A BIOPSYCHOSOCIAL APPROACH TO PERSISTENT POSTPARTUM PAIN
AND POSTPARTUM SEXUAL FUNCTION

By

JACLYN PEARL CAPPELL

A thesis submitted to the Department of Psychology
in conformity with the requirements for
the Degree of Master of Science

Queen’s University
Kingston, Ontario, Canada

September 2014

Copyright © Jaclyn Pearl Cappell, 2014
Abstract

Recently, there has been a push for a maternal-focused model of postpartum care; however, this model of care tends to focus on postpartum depression. Two issues that are related to postpartum depression but may go unaddressed by health-care professionals are persistent postpartum pain (PPP) and postpartum sexual function. Traditionally, these issues have been investigated using a biomedical approach. With a biomedical approach, PPP is attributed to tissue damage during childbirth, and sexual problems emerge due to an overemphasis placed on the (heteronormative) functionality of the genitals. However, the biomedical model provides insufficient explanations for PPP and postpartum sexual function. Therefore, the primary goal of the current studies was to apply a multidimensional framework to the study of PPP and postpartum sexual function using comprehensive conceptualizations of “pain” and “sexual function”. A secondary goal was to elucidate the relationships among postpartum depression, PPP, and sexual function by investigating the role of potential mediating variables.

Women within one year postpartum completed an online survey. In Study 1, pain characteristics of PPP (pain persisting for two months or more) were described. Women with PPP were compared to women whose pain resolved within two months postpartum on birth-related physical and psychosocial factors. The results of Study 1 indicated that PPP is pervasive in nature and more common after a Caesarean section. Somatization (functional impairment) was the only biopsychosocial factor to significantly predict PPP, and it mediated the relationship between depressive symptoms and PPP. Study 2 examined the role of birth-related physical, psychological, and relationship variables on several facets of postpartum sexual function. In this study, fatigue and relationship
satisfaction predicted sexual function as well as independently mediated the relationship between depressive symptoms and postpartum sexual function.

The results of the current studies indicate that PPP and postpartum sexual function are best addressed using a multidimensional approach, which goes well beyond the biomedical model that is so commonly used in the current literature. Furthermore, the results of these studies have significant implications for health-care providers with respect to what information should be integrated into pre- and postpartum health-care.
Acknowledgements

First and foremost, thank you to my amazing supervisor, Dr. Caroline, Pukall, for creating a work environment that fosters creativity, collaboration, and growth. Thank you for your constant positive encouragement, patience, and dedication. You are such a wonderful role model and mentor.

I was very fortunate to have great committee members to help me through this process. Thank you to Dr. Meredith Chivers and Dr. Tara MacDonald for all of the brainstorming, problem solving, and support.

Thank you to the Curly SHRLys for your help every step of the way. I could not have asked for a better lab to be a part of! Over the past two years, you have all become great friends and colleagues and I look forward to watching these relationships grow!

I would also like to thank all the new mothers who took time out of their busy and tiring days to complete my survey. Their time and effort made this research possible.

Finally, thank you to my family and friends for their unwavering support and encouragement. I am so lucky to have amazing and inspiring people in my life!
## Table of Contents

Abstract ............................................................................................................................................... i
Acknowledgements ......................................................................................................................... iii
Table of Contents ............................................................................................................................... iv
List of Tables ...................................................................................................................................... vi
List of Figures ...................................................................................................................................... vii
List of Abbreviations ........................................................................................................................ viii

**CHAPTER 1: General Introduction** .................................................................................................. 1
  Persistent Postpartum Pain and Postpartum Sexual Function ......................................................... 2
  Biomedical Approach to Pain ........................................................................................................ 4
  Biomedical Approach to Sexual Function .................................................................................... 5
  Shifting to a Biopsychosocial Approach to Pain and Sexual Function ........................................ 6
  Current Study .................................................................................................................................... 8

**CHAPTER 2: A Biopsychosocial Approach to Persistent Postpartum Pain** .................................. 9
  Biomedical Model of Persistent Vulvar and Pelvic Pain ............................................................... 10
  Biomedical Model of Persistent Postpartum Pain .................................................................... 11
  Physical Factors Involved in Postpartum Pain ............................................................................ 13
  The Biopsychosocial Model and Persistent Pelvic and Vulvar Pain .......................................... 16
  Role of Psychological Factors ....................................................................................................... 16
  Role of Social Factors ................................................................................................................... 18
  Study Goal and Research Questions ............................................................................................ 19

**Methods** ......................................................................................................................................... 21
  Participants ..................................................................................................................................... 21
  Procedures ..................................................................................................................................... 22
  Measures ....................................................................................................................................... 22

**Results** .......................................................................................................................................... 27
  Statistical Considerations ............................................................................................................ 27
  Data Considerations ..................................................................................................................... 28
  Sample Characteristics ............................................................................................................... 30
  Persistent Postpartum Pain Characteristics .............................................................................. 34
  Physical Factors Involved in Acute and Persistent Pain ............................................................ 36
  Psychosocial Factors Involved in Acute and Persistent Pain ..................................................... 37
  Logistic Regression and Mediation Analysis ............................................................................... 38

**Discussion** .................................................................................................................................... 40
  Pain Prevalence .............................................................................................................................. 41
  Pain Intensity ................................................................................................................................. 42
  Pain Quality .................................................................................................................................. 43
  Pain Location ................................................................................................................................. 43
  Pain Triggers .................................................................................................................................. 44
  Pregnancy and Birth-related Physical Factors Involved in Persistent Postpartum Pain .......... 44
  Psychosocial Factors Involved in Persistent Postpartum Pain .................................................... 47
  Limitations and Future Directions ............................................................................................... 50
List of Tables

Table 1. Degrees of Genital Tears in Childbirth.................................................................15

Table 2. Sociodemographic Variables According to Pain Group........................................32

Table 3. Pregnancy, Labour and Delivery Variables According to Pain Group.........................33

Table 4. Most Painful Pain Location as Indicated by Women with PPP.................................35

Table 5. Birth-related Factors Involved in APP and PPP.....................................................37

Table 6. Psychosocial Factors Involved in APP and PPP.....................................................38

Table 7. Sociodemographic Characteristics for the Entire Sample........................................71

Table 8. Labour and Delivery Experiences for Entire Sample................................................74

Table 9. Sexual Function, Psychological, and Relationship Variables....................................76

Table 10. Pearson’s Correlations Between Psychosocial and Sexual Function Variables..........82

Table 11. Multiple Linear Regression of Relationship between Psychosocial Factors and Postpartum Sexual Function.................................................................84

Table 12. Summary of Results from Pearson’s Correlations and Multiple Regression Analyses.....85
List of Figures

Figure 1. Flow Chart of the Number of Participants in Each Stage of Data Cleaning.................21

Figure 2. Anatomical Drawings of the Vulva, Pelvis, and Caesarean Section Scar.......................25

Figure 3. Words Used on the SF-MPQ to Describe PPP.............................................................34

Figure 4. Somatization Completely Mediates the Relationship between Depressive Symptoms and Persistent Postpartum Pain .................................................................40

Figure 5. Flow Chart Showing the Number of Participants in Each Stage of Data Cleaning........64

Figure 6. Fatigue Completely Mediates the Relationship between Depressive Symptoms and Postpartum Sexual Function .................................................................87

Figure 7. Relationship Satisfaction Completely Mediates the Relationship between Depressive Symptoms and Postpartum Sexual Function ..................................................88
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADL</td>
<td>Activity of daily living</td>
</tr>
<tr>
<td>APP</td>
<td>Acute postpartum pain</td>
</tr>
<tr>
<td>AVB</td>
<td>Assisted vaginal birth</td>
</tr>
<tr>
<td>CP</td>
<td>Current pain</td>
</tr>
<tr>
<td>CS</td>
<td>Caesarean section</td>
</tr>
<tr>
<td>DSM</td>
<td>Diagnostic and Statistical Manual of Mental Disorders</td>
</tr>
<tr>
<td>EPDS</td>
<td>Edinburgh Postnatal Depression Scale</td>
</tr>
<tr>
<td>FSC</td>
<td>Fatigue Symptom Checklist</td>
</tr>
<tr>
<td>FSFI</td>
<td>Female Sexual Function Index</td>
</tr>
<tr>
<td>IASP</td>
<td>International Association for the Study of Pain</td>
</tr>
<tr>
<td>NRS</td>
<td>Numeric rating scale</td>
</tr>
<tr>
<td>PCS</td>
<td>Pain Catastrophizing Scale</td>
</tr>
<tr>
<td>PCS-SF-36</td>
<td>Physical Component Summary of the Short-Form-36 Health Survey</td>
</tr>
<tr>
<td>PPP</td>
<td>Persistent postpartum pain</td>
</tr>
<tr>
<td>RAS</td>
<td>Relationship Assessment Scale</td>
</tr>
<tr>
<td>SDI</td>
<td>Sexual Desire Inventory</td>
</tr>
<tr>
<td>SES</td>
<td>Socioeconomic status</td>
</tr>
<tr>
<td>SF-MPQ</td>
<td>Short Form McGill Pain Questionnaire</td>
</tr>
<tr>
<td>SHRL</td>
<td>Sexual Health Research Lab</td>
</tr>
<tr>
<td>SO-MSPSS</td>
<td>Significant Other subscale of the Multidimensional Scale of Perceived Social Support</td>
</tr>
<tr>
<td>VB</td>
<td>Vaginal birth</td>
</tr>
</tbody>
</table>
CHAPTER 1

General Introduction

Pregnancy and childbirth are some of the most monumental moments in a woman’s life. For many, bringing a child into the world is a time filled with joy and excitement. However, the time following childbirth, especially within the first year, is a high-risk period for significant physical, sexual, relational and mental health concerns. After the birth of a child or multiples (i.e., twins, triplets, or more), parental focus is directed on the baby or babies (Ahlborg & Strandmark, 2001) and often the health of the parents is neglected (Gjerdingen & Center, 2003).

