behaviours, ACE → Resilience, ACE → Mental Health Symptoms and Social Support → Support Received (all *p* < .05). The only nonsignificant path was from Health Risk Behaviours → Mental Health Symptoms. Fit indices for this model were adequate, but could be improved, and subsequent analyses endeavored to better characterize

the role of resilience in the overall model in keeping with primary research questions for the study.

To test hypothesis 4, and the role of resilience as a potential moderator in the relationship between ACEs and mental health symptoms, preliminary moderation analyses were performed. Each of the three variables of interest were centered, and an interaction term was created (ACE x Resilience). These three variables were entered into a structural equation model as shown in Figure 8:

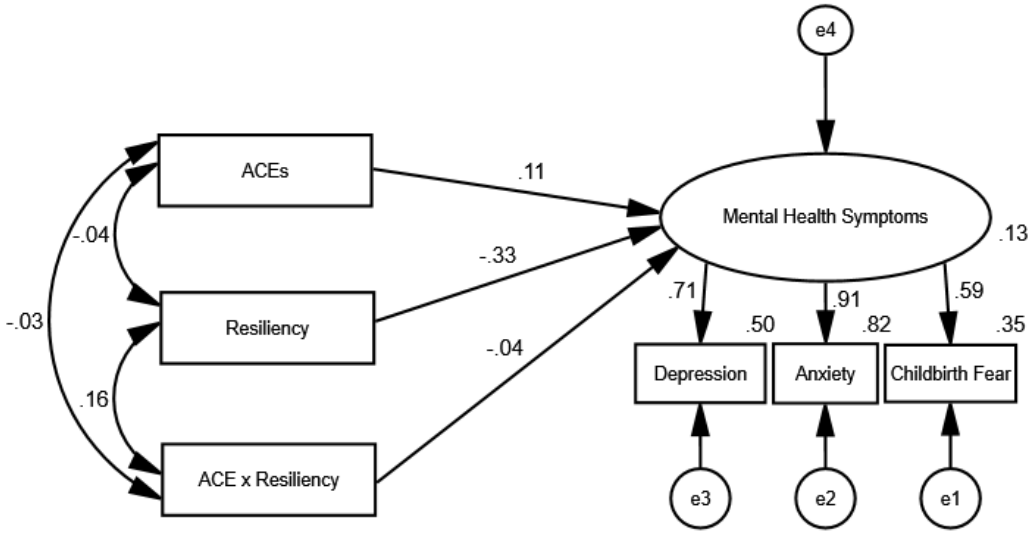

Figure 8. Examining the possible moderation of Resilience in the relationship between ACEs and Mental Health Symptoms.

Though the fit indices for this model were good χ^2 (6, N = 330) = 17.289, p = .008, χ^2/df = 2.882, CFI = .966, RMSEA = .076; CI = .035 - .119, the path coefficient for the interaction term was not significant, meaning resilience is not moderating the relationship between ACEs and Mental

Health Symptoms. The question was then asked, whether resilience might be serving as a mediator in the overall model. A pathway between Resilience and Social Support was therefore drawn, before proceeding with mediation analyses in the overall model. Figure 9 depicts the model including this additional pathway, and was the basis upon which subsequent mediation analyses were performed.

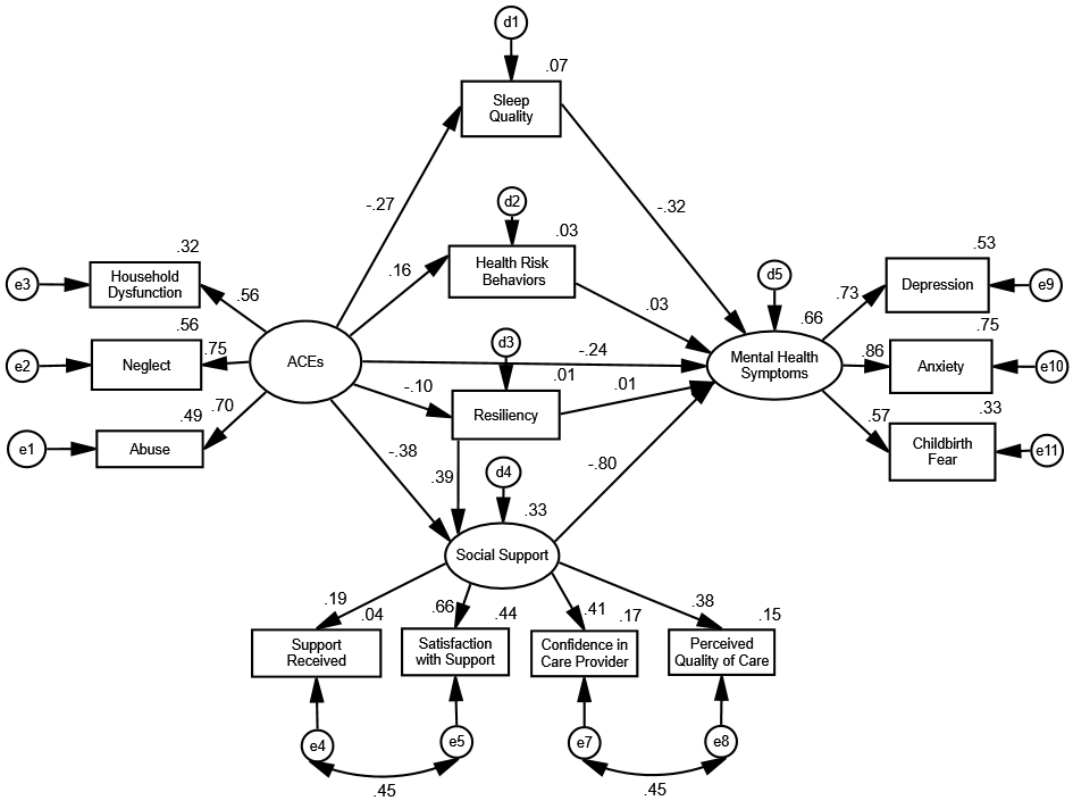

Figure 9. Final Structural Equation Model.

Fit indices for this model were acceptable [χ^2 (56, N = 330) = 150.564, p = .000, χ^2/df = 2.689, CFI = .901, RMSEA = .072; CI = .058 - .086], and this was retained as the final model, thus permitting examination of the significance of individual pathways and testing for mediation. All

pathways in the final SEM model were significant except for ACE → Resilience, Health Risk Behaviours → Mental Health Symptoms, and Resilience → Mental Health Symptoms.

Several analyses were borne from this final mediation model, to address the secondary research questions for the study, which were to determine whether Health Promoting behaviours (in this case, sleep), Health Risk Behaviours, Resilience, and/or Social Support were mediating the relationship between ACEs and mental health symptoms in pregnancy. Together, these comprised hypotheses two through four. Baron and Kenny stipulated that the following three pathways must be significant in order to demonstrate mediation: 1) predictor to outcome, 2) predictor to mediator, 3) mediator to outcome (Baron & Kenny, 1986). It has been argued there does not need to be a significant direct relationship between predictor and outcome ["Mediation (David A. Kenny)," n.d.], though this tradition was maintained in the current study. When controlling for the mediator, full mediation occurs when the initial relationship between predictor and outcome is eliminated; partial mediation occurs when this relationship is attenuated (though still significant). Bootstrapping is indicated for samples that violate assumptions of normality, and was undertaken given that multivariate non-normality was detected in the sample. A Bollen-Stine p-value (equal to .000, based on 2000 samples) of overall model fit was calculated. This approach is suitable for use with non-normally distributed data and subsequent bootstrapping. The total standardized indirect effect of ACEs on Mental Health Symptoms was revealed to be .430, 90% CI (.234, .758), p = .002, which provides support for the multiple mediation of the relationship between ACEs and Mental Health Symptoms. From here, each individual mediation analysis can be tested, and results are presented below.

Support for Hypothesis 2: The Mediating Role of Health Behaviours

Health-Promoting Behaviours. At this stage of model modification, the sole remaining health-promoting behaviour was sleep. Analyses yielded support for a partial mediation effect of Sleep on the relationship between ACEs and Mental Health Symptoms [unstandardized estimate = .483, 90% CI (.239, .839), p = .001]. In reviewing the individual path coefficients, Sleep appears to be mediating the relationship between ACEs and Mental Health Symptoms, such that poor sleep is associated with increased ACEs, leading to greater mental health symptoms in pregnancy.

Health Risk Behaviours. In reviewing individual path coefficients, though there is a weak association between ACEs significantly predicting Health Risk Behaviours (p = .014), the prediction of Mental Health Symptoms from Health Risk Behaviours is not significant. Therefore, this does not meet mediation criteria stipulated by Baron and Kenny (1989) and it can be concluded that health risk behaviours are not mediating the relationship between ACEs and mental health symptoms in pregnancy, in the current sample. This may be due, in part, to the low frequency in which the women in this study engaged in health risk behaviours.

Support for Hypotheses 3 and 4: Social Support and Resilience as Buffers

Resilience. As illustrated in the final structural model (Figure 9), Resilience was hypothesized to mediate the relationship between ACEs and the latent Mental Health Symptoms variable, and perhaps from ACEs to the latent Social Support variable. However, once the pathway was drawn from Resilience to Social Support, the path coefficient from ACEs to Resilience was no longer significant, therefore this condition for mediation was not met.

Therefore, the data does not support the role of resilience being a mediator of either of these two relationships.

Next, in order to test whether social support might be mediating the relationship between resilience and mental health symptoms, the direct effect between resilience and the latent mental health symptoms variable was first tested (not shown). The path coefficient between Resilience and the latent Mental Health Symptoms variable when tested in this direct effects model was -.33 ($p < .001$). However, when the additional indirect effect through Social Support is added to the model, as above in Figure 9, the magnitude of this relationship decreases to .01 and is no longer statistically significant. Bootstrapping standard errors for the indirect effect provided support for the full mediation of Social Support in the relationship between Resilience and Mental Health Symptoms [$b = 1.074$, 90% CI (.764, 3.487), $p = .003$]. It should be noted that though it is possible for resilience to be the mediator in the relationship between social support and mental health symptoms, it is theorized that resilience is a characteristic that predates social support in pregnancy, leading to the mediation analysis undertaken.

Social Support. As seen in the final measurement model, the latent Social Support variable was hypothesized to mediate the relationship between ACEs and Mental Health Symptoms in pregnancy. Testing of the indirect effect was significant, and support emerged for partial mediation of the Social Support latent variable [$b = 1.074$, 90% CI (.764, 3.487), $p = .003$]; that is, lower social support associated with a higher score on the latent ACE factor mediates the relationship with greater mental health symptoms.