In the past, as a mother adapted to her changing roles and a new household environment, there was a trend for postpartum care to drop off (Mercer, 1985), likely contributing to poor maternal health (World Health Organization, 1998). Indeed, much research has shown that poor maternal health (both physical and mental) is related to poor child and adolescent outcomes in terms of overall adverse effects on cognitive and emotional development, such as delayed language, behavioural problems, and insecure attachment (Beck, 1998; Kahn, Zuckerman, Bauchner, Homer, & Wise, 2002; Righetti-Veltema, Bousquet, & Manzano, 2003). Because of this association, there has been a push for a maternal-focused continuum of postpartum care (World Health Organization, 1998). For example, in most developed countries, health-care providers see women at six weeks postpartum for a routine check-up (Levitt et al., 2004). However, this model of care typically focuses on risk assessment related to postpartum depression (Gunn et al., 2006). Indeed, postpartum depression is a serious concern that can have enormous negative repercussions on the welfare of the family and development of the child (Beck,
Nevertheless, health-care professionals may not address two important issues that are related to postpartum depression: persistent postpartum genital/pelvic pain and sexual problems (S. Brown & Lumley, 2000; Chivers, Pittini, Grigoriadis, Villegas, & Ross, 2011; DeJudicibus & McCabe, 2002; Eisenach et al., 2008). Furthermore, in qualitative studies that involved interviewing new mothers about postpartum care, the topics of postpartum pain and sexual function are reportedly neglected by health-care professionals despite the desire of mothers-to-be to learn about them (A. Olsson, Lundqvist, Faxelid, & Nissen, 2005; Rudman & Waldenstrom, 2007). Therefore, investigations regarding postpartum pain and sexuality are necessary in examining the larger picture of postpartum maternal health. Furthermore, better understanding of the complex role that depression plays in the maintenance of postpartum pain and sexual problems can help target preventive or therapeutic factors during perinatal or postpartum care.

**Persistent Postpartum Pain and Postpartum Sexual Function**

Acute postpartum pain (APP) in the pelvic region, in the genital region, or at the site of incision is a common and well-documented problem following childbirth, whether delivery consisted of a vaginal birth (VB) or Caesarean section (CS; Eisenach et al., 2008; Nikolajsen, Sorensen, Jensen, & Kehlet, 2004; Vermelis, Wassen, Fiddelers, Nijhuis, & Marcus, 2010). APP usually resolves within two months after delivery (Declercq, Cunningham, Johnson, & Sakala, 2008; Kainu, Sarvela, Tiippana, Halmesmaki, & Korttila, 2010); however, for some women, the pain can persist beyond two months, which is referred to as persistent postpartum pain (PPP).

PPP experienced in the genital and pelvic region can be unprovoked (i.e., spontaneous, or occurring without provocation/contact) or it can be triggered by a host of
activities, such as coughing, deep breathing, inserting/removing a tampon, sexual activity involving vaginal penetration, and gynecological exams (Kainu et al., 2010; Paterson, Davis, Khalife, Amsel, & Binik, 2009). The most common trigger for pain is vaginal penetration (Paterson et al., 2009); indeed, dyspareunia (painful intercourse) is extremely common in the postpartum period (Barrett & Victor, 1996). Because of the sensitivity of the genital, pelvic, or incision area due to labour and delivery, health-care professionals, the new mother, and her partner are often concerned about the question of when it is considered safe to resume intercourse (Robson, Brant, & Kumar, 1981). Although there is no specific “safe” time to resume intercourse, health-care professionals typically recommend that women consider resuming sexual intercourse six weeks after delivery. This timeframe corresponds with the first routine postpartum visit and allows sufficient time for surgical and vaginal wound healing (Johnson, 2011). However, it is actually not known what sexual activities outside of penetration are resumed at what point, as this literature focuses solely on penile-vaginal penetration. While the majority of women will resume intercourse between the second and third month postpartum (von Sydow, 1999), many report sexual problems in addition to dyspareunia beyond the three-month point, such as loss of sexual desire, decreased lubrication, and difficulty reaching orgasm (Barrett et al., 2000; Johnson, 2011; Yeniel & Petri, 2014). Certainly, there is considerable evidence to suggest that sexual problems are common in the postpartum period (Abdool, Thakar, & Sultan, 2009; Johnson, 2011; Serati et al., 2010)—only 14% of women and 12% of men report no sexual problems postpartum (von Sydow, 1999).

PPP and issues with postpartum sexual function can have a negative impact on a woman’s quality of life, mental health, and relationships—all of which potentially impact
her ability to care for and bond with her newborn(s). As such, there has been a recent surge in interest in and research on these subjects in the postpartum literature. Given that gynecologists, obstetricians, anesthesiologists, and nurses are the front-line individuals involved with women in the postpartum, much of the published research comes from these medical teams (e.g., Abdool et al., 2009; Brubaker et al., 2008; Buhling et al., 2006; Connolly, Thorp, & Pahel, 2005; Eisenach et al., 2008; Hosseini, Iran-Pour, & Safarinejad, 2012; Johnson, 2011; Kainu et al., 2010; Nikolajsen et al., 2004; Serati et al., 2010; van Brummen, Bruinse, van de Pol, Heintz, & van der Vaart, 2006; Vermelis et al., 2010), resulting in a bias towards a biomedical approach to the conceptualization of postpartum pain and sexual function.

**Biomedical Approach to Pain**

In order to contextualize the biomedical approach to pain, it is imperative to situate it within the larger historical tradition of Western medicine. The ancient Greeks believed that there was an intricate interrelationship between the mind and the body. At the forefront of this philosophy was Hippocrates’ theory of the Four Humors (bodily fluids). This theory proposed that four different bodily fluids were responsible for various temperaments or personality types, and thus, it was held that physical and biological factors were intrinsically tied to psychological factors. This integrated view began to lose favour around the 17th century with the advent of physical medicine and an emphasis on empirical study in the Renaissance. During this time, the dualistic perspective of the mind and body as separate entities dominated traditional Western thought. That is, the mind (or soul) was delegated to the “unscientific” studies of philosophy and religion, while the body could be measured using objective quantification. The body, therefore, was
considered to be in the realm of physical medicine. This viewpoint initiated a trend towards a biomedical reductionist approach to medicine, which posited that disease could fully be accounted for by deviations from the norm of biological (physical) variables. Under this model, complex phenomena, such as diseases, could be reduced to a single primary principle (i.e., a physical pathology), and thus, concepts like the mind and the soul were not needed as explanatory tools (Gatchel & Turk, 1999).

Early theories of pain paralleled the biomedical approach to disease, in that pain was thought of as a symptom secondary to the presence of tissue pathology (biological variable). This model was especially problematic for individuals who experienced persistent pain because when the pain could not be attributed to physiological causes, it was deemed “psychogenic” and decidedly not “real” pain (Gatchel & Turk, 1999).

**Biomedical Approach to Sexual Function**

Historically, the biomedical approach to sexuality defined any sexual behavior that deviates from the norm as pathological (Fishman & Mamo, 2002). An infamous example of this is the inclusion of homosexuality in the first edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM; American Psychiatric Association, 1952). Decades later, the biomedical approach to sexuality is still at the forefront of debates about the medicalization of male and female sexual dysfunction (Cacchioni & Tiefer, 2012). Arguments against the biomedical approach to sexual dysfunction highlight the problematic way in which the medicalization of sexuality reinforces heteronormative sexual scripts (Cacchioni, 2007). That is, sex is conceptualized as a physiologically driven act, and as such, heterosexual penile-vaginal intercourse is defined as “real” sex. Under this model, other forms of sexual activity are “just” foreplay, which is considered
optional or as a substitution if the “real thing” isn’t possible (Ussher, Perz, Gilbert, Wong, & Hobbs, 2013). This conceptualization of sex means that the target of medical interventions for sexual dysfunction tends to focus on the ability to have intercourse (Fishman & Mamo, 2002), and while sexuality encompasses much more than just the ability to have intercourse (World Health Organization, 2002), intercourse is so often the focus of information provided by health-care professionals (Hordern & Street, 2007).

Furthermore, the biomedical approach to sexuality places such a strict focus on the functionality and performance of the genitals (Tiefer, Hall, & Tavris, 2002; Ussher et al., 2013), while neglecting to consider other psychological and relational issues that may be relevant (Ussher et al., 2013). This focus is especially evident when sexuality is considered after a medical condition or intervention. For example, the field of sexuality after gynecological cancer has recently received a lot of attention (Abbott-Anderson & Kweekeboom, 2012). However, a major criticism on the research and clinical practice regarding sexual dysfunction after gynecological cancer is that it tends to focus on concrete problems that are observable and easy to measure, and for which a specific suggestion can be provided (e.g., information about lubricants and vaginal dilators for dyspareunia). Meanwhile, other issues such as loss of desire and problems obtaining orgasms are often neglected (Cleary & Hegarty, 2011).

**Shifting to a Biopsychosocial Approach to Pain and Sexual Function**

The biomedical model remained dominant until the 20th century when psychiatrist George Engel argued that the biomedical approach was insufficient to account for the individual human experience of disease. Engel called for a biopsychosocial model of medicine, which could incorporate the psychological and social aspects of illness while
maintaining the physical component. A shift to a biopsychosocial model of pain soon followed, leading to significant implications for understanding the etiology and treatment of persistent pain (Gatchel, Peng, Peters, Fuchs, & Turk, 2007). From this perspective, the diversity of pain expressions, including its severity, duration, and implications, are accounted for by the interrelationships among physical pathology, psychological (or affective) characteristics, and the social and cultural contexts that shape the individual’s perception and response to pain. A biopsychosocial framework has been applied to many persistent pain conditions, such as arthritis and back pain (Gatchel et al., 2007), but it has yet to be applied to PPP.

In the sexuality literature today, there is general consensus that psychological and relationship factors play a significant role in the etiology and/or maintenance of sexual dysfunction, in addition to biological factors (Basson, Brotto, Laan, Redmond, & Utian, 2005; McCabe & Goldhammer, 2012; Meana, Binik, Khalife, & Cohen, 1997). This notion is evidenced in changes to the diagnostic criteria of sexual dysfunctions in the most recent version of the DSM (DSM-5; American Psychiatric Association, 2013). In the DSM-5, the previously upheld qualifiers of sexual dysfunction due to psychological versus combined factors were removed, given that the most frequent clinical presentation involves the contribution of both psychological and biological factors. Indeed, successful treatments for sexual dysfunction tend to involve an integration of medical intervention and psychological treatment to address the larger biopsychosocial issues at hand (McCabe & Goldhammer, 2012). Furthermore, a shift away from the biomedical focus on the functionality of the genitals allows for a more holistic understanding of sexuality, which involves concepts such as sexual desire and sexual satisfaction (Kleinplatz, 1998).
Current Study

The goal of the current studies is to apply a biopsychosocial framework to the study of PPP and postpartum sexual function. By investigating psychological and social/relational variables that may be contributing to problems associated with postpartum pain and sexual function, in addition to birth-related physical factors, the current research will support the shift from the biomedical model to a more comprehensive biopsychosocial model. A secondary goal of the current studies is to elucidate the relationships among depression, PPP, depression, and sexual function by exploring the role of potential mediating variables.

With respect to PPP, the first study will investigate the role of birth-related physical factors that have been implicated in PPP (i.e., mode of delivery and individual risk factors for VB and CS). Moving beyond the biomedical model, this study will also draw from the persistent vulvar and pelvic pain literatures to investigate psychosocial risk factors. Specifically, the current study will assess the roles of pain catastrophizing, somatization, depression, and social support in the maintenance of postpartum pain. The current study will also investigate the pain characteristics associated with PPP using a validated measure of pain. The second study focuses on postpartum sexual function. The postpartum sexuality literature is moving in a direction that incorporates psychological and relationship factors, in addition to birth-related physical factors, involved in postpartum sexual function. The second study will investigate the interrelationships among birth-related physical factors (i.e., mode of delivery, genital trauma, and breastfeeding), psychological, and relationship factors (i.e., fatigue, depression, and relationship satisfaction) involved in postpartum sexual function.
CHAPTER 2

Study 1: A Biopsychosocial Approach to Persistent Postpartum Pain

Acute postpartum pain (APP) in the pelvic region, in the genital region, or at the site of incision is a common and well-documented problem following childbirth, whether delivery consisted of a vaginal birth (VB) or Caesarean section (CS; Eisenach et al., 2008; Nikolajsen et al., 2004; Vermelis et al., 2010). This pain usually resolves by two months after birth (Declercq et al., 2008; Kainu et al., 2010); however, for some women, the pain can persist. The prevalence of APP is high, with some studies finding rates as high as 85% one day after CS (Eisenach et al., 2008) and 92% one day after VB (Macarthur & Macarthur, 2004). As defined by The International Association for the Study of Pain (IASP), in order for pain to be considered persistent, it must persist past the “normal” time of healing (IASP, 1994). With respect to pain following childbirth, and consistent with the existing literature, pain beyond the two-month period is considered “persistent” (e.g., Declercq et al., 2008; Dooley, Hoesni, Tan, & Carey, 2013; Eisenach et al., 2008). The two-month time period coincides more or less with the accepted six-week return of the body to the non-pregnant state (World Health Organization, 1998).

The prevalence of persistent postpartum pain (PPP) at 2 months ranges from 10% – 49% after VB (Declercq et al., 2008; Dooley et al., 2013; Eisenach et al., 2008; Glazener et al., 1995; Schytt, Lindmark, & Waldenstrom, 2005; Thompson, Roberts, Currie, & Ellwood, 2002) and 2%-79% after CS (Declercq et al., 2008; Eisenach et al., 2008; Glazener et al., 1995; Thompson et al., 2002). Prevalence estimates of PPP at or beyond 6 months range from 0.3%-14.2% after both VB and CS (Declercq et al., 2008; Eisenach et al., 2013; Kainu et al., 2010; Paterson et al., 2009; Woolhouse, Perlen,
Gartland, & Brown, 2012). The pain can be located in the perineum, pelvis, or vulva. For women who underwent CS, pain can also be experienced at the site of the abdominal incision. Considering that almost 400,000 women gave birth in Canada during 2011-2012 ("Births, estimates, by province and territory," 2012), a seemingly small percentage of women with PPP can result in a meaningful proportion of the population; by this latter estimate, 1,200 – 58,400 women in Canada alone suffered from PPP at or beyond the 6-month time period.

Given that gynecologists, obstetricians, anesthesiologists, and nurses are the frontline individuals involved with women in the postpartum, much of the published research comes from these medical teams (e.g., Eisenach et al., 2008; Kainu et al., 2010; Nikolajsen et al., 2004; Vermelis et al., 2010), resulting in a bias towards a biomedical approach to the conceptualization of postpartum pain.

The biomedical model of pain has been deemed inadequate to explain and treat pain, especially persistent pain that continues in the absence or resolution of a physical pathology (Gatchel et al., 2007). However, some persistent pain conditions have been slower to receive such acceptance, two of which are idiopathic persistent vulvar pain, or vulvodynia (“…vulvar discomfort most often described as burning pain…” as defined by the International Society for the Study of Vulvovaginal Disease; Haefner, 2007 p. 47), and persistent pelvic pain (a nonmenstrual pelvic pain of six or more months that is severe enough to cause functional disability or require medical or surgical treatment; Howard, 2003).

**Biomedical Model of Persistent Vulvar and Pelvic Pain**

Traditionally, the biomedical approach to persistent vulvar and pelvic pain has
focused on the physical mechanisms behind the pain, such as endometriosis (growth of endometrial tissue outside the uterus resulting in inflammatory response), infection, or hormone imbalance (Alappattu & Bishop, 2011; Haefner et al., 2005). Indeed, in the gynecological pain field, surveys of physicians have found that they feel as though an accompanying physical pathology makes the pain more “real” (Selte, Van Vugt, & Stones, 1998). This biomedical-focused attitude is also evident in the literature on PPP, as there is an underlying assumption that pain is a result of physical factors that cause tissue damage during labour and delivery.