To summarize the mediation analyses, support emerged for the total indirect effect of ACEs on mental health symptoms in pregnancy. In reviewing individual indirect pathways, sleep and

social support were found to mediate the association between ACEs and mental health symptoms in pregnancy, though health risk behaviours and resilience, were not mediators of this relationship. In fact, social support appears to be mediating the relationship between resilience and mental health symptoms in pregnancy.

Discussion

This study examined the relationship between maternal adverse childhood experiences – ten discrete experiences occurring before age 18, including abuse, neglect and household dysfunction (S. R. Dube et al., 2003; Felitti et al., 1998) – with mental health symptoms (including depression, pregnancy-specific anxiety, and childbirth fear) during pregnancy. Women who participated in this study were in the third trimester of pregnancy, which is often characterized by increasing discomfort, poorer sleep, and an increasing sense of imminence as childbirth approaches. Using structural equation modelling (SEM) to test study hypotheses, maternal ACEs were found to predict increased mental health symptoms (such as depression, pregnancy-related anxiety, and childbirth fear) in pregnancy. This is consistent with the literature, which has revealed associations between maternal ACEs and symptoms of depression in pregnancy (e.g., Wajid et al., 2019). A strength of the current study was that it additionally included pregnancy-specific anxiety as well as childbirth fear, as these mental health experiences may be particularly salient in pregnancy. Subsequently, I tested hypothesized mediators of the association between ACEs and mental health symptoms in pregnancy, including health-promoting and health-risk behaviours, as well as resilience and social support. Support emerged for the indirect effects of poor sleep and low social support, on the relationship between maternal ACEs and mental health in pregnancy. Social support was also found to mediate the relationship between resilience and mental health symptoms in this sample. That is, individuals with greater resilience also experienced greater social support, leading to fewer mental health symptoms. Counter to predictions, the health-promoting latent variable was not found to mediate the direct effect between ACEs and mental health

symptoms. This indicates that experiencing higher ACEs was not associated with fewer health-promoting behaviours, and these behaviours in turn, did not predict greater mental health symptoms in pregnancy. This may be due to the methods chosen to measure health-promoting behaviours leading to limited variability (that is, most women took their prenatal vitamins, most sought education on pregnancy and childbirth). Also counter to predictions, health-risk behaviours did not mediate the direct effect between ACEs and mental health. In this study, high ACEs were found to predict more health-risk behaviours (i.e., substance use), which is consistent with the literature demonstrating greater substance use among pregnant women exposed to more ACEs (e.g., Chung et al., 2010). However, health-risk behaviours were not related to mental health symptoms in pregnancy in the current study, therefore mediation was not supported. This may be due to the low frequency with which risky health behaviours (smoking, drinking, and drug use) were endorsed by the sample. Further, though there was not a specific prediction regarding the role of resilience as a *mediator*, this was explored yet not supported statistically. The role of resilience as a *moderator* was also explored, and not supported in this study. Others have found support for the role of resilience as a moderator of the association between ACEs and mental health outcomes in pregnancy (e.g., Young-Wolff et al., 2019). However, this is a relatively new focus in the literature, and more work in this area will provide clarity on these inconsistencies.

These primary study findings are discussed henceforth, in the context of this body of literature, followed by a discussion of study limitations, and implications of the findings.

Characteristics of the Sample

Adverse childhood experiences. In this sample of pregnant Canadian women who were highly-educated, with high family income, mostly married and of European descent, the most frequently endorsed ACEs reported (in descending order) were parental separation or divorce, household mental illness, emotional abuse, and emotional neglect. One quarter of participants endorsed no ACEs, most respondents (75%) endorsed having experienced one or more ACE, and nearly one quarter reported four or more ACEs. These frequencies were consistent with data collected from pregnant women attending prenatal outpatient clinics in the United States (Nguyen et al., 2019). The frequencies seen in the current sample are somewhat greater than those found in a highly similar Canadian sample of pregnant women recruited in healthcare offices, which used the eight-item ACE scale (N. Racine et al., 2018). In their study, more women (37.6%) reported zero ACEs, and fewer women (14.7%) reported four or more ACEs. It is possible that these figures differ from those reported in the current study, which included the ten-item ACE questionnaire, due to the exclusion of neglect items in the eight-item ACE questionnaire. It can also be considered a strength of the current study to have included neglect as one of the facets of early adversity.

Mental health symptoms. Among the pregnant women who comprised the sample for this study, most reported few symptoms of depression, that is, 60% reported symptoms of depression in the range of "*depression not likely*". The rest of the sample endorsed symptoms of depression ranging from "*possible*", to "*fairly high probability*", or even "*probable*" depression. This is a meaningful number of women who reported feeling symptoms of depression in their final trimester of pregnancy. Women with higher scores on depressive

symptoms were also likely to report greater pregnancy-specific anxiety, and higher childbirth fear. The Stress In Pregnancy Scale used in this study to measure pregnancy-specific anxiety does not have an established threshold to determine severity of anxiety symptoms, though results from the Childbirth Fear Questionnaire indicated that 7% of the sample endorsed *Moderate to High*, or *Extreme* levels of childbirth fear. However, it is reasonable to ascertain both pregnancy-specific anxiety and childbirth fear, in addition to symptoms of depression, were meaningful mental health experiences among a proportion of the women included in this research.

Resilience. Resilience has been defined as "the ability to withstand or adaptively recover from stressors," in addition to promoting psychological and physical well-being (Aiena, Baczwaski, Schulenberg, & Buchanan, 2015, p. 291). It is "more than the simple absence of psychopathology" (Bonanno, 2004, p. 20) and in the face of adversity, can be thought of as "relative resistance to psychosocial risk experiences" (Rutter, 1999, p. 119). Taken together, when thought of in the context of adverse childhood experiences, resilience may protect against the development of deleterious outcomes. It is worth noting that this sample can be described overall as endorsing moderate to high levels of resilience. Specifically, two thirds of the women who participated in the study endorsed levels of resilience in the moderate to high range on the RS-14 (i.e., the upper three of six categories defined by the measure's authors), and only one third of women endorsed levels of resilience ranging from Very Low to On the Low End (the lower three categories). The mean resilience score reported by this sample was consistent with that found among college students, versus a clinical sample (Aiena et al., 2015). Previous research on the role of resilience in the context of maternal ACEs has identified

differences in mental and behavioural health outcomes, when comparing women who endorse low levels of resilience, versus women who endorse high levels (Young-Wolff et al., 2019). That is, low resilience was associated with greater risk of having mental health symptoms (i.e., anxiety or depression) as well as intimate partner violence, among women reporting low resilience. Therefore, the relatively high level of resilience of the women in this study is a lens through which it is worthwhile to consider the study findings. Generalizability is therefore limited and there may be a more significant role for personal resilience among more vulnerable samples. These findings may therefore be limited to women who report high personal resilience. Further, this study revealed positive associations among resilience, income, and education. Therefore, for women living in poverty or without access to higher education, different findings may emerge than those found in the current study, as resilience levels may also be lower.

The Direct Effect of ACEs on Mental Health in Pregnancy

The first, and most critical analysis of the study data, was to test for the direct association between maternal ACEs and mental health symptoms in pregnancy. According to the requirements for mediation set out by Baron and Kenny (1986), the demonstration of this direct effect is required before proceeding with further mediation analysis. In this sample, support emerged for this direct effect, whereby higher ACEs predicted increased mental health symptoms in pregnancy. However, the effect size was small by conventional standards (β = .13, (Cohen, 1988), though consistent with what has been reported elsewhere in a pregnant sample (N. M. Racine et al., 2018). Regardless of statistical effect size, importantly, the clinical implication of this finding – that early adversity predicts later mental health symptoms in

pregnancy – is surely meaningful for those women who are experiencing mental health symptoms. This is also likely meaningful for the babies born to mothers with higher levels of ACEs and who are experiencing increased mental health symptoms during their pregnancy. Notably, it has been shown that maternal ACEs are predictive of more infant emotional health difficulties (i.e., a composite of 8 items including such examples as, "seems unhappy, sad or depressed"), as mediated by several psychosocial risk factors in the mother (Madigan, Wade, Plamondon, Maguire, & Jenkins, 2017). In Madigan et al.'s study (2017), the risk factors they included were the following, as comprising a composite indicator: single parent, teenage mother, low family income, low maternal education, maternal depression, and marital conflict. Therefore, women with multiple challenging life circumstances that tend to occur in relation to higher ACEs, are more likely to have babies with poorer emotional health.

The small magnitude of the direct effect found in the current study may also be due in part to the significant role mediators have in the association of maternal ACEs with mental health symptoms in pregnancy. Therefore, the next analyses sought to better understand what pathways may be mediating this association. In this study, the ACE construct was conceptualized and tested as a latent factor, comprised of the three domains defined by Felitti in the original ACE study – abuse, neglect and household dysfunction (S. R. Dube et al., 2003; Felitti et al., 1998). As seen in the measurement model in Figure 4, and the final model in Figure 9, all three indicators of the ACE latent variable were overlapping, and contributed to the latent variable. In reviewing the specific loadings, the abuse and neglect indicators of the ACE latent factor loaded comparable well, and the loading of the household dysfunction indicator was smaller, but still within an appropriate range to consider conceptually overlapping with the

other two indicators. The larger contribution of abuse and neglect within this latent variable implies these facets of childhood adversity are perhaps driving the association with mental health symptoms in pregnancy, more strongly than the household dysfunction facet of childhood adversity. This is consistent with what others have found, whereby abuse and neglect predict increased symptoms of depression and PTSD, but household dysfunction did not (Atzl, Narayan, et al., 2019). This underscores the relatively greater effect of abuse and neglect on prenatal mental health, than household dysfunction, across differing samples. It is worth noting that the sample of women who participated in Atzl's study was younger, more ethnically diverse, and reported lower income than the women in the current study.

Turning now to the Mental Health Symptoms latent factor, this was comprised of Depression, Pregnancy-Specific Anxiety, and Childbirth Fear. Again, two indicators (Depression and Pregnancy-Specific Anxiety) loaded more strongly onto the latent variable, and the third indicator, Childbirth Fear, loaded well enough onto the latent factor to retain it. What this indicates, in this sample, is that depression and pregnancy-specific anxiety appear to be contributing more strongly to mental health symptoms experienced by the women in this study during pregnancy, than childbirth fear. These three indicators were conceptualized and tested concurrently within the same latent variable to try and model the lived experience of pregnant women, as these three mental health experiences co-occur for many women during pregnancy. Furthermore, the continuous measurement of these variables serves to more accurately represent the experience of low mood, anxiety and childbirth fear among pregnant women. In this sample, around 20% of women endorsed levels of depression in the range of "fairly high probability" to "probable depression". The pregnancy-specific anxiety domain endorsed most

often by women in this study, as causing the most anxiety related to their pregnancy, was related to the pregnancy itself, rather than to their prenatal care, their baby, or their relationship. The levels of childbirth fear reported by this sample were largely within the average range, and only seven percent of women endorsed more than moderate childbirth fear. This may be in keeping with previous research which has shown that childbirth fear is lower among women who have previously given birth (Rouhe, Salmela-Aro, Halmesmäki, & Saisto, 2008), which describes two-thirds of the current sample. Therefore, of the three mental health experiences assessed, depression appears to be most prominent for the women in this study. This is also consistent with other studies which have included a focus on depression (e.g., Wajid et al., 2019), and thus expands on the existing literature with the novel addition of pregnancy-specific anxiety and childbirth fear within the latent construct representing mental health symptoms in pregnancy.