**Biomedical Model of Persistent Postpartum Pain**

That the biomedical approach is reductionist in nature (i.e., pain is explained by a single physical pathology) has important implications for the study of PPP. The assumption that PPP is tied to a physical pathology means that the location of the pain must be at the site of the injury. Indeed, much of the research on PPP has assumed that the pain is located in the perineum (area of skin located between the bottom of the vaginal entrance and the anus) and, as such, has asked a dichotomous, “yes” or “no” question about the presence of perineal pain (Albers, Garcia, Renfrew, McCandlish, & Elbourne, 1999; Andrews, Thakar, Sultan, & Jones, 2008; S. Brown & Lumley, 2000; Dannecker et al., 2004; Declercq et al., 2008; East, Sherburn, Nagle, Said, & Forster, 2012; Glazener et al., 1995; Johanson et al., 1993; Leeman et al., 2009; Macarthur & Macarthur, 2004; Nikolajsen et al., 2004; Sartore et al., 2004; Schytt et al., 2005; Thompson et al., 2002; Thranov, Kringelbach, Melchior, Olsen, & Damsgaard, 1990; Woolhouse et al., 2012). Other studies have asked about location, but have done so over the telephone (Dooley et al., 2013; Eisenach et al., 2013; Eisenach et al., 2008), leading
to potential issues with participants identifying the correct location of their pain given that many women are not familiar with their vulvar/genital anatomy (Herbenick & Schick, 2011). Paterson and colleagues (2009) provided their participants with an anatomical diagram of the vulva and pelvic area and found that, of the women with persistent pain in their sample, none reported pain on the perineum. Instead, women reported PPP in the pelvis, at the vaginal opening, on the vulva, and inside the vagina. The authors suggested that the rates of perineal pain reported in other studies may actually reflect pain in other areas of the vulva, specifically the posterior vulvar vestibule (the lower part of the area surrounding the vaginal opening; Paterson et al., 2009). With respect to pain post-CS specifically, most studies assume that the pain is felt at the site of incision, and again, ask a dichotomous “yes” or “no” question about the presence of pain at the site of incision or do not ask for specific locations (S. Brown & Lumley, 2000; Declercq et al., 2008; Granot, Lowenstein, Yarnitsky, Tamir, & Zimmer, 2003; Nikolajsen et al., 2004; Williams, Herron-Marx, & Knibb, 2007; Woolhouse et al., 2012).

The assumption that PPP is tied to a physical pathology also means that the pain should be caused by birth-related physical factors that create tissue damage during labour and delivery. While birth-related physical factors, such as genital tearing, are well-established predictors of APP (Albers et al., 1999; Chang, Chen, Lin, Chao, & Lai, 2011; Dannecker et al., 2004; East, Sherburn, et al., 2012; Landau, Bollag, & Ortner, 2013), it is less clear whether birth-related factors are important in the maintenance of PPP. In fact, much of the research on PPP has found that birth-related physical factors do not predict who will continue to experience PPP (e.g., Declercq et al., 2008; Eisenach et al., 2013; Eisenach et al., 2008; Klein et al., 2009; Pan, Smiley, Lavand'homme, Houle, &
Eisenach, 2007; Paterson et al., 2009), making the distinction between APP and PPP an important one. Below is a review of the physical factors that have been implicated in the development of postpartum pain.

**Physical Factors Involved in Postpartum Pain**

**Mode of delivery.** Given that the field of pain following CS is a relatively new area of research (Nikolajsen et al., 2004), there are few studies that have directly compared PPP after CS to PPP after VB. The majority of research suggests that there is no difference in the prevalence of PPP between modes of delivery (Blomquist, McDermott, & Handa, 2014; Eisenach et al., 2013; Eisenach et al., 2008; Pan, Smiley, Lavand'homme, Landau, & Eisenach, 2007; Paterson et al., 2009), although there is some evidence to suggest that PPP may be more common after CS (Declercq et al., 2008; Kainu et al., 2010). Given that the two modes of delivery involve different physical pathways (i.e., VB through the vagina and CS through surgical incision(s) made in the abdomen and uterus), it is important to consider the specific birth-related physical risk factors for each mode that may contribute to the experience of pain.

**Caesarean delivery.** The first report of persistent pain after CS was only published in 2004 (Nikolajsen et al., 2004), and as such, there is very little research investigating the risk factors associated with PPP following CS. The available information suggests that certain surgical factors may be implicated in the development of PPP following CS (Vermelis et al., 2010). Loos and colleagues (2008) investigated the predictors for PPP following CS in 690 women (the median time postpartum was 26 months). The results of this study indicated that having an emergency CS was associated with an increased odds ratio of 1.56 of experiencing PPP. However, this finding has yet
to be replicated, as other studies have either not included emergency CS as a risk factor (Nikolajsen et al., 2004) or only included women who had an elective CS (Sng, Sia, Quek, Woo, & Lim, 2009). The use of general anesthesia over spinal anesthesia has also been implicated in PPP in a sample of women who were, on average, 10 months postpartum (Nikolajsen et al., 2004); however, this finding was not replicated in a study investigating PPP at 12 months postpartum (Kainu et al., 2010). In addition, one study consisting of 857 women who had elective CS with spinal anesthesia did not find any CS-related physical factors to predict PPP (Sng et al., 2009).

**Vaginal birth.**

*Genital trauma.* Genital trauma can occur during VB whereby the overstretching of the vagina causes tears in the perineal tissue between the vagina and rectum, or from an episiotomy, a surgically planned incision on the perineum during labour. Genital trauma can also occur to the external genitalia (labial, clitoral or periurethral sites; Albers et al., 1999). It has been established that the greater the degree of tear (see Table 1), the greater the amount of APP a woman experiences (Eisenach et al., 2008); however, there is evidence to suggest that genital trauma, either from the episiotomy or spontaneous tearing during childbirth, is not related to pain by six weeks postpartum (Eisenach et al., 2013; Leeman et al., 2009; Macarthur & Macarthur, 2004). Some research suggests that episiotomy and major tears (second, third and fourth degree) may be a risk factor for pain at three months postpartum (Andrews et al., 2008; Sartore et al., 2004); however, the association seems to disappear from six months (Declercq et al., 2008) to one year postpartum (Paterson et al., 2009; Thranov et al., 1990; Williams, Herron-Marx, & Carolyn, 2007).
Table 1

*Degrees of Genital Tears in Childbirth*

<table>
<thead>
<tr>
<th>Genital Tear</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>First degree</td>
<td>Superficial tear involving the perineal(^a) or vaginal skin only</td>
</tr>
<tr>
<td>Second degree</td>
<td>Perineal skin and/or vaginal skin and muscles torn but intact anal sphincter</td>
</tr>
<tr>
<td>Third degree</td>
<td>Perineal skin and/or vaginal skin, muscles and anal sphincter torn</td>
</tr>
<tr>
<td>Fourth degree</td>
<td>Perineal skin and/or vaginal skin, muscles, anal sphincter, and tissue lining the rectum torn</td>
</tr>
</tbody>
</table>

\(^a\) area between vagina and anus.

*Note.* These definitions are modified from definitions provided by the Mayo Clinic Staff on their website (http://www.mayoclinic.org/healthy-living/labor-and delivery/multimedia/vaginal-tears/sls-20077129?s=1)

**Assisted vaginal birth.** When giving birth vaginally, instruments, such as forceps or a vacuum extractor, may be required. The use of these instruments during VB is referred to as an *assisted vaginal birth* (AVB). In the medical community, it is generally agreed that an episiotomy is indicated in an AVB (Thranov et al., 1990). The use of instruments in an AVB increase the risk of vaginal or perineal trauma and damage to the anal sphincter because of the concurrent need of the episiotomy and the additional stretching of the vagina (Eisenach et al., 2008). AVBs have been found to increase the risk of PPP at six months postpartum (Declercq et al., 2008), even after controlling for level of genital trauma (Thompson et al., 2002).

From the review of the literature, it is evident that studies of PPP have not reliably found the aforementioned physical variables to exclusively differentiate those women
who will suffer from PPP from those whose pain will resolve within the generally accepted timeframe (i.e., two months). The fact that the biomedical model (i.e., birth-related physical variables accounting for pain) cannot fully account for PPP in some women indicates that a broader conceptualization of PPP is warranted.

**The Biopsychosocial Model and Persistent Pelvic and Vulvar Pain**

The persistent vulvar and pelvic pain literature has also seen a shift towards a biopsychosocial approach (Moore & Kennedy, 2000; van Lankveld et al., 2010). In recent years, there has been a focus on the affective and cognitive (psychological) as well as social components of vulvar and pelvic pain. As no research to date has comprehensively investigated the psychological and social factors that are involved in PPP, the literature of persistent vulvar and pelvic pain may provide insight in factors involved in PPP. The following psychosocial factors—somatization, pain catastrophizing, depression, and social support—were selected because they have been consistently identified as psychosocial risk factors in persistent vulvar and pelvic pain (Alappattu & Bishop, 2011; Desrochers, Bergeron, Khalife, Dupuis, & Jodoin, 2009; Fry, Crisp, & Beard, 1997; Latthe, Mignini, Gray, Hills, & Khan, 2006; Masheb, Wang, Lozano, & Kerns, 2005; Payne et al., 2007; Pukall, Reissing, Binik, Khalife, & Abbott, 2000; Stewart, Reicher, Gerulath, & Boydell, 1994; Sutton, Pukall, & Chamberlain, 2009).