Subsequent to close examination of both the ACEs and Mental Health Symptoms latent factors, the decision was made to proceed with model testing. Somewhat unsurprisingly, as detailed in Table 5, which reported correlations between variables, all three mental health variables were correlated. Pregnancy-specific anxiety was moderate-highly correlated with both depression and childbirth fear; the latter two were more modestly correlated. Therefore, the latent mental health symptoms variable used in this study appears to be well-constructed to have captured several important contributors to mental health functioning in pregnancy. The next step, both logically and conceptually, was to test hypotheses specific to mediation of this direct effect. Interestingly, the percent variance accounted for (i.e., R^2) in Mental Health Symptoms by ACEs (in the direct effect model), was quite small (.02). When all other pathways

were added in the multiple mediation model, this value increased to 0.66, which means that the addition of Sleep, Health Risk Behaviours, Resilience, and Social Support much more fully accounts for the variance in Mental Health Symptoms compared to ACEs alone. This serves to more fully characterize the multitude of factors contributing to mental health symptoms in pregnancy.

The Mediating Role of Health Behaviours

Health-promoting behaviours. As conceptualized in this study, pregnancy-specific health-promoting behaviours included such prenatal behaviours as seeking education about pregnancy and childbirth, exercising, taking prenatal vitamins, and sleep. This was a novel research question which to my knowledge, has not previously been studied. The hypothesis that maternal ACEs would lead to engaging in fewer health-promoting behaviours in pregnancy, thus leading to greater mental health symptoms, was not borne out. In the current study, reliability of each of these measures with the exception of sleep, was poor, and findings did not emerge as predicted. Further, there was limited variability on many of these behaviours, as most women took prenatal vitamins, sought information or education about pregnancy, took additional supplements for the health of her baby, and made beneficial changes to diet and amount of relaxation or sleep. In contrast, though the health-promoting behaviours and exercise did not fit within the model and therefore were removed, sleep is a behaviour highly relevant to pregnancy, and was retained in the multiple mediation model. This was perhaps due to the more robust measurement of this variable, using a psychometrically-sound measure, and its resulting goodness of fit within the model. Further, it may truly be that sleep was better conceptualized than the other variables within the model, and/or that this is the sole health-

promoting behaviour underlying the association between maternal ACEs and mental health symptoms. Interestingly, sleep can be considered (as it was in the current study) as a health-promoting behaviour, and in other studies it is considered a risk to health when viewed from a deficit perspective. Indeed, this is what was found in the current study. Support emerged for the partial mediation of sleep on the association of maternal ACEs and mental health symptoms in pregnancy. That is, increased maternal ACEs predicted poorer sleep quality, which in turn predicted greater mental health symptoms (or poorer mental health functioning). Following these analyses, the test for mediation of health risk behaviours was conducted.

Health-risk behaviours. It was hypothesized that maternal ACEs would predict greater substance use in pregnancy, which would then lead to poorer mental health functioning. This is consistent with previous research which has revealed associations between maternal ACEs and smoking (Smith et al., 2016), alcohol use (Frankenberger et al., 2015), and smoking, alcohol and drug use (Chung et al., 2010). In this study, similar to others (Frankenberger et al., 2015), questions assessing substance use were first presented as continuous variables to capture frequency of consumption. However, due to few women endorsing higher levels of substance use in pregnancy, each of the three substance use domains (alcohol, smoking, and drug use) were dichotomized to *yes/no* since being pregnant. Therefore, total health-risk behaviour scores were created by summing these three items across substances to reflect total substance use in pregnancy. It is worth noting that overall, this sample did not endorse very much substance use, which is in keeping with public health messaging about the importance of abstaining from these behaviours during pregnancy. This is also a sensitive topic which may be difficult to report, therefore it is possible there is underreporting of substance use in this

pregnant sample. Thus, it is also possible that the levels reported represents a reduction from typical consumption. Participants were asked whether they had changed their level of consumption since learning she was pregnant, compared to the year prior to pregnancy. In response, nearly one third of the sample reported having consumed less or quit using substances. Therefore, in this sample, it appears as though a meaningful percentage of women quit using substances since leaning of their pregnancy. Despite this, among the few women who endorsed some continued substance use since learning of their pregnancy, higher maternal ACEs did predict greater substance use. However, substance use did not predict increased mental health symptoms, and support for the role of these health-risk behaviours mediating the association between ACEs and mental health symptoms was not found. It may be the case that among pregnant women who do endorse higher levels of substance use than those seen in this sample (perhaps as a maladaptive coping behaviour in the context of early adversity), this effect would be seen. Therefore, it would be worthwhile to explore this further in a more at-risk sample of women who engage in more substance use while pregnant.

Social Support and Resilience as Buffers

An important conceptual aim of this study was to determine whether certain factors may help buffer the association between ACEs and mental health symptoms in pregnancy, via formal mediation testing. To this end, social support and resilience were expected to be linked to more positive mental health, however, only social support was hypothesized to mediate the direct association between ACEs and Mental Health. That is, it was hypothesized that more ACEs would be related to less social support, which would in turn predict greater mental health symptoms in pregnancy. In this sample, support emerged for the partial mediation of the

latent social support variable, such that increased maternal ACEs were associated with decreased social support, and subsequent greater mental health symptoms (i.e., depression, anxiety and childbirth fear). Therefore, this indirect effect was demonstrated statistically, thus lending support to hypothesis three. For the women in this study, the experience of adversity early in life may reduce their ability to initiate or activate existing social support resources during pregnancy, thus contributing to poorer mental health outcomes. Further, others have shown that inadequate social support in pregnancy is linked to higher cortisol levels in response to psychological distress (Giesbrecht, Poole, Letourneau, Campbell, & Kaplan, 2013). That is, greater stress reactivity, manifested biologically as higher cortisol levels, has been associated with inadequate social support. In fact, social support may serve as a protective factor in relation to the biological effects of stress. For example, it has been suggested that social support in pregnancy serves to decrease biological sensitivity to psychological distress, and provides protection against the deleterious effects of stress-related cortisol increases (Giesbrecht et al., 2013).

The prediction around the role of resilience as a mediator of the relationship between maternal ACEs and mental health symptoms in pregnancy was not as clear. ACEs, in and of themselves, were not thought to predict levels of resilience assessed in pregnancy. It may be the case that early adversity could lead to impaired resilience, or else greater resilience. To my knowledge, this has not yet been explored in the literature. It is possible that some other factor(s) are contributing to the weakening or strengthening of resilience over time, leading to current levels of resilience seen in pregnancy. Therefore, in this study, the analysis of the relationship between ACEs and resilience was exploratory. In contrast, it was expected it may

be more likely that greater resilience would predict fewer mental health symptoms in pregnancy, consistent with what others have found (Wagnild, 2009). In the current study, as mentioned earlier, the association between maternal ACEs and resilience was seen as likely being more nuanced. That is, it is not necessarily the case that ACEs lead to an increase or decrease in resilience; rather, some other factor(s) may serve to enhance or stress individual resilience. In this study, it was hypothesized that resilience may be a moderator, as has been shown previously in other studies (Young-Wolff et al., 2019). However, this was also not supported statistically, and this may be due to the overall high levels of resilience seen in this sample. It may be the case that resilience as a personal characteristic was not "activated" within the context of this sample, with participants being of relatively high socioeconomic status and in committed relationships, which inherently may confer more support. It may be that the buffering effect of resilience is instead seen among more vulnerable samples, to guard against deleterious effects of early adversity. In this sample, resilience was instead found to predict social support, which was in turn, associated with mental health symptoms. Further testing supported the role of social support as fully mediating the relationship between resilience and mental health. Therefore, it appears that in the context of early adversity, higher levels of resilience as a personal characteristic predict lower levels of mental health symptoms in pregnancy. This effect is mediated by social support, whereby women with higher resilience are able to activate support resources, which in turn decreases mental health symptoms in pregnancy.

Overall, hypothesis three was partially supported, such that mediation effects did emerge for both social support and resilience, though in unexpected ways for the latter. The

fourth hypothesis was not supported, whereby moderation effects of social support and resilience were not found. Although other studies have found support for the moderating role of resilience - whereby having one or more ACEs (compared to no ACEs), as well as low resilience, was predictive of worse mental health outcomes among pregnant women (Young-Wolff et al., 2019) – this was not found in the current study. Further, although others have shown support for the moderating role of social support (Appleton et al., 2019; Elsenbruch et al., 2007; N. Racine et al., 2018), this was also not supported in the current study. Consistent with my findings, other researchers have also found support for social support as a mediator of childhood adversity (Smith et al., 2016).

Limitations of the Current Study

This study, while adding to the literature around ACEs and mental health symptoms in pregnancy, brings forth a number of limitations worthy of consideration when interpreting the main findings. The sample was primarily comprised of highly educated, married women who worked full time, were of European descent, and reported relatively high family income. Most women had already borne children, and had chosen to receive prenatal health care from midwives rather than GPs or obstetricians. Midwifery care has been associated with lower rates of postpartum depression (Benoit, Westfall, Treloar, Phillips, & Jansson, 2007). It is therefore possible that rates of depression in pregnancy as measured in this sample, are lower due to this association. Overall, this study was not able to characterize the effects of maternal ACEs on mental health symptoms under more adverse or high-risk conditions, such as being young, single, or having additional stressors related to finances or housing. The findings from this study, therefore, may not extend to more vulnerable populations such as these, as well as

women living in poverty, women with higher rates of substance use, and marginalized women. Further, the effect of socioeconomic status (SES) on pregnancy outcomes (Kim et al., 2018) must be considered. Increased rates of inadequate prenatal care, caesarean delivery, preeclampsia, obstetric hemorrhage, and preterm delivery have been associated with lower SES, even in the context of a universal health care system such as that seen in Kim et al.'s (2018) study based in Korea. Therefore, this sample was likely protected from increased risk of such factors, simply due to the high socioeconomic status of the women who participated. Further, being married is inherently a robust source of social support, and perceived social support has been shown to mediate the relationship between marital status and psychological well-being (Soulsby & Bennett, 2015). Therefore, the women in this study likely had an inherent advantage in terms of social support, and the study findings may not be generalizable to women low in social support, a risk factor which is associated with poorer pregnancy outcomes (Appleton et al., 2019; Elsenbruch et al., 2007; N. Racine et al., 2018; Smith et al., 2016). Also, given that most women in this study reported having already borne children, this may have had implications for most of the study's variables. That is, many of the women in my study who have already had children may be more knowledgeable about relevant prenatal health behaviours, may have more social support (having already established a network of other women who have had children), may have greater be more familiarity with their health care provider, and therefore, experience less childbirth fear as a result of their previous experience with childbirth.

In addition to sample characteristics worth keeping in mind when interpreting study findings, other methodological limitations of the study require consideration. Inherent in much

of the literature around ACEs, assessment of childhood adversity often occurs in adulthood, and is linked to concurrently assessed outcomes. In this case, childhood adversity was assessed, on average, at least 15 years after it occurred, in the context of current life stressors, and mental health functioning in pregnancy. This cross-sectional approach does not permit for explicit testing of causality, despite the theorized directionality of ACEs impacting mental health symptoms. It is therefore possible that current mental health symptoms are influencing accurate recall and reporting of adversity in childhood. That said, consistency in retrospective and prospective assessment of childhood adversity have produced similar results in the association of childhood adversity with major depression in adulthood (Patten et al., 2015). Therefore, findings borne from retrospective assessment of ACEs in the current study may not be heavily influenced by recall bias. It is also possible that mental health symptoms in pregnancy, as predicted by ACEs, may in fact influence levels of social support and other variables I have conceptualized as mediators. That is, greater mental health symptoms themselves may predict lower levels of social support, increased substance use, and poorer sleep. Another methodological limitation in the current study pertains to the limited reliability of the health-promoting behaviours measures. For example, DeLuca and Lobel have developed a measure of prenatal health behaviours with good reliability and validity, which would be appropriate for use in future studies to better operationalize health-promoting behaviours (DeLuca & Lobel, 1995; Lobel et al., 2008). Finally, it is important to consider the specific aspects of perinatal anxiety assessed in the current study (childbirth fear and pregnancy-specific anxiety), which may not have captured the full extent of anxiety experienced among

the women in this study. This may thus have served to dilute the association seen between maternal ACEs and mental health symptoms in pregnancy.

Clinical Implications and Future Directions

Opportunities for intervention. Considering the sample used for the current study is made up of pregnant women, it is worthwhile to think about the implications gleaned from the findings presented earlier. That is, how might these findings impact the lives of the individual women in this study, or other pregnant women more generally? For one, further support has emerged for the association between increased ACEs and poorer mental health functioning in pregnancy. As discussed earlier, this appears to be driven most strongly by anxiety and depression, and to a lesser extent childbirth fear. Paired with the knowledge that screening for ACEs is feasible and generally well accepted among patients and their prenatal care providers (Flanagan et al., 2018), it seems reasonable to screen for ACEs more routinely in prenatal care. This would serve to provide additional information regarding risk factors in the development of mental health symptoms in pregnancy, which some have been recommended to routinely assess in pregnancy [specifically, depression – see (*Best Practice Guidelines for Mental Health Disorders in the Perinatal Period (2014)*, n.d.)]. Given the brevity of the ACE questionnaire, it may be reasonable to include this as part of routine prenatal care, and follow up more specifically with the assessment of mental health symptoms (depression, pregnancy-specific anxiety, and childbirth fear) as needed, as part of holistic prenatal care. This can serve to reduce stigma associated with seeking mental health care in pregnancy, if it were to be routinely screened. It could also serve to identify mental health symptoms in pregnancy sooner, thus providing opportunity for earlier intervention, in an effort to protect from adverse

outcomes associated with poor mental health in pregnancy such as influence on infant temperament (Davis et al., 2007), long-term behavioural consequences (Weinstock, 2008), and effects on early development (Field, 2011). It behooves the trauma-informed clinician to be sensitive to these historical factors which may be impacting current mental health functioning for women during pregnancy (Sperlich, Seng, Li, Taylor, & Bradbury-Jones, 2017). Therefore, both for primary care providers of pregnant women, and mental health care providers who provide wraparound care for these women, more knowledge about these factors will better inform treatment.

In addition to the intervention opportunities which could emerge when assessing both ACEs and mental health symptoms in pregnancy, the current study provided further insight into additional targets for intervention. Sleep, resilience, and social support were all identified as mediators relevant to the broader association between ACEs and mental health. Fortunately, all of these are potentially modifiable factors that may be suitable targets for intervention, and are also reasonable to assess as part of prenatal care. Though poor sleep may be commonly considered an unfortunate but common feature of pregnancy, it does not need to be accepted as such, and efforts to improve sleep may reap benefits for mental health symptoms. For example, non-pharmacological interventions to improve sleep in pregnancy have included exercise, massage, and acupuncture (Hollenbach, Broker, Herlehy, & Stuber, 2013), in addition to personalized health monitoring devices (Hawkins, Iradukunda, & Paterno, 2019). Further, a recent randomized clinical trial has demonstrated the benefit of pharmacological treatment of insomnia among women in the third trimester of pregnancy, to reduce postpartum depression symptoms (Khazaie, Ghadami, Knight, Emamian, & Tahmasian, 2013). In addition, identifying

women with limited social support may be beneficial toward strengthening this area of a woman's life. For example, prenatal care providers may choose to discuss this with pregnant women, and help problem solve ways to enrich support opportunities during pregnancy. For example, the Connecting Parenting group model of prenatal care has been offered by the Birth Docs group of family physicians providing maternity care in Vancouver, B.C. (Birth Docs, n.d.). This novel program combines medical care with prenatal education, and may be a place where women could build social supports during pregnancy. A similar approach (the Centering Pregnancy program; Rising, 1998) has been implemented in Canada (McNeil et al., 2012), and has been recommended for use with vulnerable populations such as pregnant adolescents (Klima, 2003). Finally, interventions that foster women's resilience during pregnancy have been recommended (Young-Wolff et al., 2019), with some programs in particular showing promise toward reducing symptoms of depression in youth in general (Brunwasser, Gillham, & Kim, 2009). Others have developed psychoeducation programs for pregnant women with a history of abuse (Rowe, Sperlich, Cameron, & Seng, 2014). Therefore, shoring up social support and resilience during pregnancy, may serve to attenuate possible later deleterious outcomes, including mental health symptoms in women (e.g., depression, pregnancy-specific anxiety, and childbirth fear). In a meta-analytic review of the prevalence of perinatal depression, rates were similar during pregnancy and post-partum (Woody, Ferrari, Siskind, Whiteford, & Harris, 2017). Therefore, it is of interest to ask whether earlier intervention during pregnancy, may serve to offer protection from later symptoms of depression in the postpartum period. As described by Madigan and colleagues, mothers may become less attuned to the behavioural and affective needs of their babies, or else become less psychologically or emotionally available, in the

context of psychosocial stressors including depression in the context of ACEs (Madigan et al., 2017). Given findings that show higher levels of anxiety, aggression, hyperactivity, and negative affectivity among 3-year old children whose mothers endorsed three or more ACEs (McDonald et al., 2019), interventions to bolster social support, resilience, and depression may serve to benefit the well-being of both the mothers and their babies.

Future directions. The preponderance of literature has examined deleterious sequelae of childhood adversity, established more strongly in non-pregnant samples but also evident in research with pregnant women. Therefore, it is worthwhile to include additional protective factors that might ameliorate this association, or alternatively, explore the relevance of benevolent childhood experiences (BCEs; Narayan, Rivera, Bernstein, Harris, & Lieberman, 2018). These have been defined as "favourable early experiences between birth and age 18 characterized by internal and external perceived safety, security, and support; and positive and predictable qualities of life" (Narayan et al., 2018). In fact, in an ethnically diverse sample of pregnant women with low income, BDEs were found to offset the effects of ACEs on prenatal stress and psychopathology, specifically, stressful life events and PTSD symptoms (Narayan et al., 2018). This is an exciting novel addition to the field, and inclusion of BDEs when studying ACEs lends itself to a post-traumatic growth lens through which to view childhood adversity.

This is an exciting and rapidly evolving area of research, with several interesting possible next steps. A research endeavor of interest to pursue, include: broadening of diversity among future samples of pregnant women, to include participants from more vulnerable socioeconomic populations and ethnic origins when studying ACEs, as well as longitudinal extensions of the current research. This might include a second postnatal time point which

might focus on such relevant factors as childbirth outcomes (mode of delivery, baby's birth weight and head circumference) and qualitative assessment of childbirth experience, as well as follow up mental health assessment. For example, assessment of postpartum women who endorsed 3 or more ACEs has revealed greater smoking, binge drinking, symptoms of state anxiety and depression, and decreased parenting morale (McDonald et al., 2019). Maternal ACEs have further been associated with early developmental outcomes of babies born to mothers with early adversity, including more symptoms of anxiety and externalizing behaviours (aggression and hyperactivity; (McDonald et al., 2019). Therefore, it would be highly interesting to follow up with the participants included in this study to measure infant and early childhood outcomes.

Conclusions

In summary, support emerged for the primary hypothesis of the current study, which was that early adversity predicted an increase in mental health symptoms in a sample of Canadian pregnant women. This was consistent with previous research (McDonnell & Valentino, 2016; Menke et al., 2019; Smith et al., 2016; Wajid et al., 2019), and built on the existing research by including a novel structural equation modelling approach, to capture three distinct but related mental health experiences relevant to pregnancy, including depression, pregnancy-specific anxiety, and childbirth fear. Furthermore, support emerged for the mediating role of poor sleep, as well as lack of social support, in the association between maternal ACEs and mental health symptoms in pregnancy. That is, higher ACEs predicted poorer sleep, as well as less social support; both of which in turn predicted greater mental health symptoms in pregnancy. Individual resilience was also shown to predict fewer mental

health symptoms in the context of ACEs, as mediated by increased social support. Therefore, although resilience itself was not predicted by ACEs, those women with higher resilience, reported greater social support and fewer mental health symptoms. Contrary to expectations, support did not emerge for the role of pregnancy-specific health-promoting behaviours, or health-risk behaviours, as mediators of the relationship between ACEs and mental health symptoms. However, it is possible this was due to inadequate measurement in the case of health-promoting behaviours, and because few women engaged in health-risk behaviours in the current sample. Results from the current study are encouraging for the development of appropriate interventions for use with pregnant women, to try to improve sleep as well as increase social support. Given the distal occurrence of ACEs, it is worthwhile to identify such behavioural targets for intervention as sleep and social support, in an effort to lessen the association with current mental health symptoms for pregnant women. The feasibility of screening for maternal ACEs in pregnancy has been established (Flanagan et al., 2018), some obstetricians recommend screening for ACEs in pregnancy (see Cortizo, n.d.), and screening for depression in pregnancy has been recommended (BC Reproductive Mental Health Program & Perinatal Services BC, 2014). Providing this level of holistic care towards pregnant women, by focusing on both ACEs and mental health screening, and discussing psychosocial factors such as social support, stands to reap benefits for the health of both mother, and her baby.