**Role of Psychological Factors**

**Somatization.** Within the persistent pain literature, there is no single definition of somatization (Lowe et al., 2008). Gatchel and Turk (1999) define somatization as the predisposition to amplify physiological sensations or the misclassification of symptoms of emotional arousal, while another group describes it as the tendency to selectively focus
on and display hypersensitivity to a number of relatively weak or infrequent physical sensations (Ak, Sayar, & Yontem, 2004). Somatization has also been characterized by the presence of substantial functional impairment, including decreased activity and selective attention to physical symptoms (Lowe et al., 2008). For the purpose of this study, the “functional impairment” definition of somatization was used.

Two studies have looked at the role of somatization in the development of PPP up until the third month postpartum. Higher somatization scores have been found to predict pelvic girdle pain at 12 weeks postpartum (Stomp-van den Berg et al., 2012) and the presence of persistent pain at 8 weeks after CS (Pan, Smiley, Lavand'homme, Houle, et al., 2007).

Pain catastrophizing. Pain catastrophizing is defined as an individual’s exaggerated and negative cognitive and emotional schemas that are used to respond to actual or anticipated painful situations (Quartana, Campbell, & Edwards, 2009). The research on PPP has investigated the role of pain catastrophizing during labour and delivery. One study found that women who had higher catastrophizing scores about labour pain rated their ability to engage in activities of daily living (ADLs) up to one week postpartum significantly lower than non-catastrophizers (Flink, Mroczek, Sullivan, & Linton, 2009). Other research shows that women who catastrophize about their labour pain during their pregnancy, or about experimental heat stimuli during pregnancy and in the postpartum period, report more acute and persistent lumbopelvic postpartum pain than women who did not catastrophize (C. B. Olsson, Grooten, Nilsson-Wikmar, Harms-Ringdahl, & Lundberg, 2012; Strulov et al., 2007).
**Depression.** In both research and clinical settings, the rate of depression among individuals with persistent pain is high (Banks & Kerns, 1996). The relationship between depression and PPP is of particular interest because of the high risk of postpartum depression, which affects 8-15% of postpartum women (Cooper & Murray, 1998) and affects both maternal and neonatal health (Wrate, Rooney, Thomas, & Cox, 1985). Postpartum depression is defined as episodes of depression beginning within four weeks of giving birth and can last up to several months or even a year (Miller, 2002). There has been recent attention to the relationship between postpartum depression and PPP. One study reported that women with lumbopelvic pain at three months postpartum were three times more likely to have postpartum depression than women without postpartum lumbopelvic pain (Gutke, Josefsson, & Oberg, 2007). Similarly, an Australian population-based study found that back and perineal pain at six months postpartum was associated with postpartum depression (S. Brown & Lumley, 2000). In a large population based sample of new Canadian mothers, PPP was an independent risk factor for postpartum depression. This study also found a strong relationship between the presence and duration of PPP and postpartum depression as well as the number of reported persistent pain sites and postpartum depression. Women with PPP in this sample were 2.4 times more likely to have postpartum depression than pain-free women (Gaudet, 2011).

**Role of Social Factors**

**Social support.** It is almost universally recognized that social support for patients with a chronic illness has positive effects on adaptation to disability and, in some cases, the underlying disease process (Gil, Keefe, Crisson, & Van Dalfsen, 1987). However, in persistent pain, it appears that there is a more complex relationship between social
support and pain. An operant model of pain has been used to describe the relationship between social support and pain. Specifically, the operant model of pain suggests that pain behaviour might be rewarded or punished by persons with whom an individual with persistent pain has frequent contact (Leonard, Cano, & Johansen, 2006). Because pain behaviours are overt, they are susceptible to social learning influences. Individuals experiencing pain may learn, for example, that displays of pain behaviour lead to positive social consequences such as attention, sympathy, and avoidance of unwanted marital or family responsibilities. Thus, social support may act as a positive reinforcer of pain behaviours that are not part of persistent pain syndromes (Gil et al., 1987). The relationship between pain and social support is particularly evident when social support comes from a significant other (J. L. Brown, Sheffield, Leary, & Robinson, 2003). Leonard and colleagues (2006) reviewed the existing literature on spousal support and pain variables and found evidence to support the operant model of pain. Data from several studies indicates that positive attention from spouses to displays of pain are found to be associated with higher reports of pain intensity, observed pain behaviour frequency, and greater disability (Block, Kremer, & Gaylor, 1980; Gil et al., 1987; Romano et al., 1991; Turk, Kerns, & Rosenberg, 1992). To the best of my knowledge, no research has investigated the role of social support on the development and maintenance of PPP.

**Study Goal and Research Questions**

The purpose of this study was to use a biopsychosocial framework to describe the pain characteristics of and risk factors for PPP in a group of new mothers within one year postpartum. A secondary goal was to explore the relationship between depression and
PPP by investigating potential mediating variables. The following research questions were addressed:

1. What are the birth-related physical factors that differentiate women who have PPP from women who have resolved APP?
   a. It was hypothesized that women with PPP would be more likely to have had a CS than women with resolved APP.
   b. It was hypothesized that women with PPP would be more likely to have had genital trauma than women with resolved APP.
   c. It was hypothesized that women with PPP would be more likely to have had an AVB than women with resolved APP.
   d. It was hypothesized that women with PPP would be more likely to have had an emergency CS than women with resolved APP.
   e. It was hypothesized that women with PPP would be more likely to have had a CS under general anesthesia than women with resolved APP.

2. What are the psychosocial factors that differentiate women with PPP from women with resolved APP?
   a. It was hypothesized that women with PPP would have higher somatization scores than women with resolved APP.
   b. It was hypothesized that women with PPP would have higher pain catastrophizing scores than women with resolved APP.
   c. It was hypothesized that women with PPP would have higher depression scores than women with resolved APP.
It was hypothesized that women with PPP would have more social support from a romantic partner than women with resolved APP.

**Methods**

**Participants**

Inclusion criteria for this study consisted of the following: 1) biologically female; 2) 18 years of age or over; 3) fluent in English; and 4) gave birth within the past 12 months. A flow chart regarding the inclusion/exclusion of participants is available in Figure 1 and will be discussed in further detail in the Data Considerations section. Of the 194 participants who completed the survey, 151 were included in the analyses related to postpartum pain (mean age = 30.93, SD = 4.20).

*Figure 1. Flow chart of the number of participants in each stage of data cleaning*
Procedures

This study was approved by the General Research Ethics Board at Queen’s University in Kingston, Ontario (Appendix A). Participants were recruited through word of mouth and advertisements. Posters were placed around the Kingston area, online advertisements were posted on social media websites, and pamphlets were sent to doctor’s offices across Canada (Appendix B). Women interested in participating were directed to the website. They were also invited to contact a research assistant at the Sexual Health Research Lab (SHRL) if they had any questions or concerns. Once participants reached the website, read a letter of information, and consented to participate (Appendix C), they completed a detailed eligibility questionnaire which included questions about their age, whether they had given birth in the past year, and fluency in English (Appendix D). Participants who were not eligible were directed to a page that thanked them for their time but informed them that they were not eligible to participate. Following this questionnaire, participants completed a variety of validated measures and other questions (Appendix E). Once the survey was complete, participants read a debriefing form (Appendix F) and had the opportunity to anonymously enter their e-mail addresses into a monthly draw for one of four cash prizes valued at $75 each. E-mail addresses were not linked to responses on the questionnaires. After completing or withdrawing from the study, all participants were provided with resources.

Measures

Labour and delivery. Participants were asked to indicate how many babies they delivered (singleton births n = 147; multiple births n = 3; decline response n = 1) and the mode of delivery (VB n = 119; CS n = 32). Participants were also asked to indicate in what month they gave birth. The amount of time postpartum was based on the month that
they gave birth in and the day that participants completed the survey. In order to be conservative with respect to inclusion in a persistent pain group (i.e. to ensure that any women included in the PPP group were experiencing pain for beyond two months), the amount of months postpartum was rounded down, such that there was a range from 0 months postpartum (completed the survey within the month they gave birth) to 12 months postpartum (completed the survey one year from the month they gave birth). The average months postpartum for the entire sample was 6.30 months, SD = 3.07.

**Vaginal birth.** Specific questions regarding the VB experience were presented to the 119 women who had a VB. Women who had a VB were asked whether they experienced a tear in their vagina and/or perineum (n = 77), and if so, what degree of tear (first degree n = 28, second degree n = 31, third degree n = 10, decline response = 8). Women who had a VB were asked whether they had an episiotomy (n = 15) and/or an AVB (n = 15). Only one woman who had an AVB reported a first-degree tear. All other women who had an AVB either experienced a second (n = 6) or third (n = 8) degree tear or had an episiotomy (n = 4). A “genital trauma” group was created including women who an episiotomy and/or experienced a tear in their vagina and/or perineum (n = 82).

**Caesarean section.** The 32 women who had a CS were asked to report whether their CS was planned in advance (n = 15), and if so, whether they chose to have it in advance (i.e., elective CS; n = 10). Women who did not have a CS planned in advance were asked whether they tried to give birth vaginally before the CS (n = 10). None of the women who tried to give birth vaginally before CS reported any genital tearing. Sixteen women reported having an emergency CS and 5 reported having had a CS performed under general anesthesia.
**Pain.** All women were asked whether they experienced pain during their most recent pregnancy (no pain, mild pain, moderate pain, severe pain). All women were also asked whether they were currently experiencing pain (yes/no) and to rate their average intensity of current pain since they gave birth from 0 (no pain) to 10 (worst pain ever) using a Numeric Rating Scale (NRS). Women who indicated that they no longer experienced pain were asked when they stopped having the pain. To indicate when they stopped having pain, women were provided with a drop-down list of time periods within two months to select from or they could choose an “other” option to indicate when the pain resolved after two months. Only women who indicated that they were currently experiencing pain (Current Pain group, CP; n = 53) were presented with the remaining pain questions. CP women were asked to describe the location (Figure 2) and intensity of their worst pain on the NRS explained above. CP women were presented with a list of activities that are often associated with vulvar and genital pain and were asked to indicate whether they experienced pain during and/or after the activity. CP women were also asked whether (yes/no) they experienced unprovoked pain since giving birth.
Figure 2. Anatomical drawings of the vulva, pelvis, and Caesarean section scar. 
Note. Women who had a VB were shown the vulva and pelvis images. Women who had a CS were shown the vulva, pelvis, and C-section scar images

The Short-Form McGill Pain Questionnaire (SF-MPQ; Melzack, 1987). The SF-MPQ consists of 15 pain adjectives, 11 of which describe the sensory aspects of pain and four of which describe the affective aspects of pain. Each descriptor is ranked on an intensity scale of 0 (none), 1 (mild), 2 (moderate), or 3 (severe). Only CP women completed the SF-MPQ. For this sample, good reliability was achieved for women with PPP (n = 44), Cronbach’s α = .716.

Psychosocial factors. All women were asked questions regarding somatization, pain catastrophizing, depression, and social support.

The Physical Component Summary of the Short-Form-36 Health Survey (PCS-SF-36; Ware & Sherbourne, 1992). The PCS-SF-36 was used to examine functional impairment related to physical symptoms (somatization). The PCS-SF-36 measures an individual’s perception of their general health, limitations due to health, and interference
with ADLs. Scores range from 0 to 100, with higher scores indicating better functioning. The SF-36 has been validated on a variety of populations, including persistent pain patients. It has been proven to be both reliable and valid (Brazier et al., 1992). Two women did not provide data for at least 85% of the PCS-SF-36 measure (one in the APP group and one in the PPP group), and their data were excluded from these analyses. For this sample, good reliability was achieved for women with APP (n = 106) and PPP (n = 43), Cronbach’s α = .853 and .860, respectively.

The Pain Catastrophizing Scale (PCS; Sullivan, Bishop, & Pivik, 1995). The PCS is a 13-item measure consisting of descriptions of various thoughts and feelings people might experience related to pain. Participants indicate on a Likert scale of 0 (not at all) to 4 (all the time) how often they experience that particular thought or feeling when they are in pain. The total score on the PCS ranges from 0 to 52, with lower scores indicating less catastrophizing. This scale was administered to all women. For women experiencing postpartum pain, the instructions for the PCS were re-worded to ask about their most intense pain related to their labour and delivery. For all other women, the instructions were re-worded to ask about their most intense, regularly experienced pain (such as headaches, menstrual cramps, pain from an injury, etc.), as has been done in previous research on vulvodynia (e.g., Pukall, Binik, Khalife, Amsel, & Abbott, 2002; Sutton et al., 2009). For this sample, high reliability was achieved for women with APP (n = 107), Cronbach’s α = .942, and high reliability was achieved for women with PPP (n = 44), Cronbach’s α = .943.

The Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987). The EPDS is a 10-item questionnaire that detects depressive symptoms in
perinatal women. The EPDS is widely used in postpartum research (Dennis, Heaman, & Vigod, 2012; O'Hara & Swain, 1996) and has well-established psychometric properties (Berle, Aarre, Mykletun, Dahl, & Holsten, 2003; Jadresic, Araya, & Jara, 1995). For this sample, high reliability was achieved for women with APP (n = 107), Cronbach’s $\alpha = .898$, and women with PPP (n = 44), Cronbach’s $\alpha = .899$.

The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988). The MSPSS is a 12-item scale, which addresses the subjective assessment of social support adequacy from three sources: family, friends, and a significant other. The “significant other” subscale was used in this study. It asks about “a special person” without referring explicitly to a romantic partner. Because the current study was interested in the role of social support from a partner, only partnered women were included in these analyses (n = 148). Two women did not provide data for at least 85% of data for the MSPSS significant other scale (one in the APP group and one in the PPP group), and their data were excluded from these analyses. Each item is measured on a 7-point rating scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). The MSPSS has been shown to have good internal reliability and validity (Zimet, Powell, Farley, Werkman, & Berkoff, 1990). For this sample, high reliability was achieved for women with APP (n = 103), Cronbach’s $\alpha = .977$, and high reliability was achieved for women with PPP (n = 43), Cronbach’s $\alpha = .922$.

Results

Statistical Considerations

A comprehensive pain profile of women with PPP was described. The proposed goal of generating a predictive logistic regression model for PPP using all pre-determined
variables was not possible due to the small sample size of women with PPP and restrictions with power. Instead, women with PPP were compared to women who had resolved APP (whose pain resolved within the expected time frame, i.e., two months) on the pre-determined physical and psychosocial risk factors for pain following childbirth. The biopsychosocial variables that were significantly different between the resolved APP group and PPP group were entered into a binomial logistic regression to obtain a more precise estimate of the association between the biopsychosocial factors and PPP. Finally, potential mediating variables of the relationship between depression and PPP were sought based on the results of the logistic regression.

**Data Considerations**

Before beginning the data cleaning process, the data from certain participants were removed from the dataset. Figure 1 displays a flow chart of the number of participants in each stage of data cleaning. Of those who visited the website (N = 2167), 1805 did not provide consent. Of the 362 who did consent, one was excluded because the individual was not biologically female, 11 were excluded because they had not given birth in the last 12 months, and 156 did not complete the survey. To prevent the analysis of duplicate data, all datasets were screened based on date given birth, baby weight and user response information. No duplicates were identified. Of the 194 women who completed the survey, the data from one woman who had both a VB and CS when delivering multiples were removed from analyses so as not to confound results on the effect of mode of delivery. Data from an additional 12 women were excluded because they reported CP on a dichotomous variable (yes/no) but then selected 0 (no pain) on the NRS. As the focus of this study was on the experience of pain after childbirth, the data
from women who reported that they never experienced pain after birth (n = 8), who declined to respond to the question as to when they stopped having pain (n = 1), and who did not know when they stopped having pain (n = 2) were not included in the pain analyses. Women who were less than two months postpartum and were in the CP group (n = 9) were excluded from the pain analyses because it was unclear whether their pain would resolve within the two-month period (making them eligible for the APP group) or persist beyond that point (making them eligible for the PPP group). The goal of the current study was to investigate pain with a postpartum onset; therefore, in order to clearly elucidate the incidence, characteristics, and risk factors of persistent pain from childbirth, the data from women who reported experiencing severe pain during pregnancy (n = 10) were also excluded. The data from women who reported mild and moderate pain during pregnancy were not excluded because some form of pain is common during pregnancy, especially in the back and pelvis (Mogren & Pohjanen, 2005; Rost, Jacqueline, Kaiser, Verhagen, & Koes, 2004). A total of 151 women were included in the pain analyses.

Prior to conducting analyses, the data were examined for missing values, appropriate ranges, normality, and univariate and multivariate outliers. Overall, less than 5% of the data were coded as missing. Missing values were only imputed for validated scales; no missing values were imputed for the sociodemographic or pain-related screening questions. For a given scale, if less than 15% of the questions were missing, those missing values were replaced with group means for that particular item. If more than 15% of the questions were missing, then those individuals’ responses for that particular scale were not included in the analyses.
Based on skewness and a visual inspection of histograms, if the variables violated the normality assumption, appropriate transformations were performed until the variables resembled a normal distribution. Analyses, conducted using IBM Statistical Package for the Social Sciences (SPSS) Version 20, were then performed on the transformed and non-transformed variables. If the results of both were similar, the results from the non-transformed variables are presented for ease of interpretation. The data were also checked to make sure they met assumptions for t-tests. Where assumptions were not met, appropriate accommodations were made (e.g., Mann Whitney U tests). Alpha values were set at $p \leq .05$. Data were expressed as mean ± standard deviation and mean ranks.