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Appendix A: Consent Form

CHILDBIRTH FEAR STUDY - INFORMED CONSENT

Principal Investigator:	Dr. Nichole Fairbrother ***contact information included on study consent form***
Co-Investigator:	Patricia Janssen, PhD ***contact information included on study consent form***
Co-Investigator:	Kathrin Stoll ***contact information included on study consent form***
Co-Investigator:	Dana Thordarson ***contact information included on study consent form***
Co-Investigator:	Hope Walker ***contact information included on study consent form***
Co-Investigator:	Dr. Marsha Runtz, ***contact information included on study consent form***

INVITATION TO PARTICIPATE
We are inviting you to participate in this study because you are a pregnant woman living in Canada.

PURPOSE
The purpose of this study is to validate a new measure of childbirth fears and concerns, and to better understand pregnant women's mental health and feelings about labour and delivery. We would also like to better understand how early life experiences may relate to how women respond to childbirth and pregnancy, in terms of how they feel and what they do. Fears related to childbirth are common, and have been associated with a number of birth-related and mental health difficulties. We hope that this measure will allow health care providers to identify women with these fears and respond with appropriate care. Through this study, we hope to better understand and explore relationships between pregnant women's mental health, possible history of trauma or unwanted sexual experiences, existing symptoms of posttraumatic stress and feelings about labour and delivery.

STUDY SUPPORT
This research is funded by Island Health and by the Canadian Institutes of Health Research.

STUDY PROCEDURES
If you agree to participate, you will be asked to complete an online project survey and a telephone interview. At the end of the online survey, you will also be given the opportunity, if you are interested, to complete an optional questionnaire.

THE SURVEY: The questionnaires will be administered online, via Fluid Surveys. You will be emailed a confidential link to your survey to complete. You will complete the questionnaire and interview when you are between 33 weeks gestation and birth.

The online survey will ask you about:

- Your background
- Reproductive history
- Information about current pregnancy
- Birth preferences
- Your mood
- Fears you may or may not experience in relation to childbirth and medical situations
- History of trauma and/or sexual abuse in childhood and adulthood
- Symptoms of posttraumatic stress

At the end of this portion of the survey, you will have the opportunity to complete an additional questionnaire. This optional questionnaire will take 15 to 25 minutes of your time. You are free to continue by completing these additional questions, or to skip this section.

OPTIONAL SURVEY QUESTIONS: The optional survey questions ask you about:

- How you take care of your health
- Your relationship with your health care provider
- Worries about your pregnancy
- Negative childhood experiences, including sexual victimization

• Social support
• Healthy coping

To clarify, this is a research study and as such, participation is NOT part of your pregnancy care. The childbirth fear questionnaire is being tested for use as a screening tool and will not result in a diagnosis. If you believe you are experiencing an impairing fear of childbirth, please contact your healthcare provider immediately. Questions about your race/ethnicity and income are included because it is important to know how race/ethnicity and income relate to maternal wellbeing and if specific groups of people are affected differently by mental health problems; you do not have to provide this information if you do not wish to.

INTERVIEW: The interview will be conducted by telephone. At the time of your interview, we will ask if you are comfortable with us audio-taping your interview. You are welcome to participate without agreeing to audiotaping of interviews. You do not have to answer any questions you do not want to answer. In the interview you will be asked about symptoms of specific fears related to childbirth.

The questionnaire package will take approximately 45 minutes to complete. The optional survey questions will take 15-25 minutes to complete. The prenatal interview will take 15 minutes on average. Altogether, involvement in the study will take between one and one and a half hours of your time.

CONFIDENTIALITY

CONFIDENTIALITY: All responses and data are kept strictly confidential. Access to the research data is restricted to the project investigators and members of the study team. All results are kept strictly confidential. The data we collect is identified with a numerical code only, not by name. Any identifying information (e.g., name, address, contact information) is kept separate from your data. Only your data code appears on your interview and questionnaire responses. Data is stored on secure, password protected computers or in a secure, locked file in our research lab. Access to the data is restricted to project team members (Dr. Nichole Fairbrother, Dr. Patricia Janssen, Dr. Kathrin Stoll, Dr. Dana Thordarson, Dr. Marsha Runtz, and Hope Walker, and the project research staff). Any publications of these data will be presented information for all participants as a group, so that no single person's data will be separated from the rest. Project data will be stored for 5 years after the study finishes; at that time electronic and audio data will be deleted and interview packages will be shredded. We are able to use data provided by all participants, even those who decide to leave the study early. However, if for some reason, you would like some or all of your data NOT to be included in the research, we are happy to remove and destroy it.

UBC SURVEY TOOL: The UBC Survey Tool is being used to collect data for this research. The UBC Survey Tool is a Canadian-hosted survey program accessed through the vendor, FluidSurveys. FluidSurveys is a service provided by SurveyMonkey, a US based company. This survey tool complies fully with the BC Freedom of Information and Protection of Privacy Act (FIPPA) and all data is stored and backed up in Canada.

BENEFITS

Completing the survey may help women to clarify their own feelings and preferences regarding their upcoming childbirth. The results of the study will help us assess the validity of a new measure of fears related to various aspects of childbirth, and to better understand how early life experiences may relate to how women respond to childbirth and pregnancy. We hope that this measure will be useful to pregnant women with childbirth concerns and the health professionals who work with them.

RISKS

The study questionnaires ask about a range of different situations and feelings people experience. Some of these questions concern previous trauma and/or unwanted sexual experiences. If you are fearful, anxious or upset about these situations, completing the study questionnaire may draw your attention to these feelings. You may find this experience unpleasant or distressing. If you experience any distress in response to the survey questions and would like to discuss this with us, you will have the opportunity to request that an interviewer on the research team follow up with you at the end of the survey. You are also welcome to send us an email at ***email address included on study consent form***, or contact us by telephone at ***phone number included on study consent form***, and Dr. Nichole Fairbrother (the Principal Investigator) will get in touch with you to discuss your concerns and, if appropriate, make suggestions for counseling. If you are in crisis and require immediate attention, we urge you to call the mental health crisis line open 24 hours a day at: 310-6789. In the event of an emergency, please call 9-1-1.

HONORARIA

SURVEY AND INTERVIEW: Participants who complete the study will have their name entered into a draw for a 1 in 100 chance to win a prize of $150. If 1000 women participate, there will be 10 people randomly drawn. Participants who are randomly selected will be contacted to provide their mailing address so that they can receive their honoraria.

OPTIONAL SURVEY: If you decide to complete the extra questions, you will be invited to enter your name in a draw to win one of 3 brand new 16 GB iPad Airs.

When the study is complete, a summary of our research findings will be made available on our web site (parlab.med.ubc.ca) and our Facebook Page: www.facebook.com/ChildbirthFearStudy. Should you wish to be sent research findings of this study, please email us at: ***email address included on study consent form***

CONTACT

If you have any questions about the questionnaires or desire further information with respect to this study, you may contact Dr. Fairbrother by telephone at: ***phone number included on study consent form*** or by email at: ***email address included on study consent form***. If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in

the University of British Columbia Office of Research Ethics by e-mail at ***email address included on study consent form*** or by phone at ***phone number included on study consent form***. Alternatively, you may contact the Island Health Research Ethics Office at: ***phone number included on study consent form*** or by email at ***email address included on study consent form***.

CONSENT

I understand that my participation in this study is entirely voluntary and that I may withdraw or refuse to participate at any time without consequence. By completing this survey, it is understood that I have consented to participate.

- ○ Yes, I consent to participate.
- ○ I do NOT consent to participate.

CONSENT TO AUDIO RECORD THE TELEPHONE INTERVIEW PORTION.

Please note - Consent to audio recording of the telephone interview will be confirmed when called for the study interview. You may still participate in the study should you choose not to have the interview audio recorded.

- □ I consent to be audio recorded during the interview portion of the study.

PERMISSION TO CONTACT FOR FUTURE RESEARCH

Should the lab secure additional funding, we would like permission to get back in touch with you, to inform you about future research the lab is undertaking. If you are interested in hearing more about future research and related studies, please indicate so below.

Do you consent to a member of the Perinatal Anxiety Research Lab contacting you at a later date to inform you of future related research?

- ○ I give consent to the Perinatal Anxiety Lab to get back in touch with me at a later date to inform me about further research.
- ○ I do not give consent.

Appendix B: Debriefing Form

Information about the Childbirth Fear Study

Thank you for participating in our study. We are very grateful for your help and appreciate the effort you have made. In the Childbirth Fear Questionnaire (CFQ) study, a new tool was developed to better understand and measure pregnant women's fear of childbirth. Through this study, we hope to assess the validity of the Childbirth Fear Questionnaire (CFQ) in assessing clinical childbirth fears. Additional goals of this project are:

1. To learn more about childbirth fears, attitudes and beliefs about childbirth, and how much these fears impact the lives of pregnant women.
2. To learn more about childbirth fear's impact on birth experiences.
3. To explore the relationship between fear of childbirth, mental health and a history of sexual assault, abuse, trauma or current symptoms of posttraumatic stress.
4. To better understand how early life experiences may relate to a woman's emotions and behaviours during pregnancy and childbirth.

The questionnaire and interview you completed were chosen and developed to help us further our understanding of perinatal mental health. We plan to use the results of this study as well as information from other research on this topic to develop scientifically-based guidelines and materials for caregivers assisting pregnant women who experience this type of fear. These guidelines will be communicated to pregnant women and health practitioners who care for them. Results from studies such as this one will be of benefit to psychologists and others in health care professions who assist pregnant women with various life experiences to cope in healthy ways.

We understand that some of the questions we've asked can be difficult or upsetting to read and respond to. If you are feeling distressed by your fears surrounding childbirth, we encourage you to contact (a) your physician, (b) Dr. Fairbrother, or (c) the BC Psychological Association Referral Line at: ***phone number included on study consent form***. If you have any questions and concerns, you are welcome to send us an email or contact us by telephone, and Dr. Nichole Fairbrother (the Principal Investigator) will get in touch with you to discuss your concerns and, if appropriate, make suggestions for counseling.

If you have found any of the questions distressing, would you like a project interviewer to follow up with you via telephone?

- ○ Yes, I have found questions distressing. I would like a project interviewer to follow up with me.
- ○ No, thank you.

If you have selected yes, an interviewer will be in touch with you within 48 hours. If you are in crisis and require immediate attention, we urge you to call the mental health crisis line open 24 hours a day at: ***phone number included on study consent form***. In the event of an emergency, please call 9-1-1.

Email: ***email address included on study consent form*** **Phone:** ***phone number included on study consent form****

Province Wide Participant Resources

- BC Nurse Line (Available 24/7) 811
  Call to speak with a nurse for free, anytime
- To find a Registered Psychologist in British Columbia:
  http://www.psychologists.bc.ca/find_psychologist_full
- To find a psychologist by province in Canada - Canadian Psychological Association:
  www.cpa.ca/public/findingapsychologist/
- For 24-hour hotline support regarding a sexual assault: Victoria Sexual Assault Centre 24 hour crisis and support line 250-383-3232, vsac.ca
- The Assaulted Women's Helpline (http://www.awhl.org/about/): 1-866-863-0511
- About anxiety among mothers-to-be and new mothers: http://perinatal.anxietybc.com or their hotline: 604-310-6789
- La Leche League Canada
  1 (800) 665-4324 www.lllc.ca
  Provides breast-feeding support and referral services.
- Birth Trauma Canada http://birthtraumacanada.org/
  Birth Trauma Canada is an organization of mothers who have had negative childbirth experiences. They work to provide support for women who have had traumatic birth experiences through giving women a voice, providing resources, and advocating for better obstetrics care.
- Pacific Postpartum Support Society Toll-Free: (855) 255-7999;
  Free, trained counsellors available Mon. – Fri. 10:00–3:00
  http://postpartum.org/
  Pacific Post Partum Support Society provides a variety of free or low-cost programs for mothers experiencing a difficult pregnancy or postpartum adjustment, including postpartum depression and anxiety (PPD/A). Services include telephone support from experienced postpartum counsellors (available across BC), publications and resource materials (available to all on their website), and weekly support groups (available in the Lower Mainland only).
- Self Care Program for Women with Postpartum Depression and AnxietyBC
- Women's Hospital Reproductive Mental Health Patient Guide is available for all to download, free of charge, at:

http://www.bcapop.ca/uploads/9/9/0/1/9901389/reproductivementalhealthselfcareguide.pdf

Further information and resources can be found here:

http://www.anxietybc.com/parents/new-moms

https://www.healthyfamiliesbc.ca/parenting

http://www.healthlinkbc.ca/commonhealthconcerns/womenshealth/pregnancychildbirth.html

http://themidwivescollective.ca/resources/

For more information about fear of childbirth you may wish to read the following articles:

Aksoy, M., Aksoy, A.N., Dostbil, A., Celik, M. G., & Ince, I. (2014). The relationship between fear of childbirth and women's knowledge about painless childbirth, Obstetrics and Gynecology International, 2014, 1-7.

Hofberg, K. & Ward, M.R. (2003). Fear of pregnancy and childbirth. Postgrad Med J, 79, 505-510.

Johnson, R. & Slade, Pauline. (2003). Obstetric complications and anxiety during pregnancy: Is there a relationship? J Obstetrics Gynecol, 24, 1-14.

Klusman, L.E. (1975). Reduction of pain in childbirth by the alleviation of anxiety during pregnancy. J Consult Clin Psychol, 43, 162-165.

Survey Submission Page and Thank You

Thank you very much for taking part in this research. We are very appreciative of your time and effort. The results of this research will be posted on our website when they become available at: parlab.med.ubc.ca Please note that it can sometimes take several months between the conclusion of the study and the posting of our findings.

1. Please indicate below if you would like us to include your survey responses in our research. If you respond "No" to the question below, we will not include your responses in our research.

- ○ Yes, I would like you to include my responses.
- ○ No, I do not wish you to include my responses.

Appendix C: ACEs and Pregnancy Study Questionnaire

Demographics

1. Are you pregnant?
☐ Yes
☐ No

2. What is your age? _____

3. Your baby's due date: ___ / ___ / ___ (YYY / MM / DD)

5. What is your current relationship status? (Check all that apply)
☐ Single (never been married)
☐ Married
☐ Cohabiting (living with romantic partner, but not married)
☐ Non-cohabiting (in a romantic relationship, but not living together or married)
☐ Separated
☐ Divorced
☐ Widowed
☐ Other (please specify): _____

6. How do you identify yourself regarding gender? (For some people this is the same as biological sex, and for some people it is different)
☐ Male
☐ Female
☐ Androgynous
☐ Trans male
☐ Gender-queer
☐ Two-spirited
☐ Other (please specify): _____

7. What country were you born in? _____

8. What language do you speak most often at home? _____

9. What is your cultural/ethnic heritage? Please check all that apply.
☐ NORTH AMERICAN ABORIGINAL ORIGINS (e.g., First Nations, Inuit, Metis)
☐ EUROPEAN ORIGINS (e.g., British Isles, Western/Eastern European, Northern/Southern European)
☐ CARIBBEAN ORIGINS (e.g., Haitian, Puerto Rican, Cuban, Dominican)

☐ LATIN, CENTRAL, AND SOUTH AMERICAN ORIGINS (e.g., Central/South American, Mexican, Mayan, Brazilian)
☐ AFRICAN ORIGINS (e.g., Congolese, Ivorian, Algerian, Egyptian, Rwandan, South African, Zambian)
☐ MIDDLE EASTERN ORIGINS (e.g., Iraqi, Iranian, Syrian, Jordanian, Saudi Arabian)
☐ SOUTH ASIAN ORIGINS (e.g., Bangladeshi, East Indian, Pakistani, Punjabi, Sri Lankan)
☐ EAST ASIAN ORIGINS (e.g., Chinese, Japanese, North and South Korean, Taiwanese, Mongolian)
☐ SOUTHEAST ASIAN ORIGINS (e.g., Cambodian, Flipino, Thai, Malaysian, Vietnamese)
☐ OCEANIA ORIGINS (e.g., Australian, New Zealander, Pacific Islander)
☐
OTHER_____

10. Education: Number of years of schooling (e.g. high school – 12-13, college = 15 or 16 for most people, etc.) _____

11. What is your primary occupation?
☐ Student
☐ Full-time employed
☐ part-time employed
☐ full-time homemaker
☐ unemployed, seeking work
☐ Retired
☐ Disabled
☐ Unemployed/other

12. Family income
☐ $20,000 - $30,000
☐ $30,000 – $40,000
☐ $40,000 - $50,000
☐ $50,000 - $60,000
☐ $60,000 - $70,000
☐ $70,000 - $80,000
☐ $80,000 - $90,000
☐ $90,000 - $100,000
☐ More than $100,000

Pregnancy Information

To better understand factors that may relate to a woman's mental health during pregnancy, we would like to ask you some questions about your reproductive history.

1. Before becoming pregnant (this pregnancy) were you suffering from any medical problems (for example, high blood pressure, diabetes)?

☐ Yes
☐ No

2. Have you had any medical problems or complications related to your pregnancy so far?

☐ Yes
☐ No

3. Have you had any medical problems or complications related to a previous pregnancy?

☐ Yes
☐ No
☐ N/A (this is your first pregnancy)

4. How many times have you been pregnant before (not including this pregnancy)?

☐ 0
☐1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ More than 10

5. How many children do you have in total? (i.e. biological, adopted, stepchildren, etc.)

☐ None
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7 or more

How many biological children do you have?
☐ None
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7 or more

7. How many adopted children do you have?
☐ None
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7 or more

How many step-children do you have?
☐ None
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7 or more

6. How many babies are you carrying (i.e. singleton, twins, triplets)?
Number of babies
☐ 1
☐ 2
☐ 3
☐ 4 or more

7. Who is your primary care provider in this pregnancy?
☐ Family Physician
☐ Midwife
☐ Obstetrician

8. Have you planned/do you plan to use the services of a doula during this pregnancy?

☐ Yes

☐ No

Fear of Childbirth Questionnaire

Below is a list of labour and childbirth situations that some women may find frightening. For each of the situations listed, please indicate how fearful you are. Please use the scale below as a guide:

Not at all	0	I am not at all afraid of this aspect of labour and birth.
Slightly	1	I am a little bit afraid of this aspect of labour and birth.
Moderately	2	I am quite afraid of this aspect of labour and birth.
Very	3	I am very afraid of this aspect of labour and birth.
Extremely	4	I am extremely afraid of this aspect of labour and birth.

How fearful are you of…

SITUATION	FEAR				
	Not at all	Slightly	Moderately	Very	Extremely
1. Needing to have stitches after the birth?	0	1	2	3	4
2. Not getting the pain medication I need?	0	1	2	3	4
3. The baby being harmed during labour/birth?	0	1	2	3	4
4. Being harmed because of incompetent medical care?	0	1	2	3	4
5. My body looking less attractive following the birth?	0	1	2	3	4
6. Having an emergency cesarean birth?	0	1	2	3	4
7. Being aware of the incision being made during a cesarean birth?	0	1	2	3	4
8. Other people seeing me have a bowel movement during labour/birth?	0	1	2	3	4
9. Being administered injections?	0	1	2	3	4
10. Not being able to have the kind of birth I want (i.e. vaginal or cesarean)?	0	1	2	3	4

11. Being separated from my support person for a cesarean birth?	0	1	2	3	4
12. Vaginal tearing during labour/birth?	0	1	2	3	4
13. Not being able to have a cesarean birth, even though this is what I would prefer?	0	1	2	3	4
14. Not living up to expectations to be strong?	0	1	2	3	4
15. Being administered an epidural?	0	1	2	3	4
16. Experiencing pain during contractions?	0	1	2	3	4
17. The baby contracting an illness during labour/birth (i.e. herpes, HIV)?	0	1	2	3	4
18. My partner enjoying sexual intercourse less because of stretching of my vagina from having a vaginal birth?	0	1	2	3	4
19. Having other people see me urinate during labour/birth?	0	1	2	3	4
20. My vagina looking less attractive following a vaginal birth?	0	1	2	3	4
21. Experiencing pain during a vaginal birth?	0	1	2	3	4
22. Experiencing pain while pushing the baby out?	0	1	2	3	4
23. Not being able to have a vaginal birth even though this is what I would prefer?	0	1	2	3	4
24. Receiving unwanted pain medication during labour/birth?	0	1	2	3	4
25. Not being able to have an epidural during labour if I want/need one?	0	1	2	3	4
26. Feeling pressure from others to have a natural (unmedicated) childbirth, even though that's not really what I want?	0	1	2	3	4
27. The baby being hurt by a medical intervention that takes place during labour/birth (e.g. vacuum, anesthetics)?	0	1	2	3	4
28. Having scars or wounds that do not heal properly?	0	1	2	3	4