**Determination of pain groups.** Women who indicated that they experienced pain immediately after childbirth and reported resolved pain before two months postpartum were included the acute postpartum pain (APP) group ($n = 107$). Women who reported experiencing CP and were two or more months postpartum ($n = 44$) were included in the persistent postpartum pain (PPP) group.

**Sample Characteristics**

To determine patterns of difference in sample characteristics between the APP and PPP groups, two strategies were used. If the variable was continuous, Mann Whitney U tests were used and if the variable was categorical, a contingency analysis was conducted to evaluate whether there was any relationship between pain group and various sample characteristics. Cramer’s $V$ and absolute values of $r$ were used to report the strength of those relationships. Sociodemographic variables (Table 2) and birth-related variables were examined (Table 3) according to pain group. A two-way contingency table analysis was conducted to evaluate whether women with PPP differed from women with
APP in terms of annual household income. Pain group and annual household income before taxes were found to be significantly related as women with PPP reported lower income than women with resolved APP, Pearson’s $\chi^2 (2) = 7.59, p = .022$, Cramer’s $V = .23$. Follow-up pairwise comparisons were conducted to evaluate the difference among the proportions. The only pairwise difference that was significant was between the low-income and high-income group, Pearson’s $\chi^2 (1) = 7.664, p = .006$, Cramer’s $V = .30$, as women with PPP were more likely to be in the low income bracket and women with resolved APP were more likely to be in the high income bracket. Women with PPP reported more severe pain in the immediate postpartum (within 24 hours; $M \ rank = 86.80$) than women who had APP ($M \ rank = 70.96$), $U = 1814.50, p = .041$, abs($r$) = .17. Women with PPP were more likely to experience mild to moderate pain during their pregnancy (79.5%) compared to women who had APP (60.7%), Pearson’s $\chi^2 (1) = 4.93, p = .026$, Cramer’s $V = .18$. 

### Table 2

*Sociodemographic Variables According to Pain Group*

<table>
<thead>
<tr>
<th></th>
<th>APP (n = 107)</th>
<th>PPP (n = 44)</th>
<th>$U$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M ± SD</td>
<td>M ± SD</td>
<td>Statistic</td>
</tr>
<tr>
<td></td>
<td>(Mean Rank)</td>
<td>(Mean Rank)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>30.68 ± 3.88</td>
<td>31.52 ± 4.98</td>
<td>2084.00</td>
</tr>
<tr>
<td></td>
<td>(73.16)</td>
<td>(81.14)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>APP (n = 107)</th>
<th>PPP (n = 44)</th>
<th>Pearson’s $\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>College degree or higher</td>
<td>89 (83.2)</td>
<td>31 (70.5)</td>
<td>3.09</td>
</tr>
<tr>
<td>Caucasian</td>
<td>100 (93.5)</td>
<td>39 (88.6)</td>
<td>0.99</td>
</tr>
<tr>
<td>Canadian</td>
<td>94 (87.9)</td>
<td>37 (84.1)</td>
<td>0.38</td>
</tr>
<tr>
<td>Annual household income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (0 - $59,999)</td>
<td>15 (14.3)</td>
<td>13 (31.7)</td>
<td></td>
</tr>
<tr>
<td>Medium ($60,000 - $119,999)</td>
<td>44 (41.9)</td>
<td>18 (43.9)</td>
<td>7.59*</td>
</tr>
<tr>
<td>High ($120,000 +)</td>
<td>46 (43.8)</td>
<td>10 (24.4)</td>
<td></td>
</tr>
<tr>
<td>Currently in relationship</td>
<td>104 (97.2)</td>
<td>44 (100)</td>
<td>1.26</td>
</tr>
<tr>
<td>Raising child(ren) with a partner</td>
<td>103 (96.3)</td>
<td>43 (97.7)</td>
<td>4.08</td>
</tr>
<tr>
<td>Married or common law</td>
<td>98 (91.6)</td>
<td>40 (90.9)</td>
<td>0.02</td>
</tr>
<tr>
<td>Sexual Orientation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterosexual</td>
<td>99 (92.5)</td>
<td>42 (95.5)</td>
<td></td>
</tr>
<tr>
<td>Bisexual</td>
<td>5 (4.7)</td>
<td>2 (4.5)</td>
<td>1.26</td>
</tr>
<tr>
<td></td>
<td>APP (n = 107)</td>
<td>PPP (n = 44)</td>
<td>Pearson’s χ²</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------</td>
<td>--------------</td>
<td>---------------</td>
</tr>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td>Singleton birth</td>
<td>105 (98.1)</td>
<td>42 (95.5)</td>
<td>2.48</td>
</tr>
<tr>
<td>Mild-moderate pain during pregnancy</td>
<td>65 (60.7)</td>
<td>35 (79.5)</td>
<td>4.93*</td>
</tr>
<tr>
<td>Delivered by a doctor</td>
<td>73 (68.2)</td>
<td>33 (75.0)</td>
<td>1.21</td>
</tr>
<tr>
<td>Currently exclusively breastfeeding</td>
<td>73 (68.2)</td>
<td>29 (65.9)</td>
<td>.076</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>APP (n = 107)</th>
<th>PPP (n = 44)</th>
<th>U statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean Rank</td>
</tr>
<tr>
<td>Mean Rank</td>
<td>Mean Rank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Months postpartum</td>
<td>6.29 (3.09)</td>
<td>6.32 (3.06)</td>
<td>2351.50</td>
</tr>
<tr>
<td></td>
<td>75.98</td>
<td>76.06</td>
<td></td>
</tr>
<tr>
<td>Severity of acute pain</td>
<td>5.17 (2.35)</td>
<td>6.00 (2.25)</td>
<td>1814.50*</td>
</tr>
<tr>
<td></td>
<td>70.96</td>
<td>86.80</td>
<td></td>
</tr>
<tr>
<td>Baby weight¹ (ounces)</td>
<td>120.45 (20.35)</td>
<td>120.10</td>
<td>2193.50</td>
</tr>
<tr>
<td></td>
<td>76.81</td>
<td>(16.48) 72.35</td>
<td></td>
</tr>
</tbody>
</table>

*p ≤ .05

¹weight of first baby for multiples
Persistent Postpartum Pain Characteristics

Descriptive statistics (frequencies, means, and standard deviations) were used to describe the sample of women with PPP (n = 44).

Pain intensity. The SF-MPQ and NRS scores were based on the areas described as the most painful by women. The average pain intensity rating using the NRS was 3.23 (SD = 1.81). The average score on the sensory subscale of the SF-MPQ was 6.32 (SD = 4.70), the average score on the affective subscale of the SF-MPQ was 0.98 (SD = 1.28), and the average total score on the SF-MPQ was 7.30 (SD = 5.35).

Pain quality. On the SF-MPQ the most common words used to describe the pain were “tender” (72.7%, n = 32), “aching” (54.5%, n = 24), “sharp” (52.3%, n = 23), and “cramping” (45.5%, n = 20). Eighteen percent of women with PPP described their “tender” pain as severe. Figure 3 shows all pain descriptions and pain ratings on the SF-MPQ.

Figure 3. Words used on the SF-MPQ to describe PPP
**Pain location.** The most common areas where women experienced PPP were at the vaginal opening (n = 13, 29.5%), inside the vagina (n = 12, 27.3%), at the site of incision for women who had a CS (n = 11, 25.0%), and in the pelvic or abdominal region (n = 9, 20.5%). Two women who had CS reported pain inside the vagina and five reported pain in the pelvic or abdominal region. All of the women who reported pain at the vaginal opening had had a VB. Table 4 shows the most painful areas as indicated by women with PPP and by each mode of delivery.