29. Enjoying sexual intercourse less because of pain or discomfort from the birth?	0	1	2	3	4
30. Requiring vacuum or foreceps?	0	1	2	3	4
31. The baby dying during labour/birth?	0	1	2	3	4
32. Serious postpartum infection?	0	1	2	3	4
33. Other people seeing me naked during labour/birth?	0	1	2	3	4
34. Being watched by strangers during labour/birth?	0	1	2	3	4
35. Feeling pressure to receive pain medication during labour/birth even thought I may not want to?	0	1	2	3	4
36. Bleeding too much during labour/birth?	0	1	2	3	4
37. The baby suffocating during labour/birth?	0	1	2	3	4
38. Dying during labour/birth?	0	1	2	3	4
39. Having a cesarean birth?	0	1	2	3	4
40. Vomiting during labour/birth?	0	1	2	3	4
41. Having a lot of pain during cesarean birth?	0	1	2	3	4
42. Losing emotional control in front of other people (being rude, yelling) during labour/birth?	0	1	2	3	4
43. Serious postpartum hemorrhage?	0	1	2	3	4
44. Experiencing pain during a cesarean birth?	0	1	2	3	4
45. Having a cesarean birth under general anesthetic?	0	1	2	3	4
46. Having a catheter inserted (a tube inserted into the urethra to collect urine)?	0	1	2	3	4
47. The baby being damaged/handicapped as a consequence of labour/birth?	0	1	2	3	4
48. Having an episiotomy?	0	1	2	3	4
49. Being separated from the baby after a cesarean birth?	0	1	2	3	4

50. Enjoying sexual intercourse less because of stretching from a vaginal birth?	0	1	2	3	4
51. Having a vaginal birth?	0	1	2	3	4
52. Stretching of my vagina from giving birth vaginally?	0	1	2	3	4
53. Experiencing pain during labour?	0	1	2	3	4
54. Rectal tearing/damage as a consequence of labour/birth?	0	1	2	3	4
55. Being left with scars from a vaginal birth?	0	1	2	3	4
56. Having general anaesthetic?	0	1	2	3	4
57. Being left with scars from a cesarean birth?	0	1	2	3	4
58. Having to have a hospital birth when this is not what I want?	0	1	2	3	4
59. Having to be induced?	0	1	2	3	4
60. Having medical interventions I may not need?	0	1	2	3	4
61. Not getting to the hospital in time (i.e., the baby being born on our way to the hospital)?	0	1	2	3	4
62. Other: _____	0	1	2	3	4

Fear of Childbirth Questionnaire - Interference Scale

Sometimes our fears can cause interference in our lives; for example with our work, family and other things we like to do. Please indicate, using the following scale, how much your childbirth fears are interfering with your life:

No Interference	0	My fear does not interfere with this aspect of my life.
Mild Interference	1	My fear interferes with my life, but only in very small ways.
Moderate Interference	2	My fear interferes with some activities that are important to me. My fear definitely causes problems in my life.
Severe Interference	3	My fears prevent me from doing some important things in my life (e.g. attending medical appointments, working, caring for my children).
Extreme Interference	4	My fear prevents me from doing many important activities. My fear is causing serious problems in my life.

Interference					
	None	Mild	Moderate	Severe	Extreme
1. With my relationship with my partner/spouse.	0	1	2	3	4
2. With my relationship with other family members.	0	1	2	3	4
3. With other relationships in my life.	0	1	2	3	4
4. With my relationships with my prenatal caregivers.	0	1	2	3	4
5. With my work life.	0	1	2	3	4
6. With my leisure activities.	0	1	2	3	4
7. With getting ready for the new baby.	0	1	2	3	4
8. Other (specify): _____	0	1	2	3	4

Source: Fairbrother, N., Thordarson, D. S., & Stoll, K. (2018). Fine tuning fear of childbirth: The relationship between Childbirth Fear Questionnaire subscales and demographic and reproductive variables. *Journal of Reproductive and Infant Psychology*, *36*(1), 15–29.

Edinburgh Postnatal Depression Scale (EPDS)

Please answer the following questions on how you have been feeling OVER THE LAST 7 DAYS, not just today.

Over the last 7 days:

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

2. I have looked forward with enjoyment to things
   ☐ As much as I always did
   ☐ Rather less than I used to
   ☐ Definitely less than I used to
   ☐ Hardly at all

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

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

5. I have felt scared or panicky for no good reason
   ☐ Yes, quite a lot
   ☐ Yes, sometimes
   ☐ No, not as much
   ☐ No, not at all

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

☐ No, I have been coping as well as ever

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

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

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

10. The thought of harming myself has occurred to me
    ☐ Yes, quite often
    ☐ Sometimes
    ☐ Hardly ever
    ☐ Never

Source: Cox, JL, Holden JM and Sagovosky R; Detection of Postnatal Depression. Development of the 10-item Edinburgh Postnatal Depression Scale Br J Psychiatry 1987 150: 782-6

Prenatal Health Behaviours

Please respond to the following questions based on your current pregnancy.

1. Do you take a prenatal multivitamin (i.e., a vitamin that is specifically formulated for pregnant women or that was prescribed by your health practitioner for your pregnancy)?

☐ No

☐ Yes

If YES:
When did you first start taking a prenatal vitamin?

☐ Pre-pregnancy

☐ Once I found out I was pregnant

☐ Other: _____

If YES:
On average, how many days per week do you take your prenatal vitamin?

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 6

☐ 7

2. Do you take any other medications or supplements for your pregnancy?

☐ No

☐ Yes

If YES:
What do you take? _____
What is the purpose of the mediation or supplement? _____
Was it prescribed or recommended by your doctor? YES / NO
Was it recommended by another health professional? YES / NO
What type of professional (e.g., naturopath, dietician)? _____

3. Have you read any books or published literature about pregnancy or childbirth?

☐ No

☐ Yes

☐ I plan to before the baby is born

4. Have you visited any websites about read any books or published literature about pregnancy or childbirth?

☐ No

☐ Yes

☐ I plan to before the baby is born

5. Have you taken a prenatal health and education course?

☐ No

☐ Yes

☐ I plan to before the baby is born

6. Have you seen a doctor (or other health provider) for regular prenatal visits?

☐ No

☐ Yes

☐ I plan to before the baby is born

7. Have you made any changes to your diet and nutrition since learning you were pregnant?

☐ No

☐ Yes

☐ I plan to before the baby is born

If YES:
What changes have you made?

_____

8. Have you made any changes to the amount you engage in relaxation activities (e.g., meditation) or sleep?

☐ No

☐ Yes

☐ I plan to before the baby is born

If YES:
What changes have you made?

_____

9. What other lifestyle and health changes have you engaged in since learning you were pregnant?

_____
_____
_____

10. Have you sought support from other pregnant women, either informally or through formal support groups? (Select all that apply)

☐ No

☐ Yes – informally (from friends or new acquaintances)

☐ Yes – formally (through organized groups or community activities)

☐ I plan to before the baby is born

The next questions refer to your pregnancy history …

Questions about your current pregnancy

1. Is this your first pregnancy? YES / NO

    1b. If no: How many other pregnancies (not including your current pregnancy)? _____

2. What week gestation of your pregnancy are you currently in? _____

3. Have you ever given birth via cesarean section? YES / NO

    3b. If yes, how many previous cesarean sections have you had? _____

4. Have you ever had a pregnancy that did not go to term or result in a live birth? YES / NO

    4b. If yes, have you had a miscarriage? YES / NO

    4c. If yes, how many times have you had a miscarriage? _____

    4d. Have you had an abortion? YES / NO

    4e. If yes, how many times have you had an abortion? _____

    4f. Have you had a stillbirth? YES / NO

    4g. If yes, how many times have you had a stillbirth? _____

The next questions refer to social support …

Help you receive from your partner

Please respond to the following questions based on your current pregnancy. The following questions are about help or support from your partner since you have been pregnant.

Sample item:

1. Since you have been pregnant, has your partner provided financial support or things like a place to live?

   YES NO N/A – no partner

   1a. How satisfied were you with this help?

0	1	2	3
Not at all	Somewhat	Moderately	Very Much

Help from Others

The following questions are about help or support from people BESIDES your partner (like friends or other family) since you have been pregnant. Please indicate who you are answering these questions about (e.g. sister, mother – you may include more than one person):

_____

Sample item:

2. Has someone helped you with things you have to do like errands, household tasks or childcare, since you have been pregnant?

   YES NO

   2a. How satisfied were you with this help?

0	1	2	3
Not at all	Somewhat	Moderately	Very Much

Modified from: Collins, N. L., Dunkel-Schetter, C., Lobel, M., & Scrimshaw, S. C. M. (1993). Social Support in Pregnancy: Psychosocial Correlates of Birth Outcomes and Postpartum Depression. *Journal of Personality and Social Psychology*, *65*(6), 1243–1258.

Health Care Provider Support

Please respond to the following questions based on your current pregnancy.

*The next set of questions asks about your relationship with your **primary** health care provider.*

1. Who is the primary provider of your prenatal care during this pregnancy?
☐ Family Physician
☐ Midwife
☐ Obstetrician

2. Are you planning a home birth?
☐ No
☐ Yes
☐ Undecided

Reason(s) for wanting a home birth: _____

3. Who do you intend to have support you during childbirth? (Check all that apply)
☐ Romantic partner (indicate: male or female) _____
☐ Family member (who: eg., mother, sister…) _____
☐ Friend (indicate: male or female) _____
☐ Primary care provider (your doctor or midwife)
☐ Nurse
☐ Doula
☐ Other, please specify: _____

4. How confident are you, that your health care provider (doctor, midwife, or obstetrician) will provide the support you need during the delivery?
☐ Not very confident
☐ Moderately confident
☐ Very confident

5. If you have previously given birth, how has your experience of the birth influenced your current expectations and plans?

The next items refer to your impressions of your relationship with your health care provider …

Quality of Health Care from Your Perspective

Based on your interactions with your health care provider so far, please rate each of the following regarding your experiences:

Sample items:	Do Not Agree At All	Slightly Disagree	Slightly Agree	Completely Agree	Not applicable
1. I received the best possible treatment (as far as I can tell)	1	2	3	4	0
5. My care provider (doctor, midwife) seemed to understand how I experienced my situation	1	2	3	4	0
6. The care provider was respectful towards me	1	2	3	4	0

Source: Larsson, B. W., & Larsson, G. (2002). Development of a short form of the Quality from the Patient's Perspective (QPP) questionnaire. *Journal of Clinical Nursing*, *11*(5), 681–687. https://doi.org/10.1046/j.1365-2702.2002.00640.x

The next questions refer to your feelings in the past two weeks …

Stress In Pregnancy Scale

Please read each of the statements listed below. Circle the number in the column that most closely reflects the degree of stress you have felt *during the past 2 weeks*. Please respond to every statement. There are no "right" or "wrong" answers.

0	1	2	3	4
No Stress	**Low Stress**	**Moderate Stress**	**High Stress**	**Very High Stress**

Sample items:

1.	My ability to maintain my present level of functioning throughout my pregnancy.	0	1	2	3	4
2.	What questions to ask my doctors about my pregnancy.	0	1	2	3	4
3.	The effect of lifestyle behaviours (e.g. diet, activity, smoking, etc.) on the health of my pregnancy.	0	1	2	3	4
4.	About the adequacy of my pregnancy-related medical care.	0	1	2	3	4
5.	About my ability to cope with my pregnancy.	0	1	2	3	4
6.	Whether my partner can manage at home.	0	1	2	3	4
7.	The atmosphere (e.g. hospital, home-birth) in which I will give birth	0	1	2	3	4

The next questions refer to physical activity …

Physical Activity

1. On average, since you have been pregnant, how many city blocks or their equivalent do you walk each day? (Let 7 blocks = 1 km) _____

2. On average, since you have been pregnant, how many flights of stairs do you climb UP each day? (Let 1 flight = 10 steps) _____

3. List any sports of recreation you have actively participated in since you learned you were pregnant. Please remember to include seasonal sports or events.

Sport / Activity	Average # times / month	Average time/session in minutes
1.		
2.		
3.		
4.		
5.		

4. Which of these statements best express your point of view?

☐ I engage in enough exercise to be healthy

☐ I ought to engage in more exercise

☐ Don't know

5. At least ONCE a week, do you engage in regular activity such as brisk walking, jogging, bicycling, swimming, etc. long enough to work up a sweat, get your heart thumping, or get out of breath (for at least 20 to 30 minutes)?

☐ No

☐ Yes

If YES:
How many times per week? _____
Which activity/activities? _____

Modified from: Paffenbarger, R. S., Blair, S. N., Lee, I.-M., & Hyde, R. T. (1993). Measurement of physical activity to assess health effects in free-living populations. *Medicine and Science in Sports and Exercise*, *25*(1), 60–70.

Changes to exercise habits during pregnancy

Please respond to the following questions based on your current pregnancy.

1. Have your exercise habits changed since becoming pregnant?
☐ No
☐ Yes – they have *increased*
☐ Yes – they have *decreased*

2. Has your doctor or another health professional recommended you *increase* your physical activity levels while pregnant?
☐ No
☐ Yes

3. Has your doctor or another health professional recommended you *decrease* your physical activity levels while pregnant?
☐ No
☐ Yes

4. Are you worried about the effects of exercise on your pregnancy?
☐ No
☐ Yes

If YES:
What are you worried about? _____

Are you concerned about the lack of physical activity in your pregnancy?
☐ No
☐ Yes

The next questions refer to adverse events which may have occurred in your first 18 years …

Adverse Childhood Experiences

While you were growing up, during your first 18 years of life:

1.	Did a parent or other adult in the household **often or very often:**		
	Swear at you, insult you, put you down, or humiliate you?	YES	NO
	Act in a way that made you afraid that you might be physically hurt?	YES	NO
2.	Did a parent or other adult in the household **often or very often**:		
	Push, grab, slap, or throw something at you?	YES	NO
	Ever hit you so hard that you had marks or were injured?	YES	NO
4.	Did you **often or very often** feel that:		
	No one in your family loved you or thought you were important or special?	YES	NO
	Your family didn't look out for each other, feel close to each other, or support each other?	YES	NO
5.	Did you **often or very often** feel that:		
	You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?	YES	NO
	Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?	YES	NO
6.	Were your parents **ever** separated or divorced?	YES	NO
7.	Was your mother or stepmother:		
	Often or very often pushed, grabbed, slapped, or had something thrown at her?	YES	NO
	Sometimes, often, or very often kicked, beaten, hit with a fist, or hit with something very hard?	YES	NO
	Ever repeatedly hit at least a few times or threatened with a gun or knife?	YES	NO
8.	Did you live with anyone who was a problem drinker or alcoholic or used street drugs?	YES	NO
9.	Was a household member depressed or mentally ill, or did a household member attempt suicide?	YES	NO
10.	Did a household member go to prison?	YES	NO

Source:
https://www.ncjfcj.org/sites/default/files/Finding%20Your%20ACE%20Score.pdf

The following portion of the survey is intended for participants who are 18 years of age or older. This is important, because the following questions are of a sensitive nature and ask about sexual assault in childhood, and could therefore have legal implications for people under the age of 18.

Are you 18 years of age or older?
☐ Yes
☐ No

These questions, and all others, are optional, so you may choose to skip any questions you would prefer not to answer.

We know that many people have unwanted "sexual" or violent experiences as children or adults. Some of these are with playmates or friends and some with relatives of acquaintances. These experiences may be so upsetting that they may not be discussed with anyone. Sometimes they are forgotten for long periods of time, and sometimes they are frequently brought to mind.

While you were growing up, during your first 18 years of life:

3.	Did an adult or person at least 5 years older than you **ever**:		
	Touch or fondle you or have you touch their body in a sexual way?	YES	NO
	Attempt or actually have oral, anal, or vaginal intercourse with you?	YES	NO

3b. Regardless of the age of the other person, did anyone **ever**:		
Touch or fondle you or have you touch their body in a sexual way, without your consent?	YES	NO
Attempt or actually have oral, anal, or vaginal intercourse with you, without your consent?	YES	NO

If "yes" on either item on question 3:
We would like you to help us understand these experiences that people may have. If this occurred more than one time, please think of the event that you feel had the most impact on your life, and answer the following questions:

9. Gender of the *other person*	Male | Female
10. Age of the *other person* at the time of the incident.	_____
11. Relationship *of the other person* to you	☐ parent, stepparent, or guardian ☐ brother or sister ☐ grandparent ☐ cousin ☐ uncle or aunt

	☐ other *adult* relative ☐ adult authority figure (e.g., teacher, minister) ☐ your boyfriend or girlfriend ☐ other known adult (*not family*) ☐ stranger
12. Was *physical force* ever used?	YES | NO
13. Approximately how many times did it happen?	
14. Your age the *first* time it occurred	
15. Your age the *last* time it occurred	

Sleep

How often in the past week did you:

Sample items:	No days	1	2	3	4	5	6	Every day
9. Feel tired or fatigued during the day.								
10. Feel satisfied with the quality of your sleep.								
11. Feel alert and energetic during the day.								
16. Drink and alcoholic beverage to help you get to sleep.								

Source: Lee, K. A. (1992). Self-reported sleep disturbances in employed women. *Sleep*, *15*(6), 493–498. https://doi.org/10.1093/sleep/15.6.493

The next questions refer to alcohol and substance use …

Alcohol Use

For the following questions, a standard drink is equal to a 341 ml (12 oz.) bottle of 5% strength beer, cider or cooler; a 142 ml (5 oz.) glass of 12% strength wine; or a 43 ml (1.5 oz.) shot of 40% strength spirits.

1. In the previous 12 months *before you were pregnant*, how many drinks containing alcohol did you have during an average week?

☐ No drinks during an average week
☐ Less than one drink during an average week
☐ 1 to 3 drinks a week
☐ 4 to 6 drinks a week
☐ 7 to 10 drinks a week
☐ 11 to 14 drinks a week
☐ 15 to 17 drinks a week
☐ 18 or more drinks a week
☐ Don't know / Not applicable

Please respond to the following questions based on your current pregnancy.

2. Since becoming pregnant but *before you knew you were pregnant* did you consume any alcohol?
☐ Yes
☐ No

3. Once you *knew that you were pregnant*, did you consume *any* alcohol?
☐ Yes
☐ No

4. Since becoming pregnant, including the time before you knew you were pregnant, on how many occasions did you consume **3 or more** in one sitting, and how many times have you had **11 or more** drinks in one week?

	First trimester (weeks 0 – 12) **BEFORE** you knew you were pregnant	First trimester (weeks 0 – 12) **AFTER** you learned you were pregnant	Second trimester (weeks 12 – 24)	Third trimester (weeks 24 – 40)
Number of times you consumed **3 or more** drinks in one sitting?				
Number of times you consumed **11 or more** drinks in one week?				

5. How many drinks of alcohol did you **consume in the past week in total**?

_____

Is there anything else you would like to say about your alcohol use during the time before you knew you were pregnant or since learning about your pregnancy?

Substance Use

During your pregnancy, how often have you:

1. Smoked any cigarettes, a cigar, or pipe, or used snuff or chewing tobacco?

First trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily
Second trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily
Third trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily

2. Used any of the following substances outside of prescriptions used according to your doctor's directions:

Painkillers (like Vicodin or codeine, etc.)

First trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily
Second trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily
Third trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily

Stimulants (like Ritalin, Adderall)

First trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily
Second trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily
Third trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily

Sedatives or tranquilizers (like sleeping pills or Valium)

First trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily
Second trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily
Third trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily

Marijuana

First trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily
Second trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily
Third trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily

Other drugs like: cocaine or crack, club drugs (like ecstasy), hallucinogens (like LSD), heroin, inhalents or solvents (like glue), methamphetamine (like speed)

First trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily
Second trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily
Third trimester	None	1-2 days/wk	3-4 days/wk	5-6 days/wk	daily

Please indicate which substance(s) you consumed:
_____

3. Since learning you were pregnant, have you changed your level of consumption of any of the substances (cigarettes or any of the drugs listed in question 2) compared to the year prior to pregnancy?

☐ No – I consume as much during pregnancy as I did before I learned I was pregnant
☐ Yes – I consume more now that I am pregnant
☐ Yes – I consume less now that I am pregnant
☐ Yes – I have quit

Please indicate which substances you have *increased* in consumption since learning you were pregnant (e.g., cigarettes or specific drugs listed in question 2):
_____

Please indicate which substances you have *decreased* in consumption since learning you were pregnant (e.g., cigarettes or specific drugs listed in question 2):
_____

The next (and final) questions refer to your beliefs about yourself …

Resilience Scale Short Form (RS-14)

Below is a list of statements. To the right of each are seven numbers, ranging from "1" (Strongly Disagree) on the left to "7" (Strongly Agree) on the right. Please indicate the number which best indicates your feelings about that statement. For example, if you strongly disagree with a statement, you would say "1". If you are neutral, say "4", and if you strongly agree, say "7", etc.

Sample items:

Circle the number in the appropriate column	**Strongly Disagree**						**Strongly Agree**
1. I usually manage one way or another.	1	2	3	4	5	6	7
11. My belief in myself gets me through hard times.	1	2	3	4	5	6	7
13. My life has meaning.	1	2	3	4	5	6	7

Wagnild G. (2009). The Resilience Scale User's Guide for the US English version of the Resilience Scale and the 14-Item Resilience Scale (RS-14). Worden, MT: The Resilience Center.