Table 4

*Most Painful Pain Location as Indicated by Women with PPP*

<table>
<thead>
<tr>
<th>Most Painful Pain Location</th>
<th>All PPP women</th>
<th>VB women</th>
<th>CS women</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n = 44)</td>
<td></td>
<td>(n = 30)</td>
<td>(n = 14)</td>
</tr>
<tr>
<td>n (%)</td>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Vaginal opening</td>
<td>12 (27.2)</td>
<td>11 (36.7)</td>
<td>1 (7.1)</td>
</tr>
<tr>
<td>Site of incision</td>
<td>8 (18.2)</td>
<td>n/a(^a)</td>
<td>8 (57.1)</td>
</tr>
<tr>
<td>Inside the vagina</td>
<td>7 (15.9)</td>
<td>7 (23.3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Pelvis</td>
<td>5 (11.4)</td>
<td>3 (10.0)</td>
<td>2 (14.3)</td>
</tr>
<tr>
<td>Perineum</td>
<td>4 (9.0)</td>
<td>4 (13.3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Uterus</td>
<td>2 (4.5)</td>
<td>1 (3.3)</td>
<td>1 (7.1)</td>
</tr>
<tr>
<td>Pubic bone</td>
<td>1 (2.3)</td>
<td>1 (3.3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Cervix</td>
<td>1 (2.3)</td>
<td>0 (0)</td>
<td>1 (7.1)</td>
</tr>
<tr>
<td>Decline response</td>
<td>4 (9.0)</td>
<td>3 (10)</td>
<td>1 (7.1)</td>
</tr>
</tbody>
</table>

\(^a\) only women who had a CS were asked whether they experienced pain at the site of incision.
**Pain triggers.** The most common activity that provoked pain was vaginal penetration with a penis – both during (63.6%) and after (54.5%) penetration. Pain was also common during gynecological exams when the speculum was inserted (56.8%), when the cervix was swabbed (43.2%), and when the ovaries were palpated (38.6%). Pain was also common during (27.3%) and after (31.8%) walking as well as during (25.0%) and after (18.2%) sitting. Table 1 (Appendix G) shows how many women indicated which ADLs triggered pain. Fourteen (31.8%) of the 44 women with PPP reported experiencing unprovoked genital and/or pelvic pain, and this pain was most common at the site of incision (20.0%) and in the vulvar area (12.5%).

**Physical Factors Involved in Acute and Persistent Pain**

To answer the first research question with respect to what physical risk factors differentiated women with PPP from women who had APP, a contingency table analysis was conducted to determine if women with PPP differed from women with APP on birth-related physical risk factors. Table 5 shows the birth-related physical risk factors for APP and PPP by pain group. Women with PPP were more likely to have had a CS (31.8%) than women who had APP (16.8%), Pearson’s $\chi^2 (1) = 4.20, p = .040$, Cramer’s $V = .17$. 
Table 5

Birth-related Factors Involved in APP and PPP

<table>
<thead>
<tr>
<th></th>
<th>APP (n = 107)</th>
<th>PPP (n = 44)</th>
<th>Pearson $\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td>Mode of delivery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal birth</td>
<td>89 (83.2)</td>
<td>30 (68.2)</td>
<td>4.20*</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>18 (16.8)</td>
<td>14 (31.8)</td>
<td></td>
</tr>
<tr>
<td>Vaginal birth (n =119)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assisted VB</td>
<td>10 (11.2)</td>
<td>5 (16.7)</td>
<td>0.60</td>
</tr>
<tr>
<td>Genital trauma</td>
<td>60 (67.4)</td>
<td>22 (73.3)</td>
<td>0.28</td>
</tr>
<tr>
<td>Caesarean section (n = 32)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General anesthesia</td>
<td>3 (16.7)</td>
<td>2 (14.3)</td>
<td>0.03</td>
</tr>
<tr>
<td>Emergency CS</td>
<td>10 (55.6)</td>
<td>6 (42.9)</td>
<td>1.66</td>
</tr>
</tbody>
</table>

*p ≤ .05

Psychosocial Factors Involved in Acute and Persistent Pain

In order to answer the second research regarding what psychosocial factors differentiate women with PPP from women who had APP, Mann Whitney U tests were used to determine whether women with PPP differed significantly from women with APP on the psychosocial variables of interest. Table 6 shows the psychosocial risk factors for pain according to pain group. Women with PPP scored lower on the PCS-SF-36 ($M$ rank = 46.26) than women with APP ($M$ rank = 84.73), $U = 1035.50$ $p < .001$, $abs (r) = .41$. 
Women with PPP had higher scores on the EPDS ($M$ rank = 87.27) than women with APP ($M$ rank = 71.36), $p = .042$, abs ($r$) = .17.

Table 6

*Psychosocial Factors Involved in APP and PPP*

<table>
<thead>
<tr>
<th></th>
<th>APP (n = 107) Mean (SD)</th>
<th>PPP (n = 44) Mean (SD)</th>
<th>$U$ Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Rank</td>
<td>84.73</td>
<td>46.26</td>
<td></td>
</tr>
<tr>
<td>PCS-SF-36$^a$</td>
<td>88.77 (11.39)</td>
<td>77.00 (15.91)</td>
<td>1035.50***</td>
</tr>
<tr>
<td>PCS</td>
<td>9.40 (9.18)</td>
<td>9.47 (10.47)</td>
<td>2238.50</td>
</tr>
<tr>
<td>EPDS</td>
<td>6.16 (5.33)</td>
<td>8.25 (5.97)</td>
<td>1850.00*</td>
</tr>
<tr>
<td>MSPSS-SO$^b$</td>
<td>25.70 (4.30)</td>
<td>25.35 (4.43)</td>
<td>2063.00</td>
</tr>
</tbody>
</table>

*p $< .05$, **$p < .01$, ***$p < .001$

*Note.* PCS-SF-36 = Physical Component Summary of the Short-Form-36 Health Survey; PCS = Pain Catastrophizing Scale; MSPSS-SO = Multidimensional Scale of Perceived Social Support Significant Other Subscale; EPDS = Edinburgh Postnatal Depression Scale; $^a$APP n = 106, PPP n = 43; $^b$APP n = 103, PPP n = 43.

**Logistic Regression and Mediation Analysis**

To obtain a more precise estimate of the association between the biopsychosocial factors and PPP, a binomial logistic regression model was developed with pain group membership (i.e., APP and PPP) as the outcome variable. Mode of delivery, depressive symptoms, and somatization were entered as predictors in the model. Annual household
income was also included in the model *post hoc* as socioeconomic status is often
considered a macro-cultural factor in biopsychosocial models (Suis & Rothman, 2004).
When all predictors were entered into the model, the model’s ability to accurately predict
group membership was 76.8%, $\chi^2(5) = 22.60$, $p < .001$. Somatization was the only
biopsychosocial variable that significantly predicted group membership, $B = -0.07$, $SE = .02$, $Wald = 11.66$, $p = .001$, such that for every 1 score decrease on the PCS-SF-36,
individuals were 0.94 times more likely to be in the PPP group.

A mediation model (Figure 4) was created to better understand the
interrelationships among depressive symptoms, somatization, and PPP. Using syntax
provided by Nathan Herr (2006) that was modified from Baron and Kenny’s (1986)
approach, a mediation model was created with PPP as a dichotomous outcome variable to
determine whether somatization mediates the relationship between depressive symptoms
and PPP. The IV (depressive symptoms) and the DV (PPP) were significantly related,
such that more depressive symptoms were associated a greater likelihood of having PPP,
$B = 0.07$, $SE = 0.03$, $Wald = 4.24$, $p = .039$. The mediator (somatization) and the IV were
also significantly related, such that more depressive symptoms were associated with more
somatization, $B = -1.40$, $t(145) = -8.30$, $p < .001$. Therefore, the relationship between the
mediator and the DV controlling for the IV was examined and was significant, $B = -0.07$,
$SE = 0.02$, $Wald = 13.94$, $p < .001$, while the relationship between the DV and the IV was
no longer significant, $B = -0.03$, $SE = 0.04$, $Wald = 0.41$, $p = .526$. A Sobel’s test was
conducted to determine if the mediation was significantly large. Sobel’s test was
significant, Sobel value = 3.48, $p < .001$, indicating that somatization significantly
mediates the relationship between depressive symptoms and PPP.
Figure 4. Somatization completely mediates the relationship between depressive symptoms and persistent postpartum pain.

Discussion

PPP was quite prevalent in this sample: 29.1% of women who experienced some pain after childbirth reported experiencing pain beyond two months postpartum. While the intensity of this pain was reported as mild, it was pervasive in terms of it being experienced in a variety of locations in the genito-pelvic region as well as during and after a number of common ADLs. The results of this study indicate that PPP is best understood using a multidimensional framework that goes beyond the biomedical model. Much of the previous research has assumed that pain is a direct result of tissue damage in specific locations (i.e., the perineum or site of incision). The current study found that
psychological factors, specifically somatization and depressive symptoms, in addition to certain physical factors—specifically pain during pregnancy, severity of acute pain, and having had a CS—differentiate women who have PPP from women whose pain resolved within two months postpartum. In addition, the results of this study indicate that functional impairment independently predicts PPP and mediates the relationship between depressive symptoms and PPP.

**Pain Prevalence**

In this study, 44 of 151 women (29.1%) who experienced some pain after childbirth reported persistent pain in the genitals, pelvis, or at the site of incision lasting beyond two months postpartum. It is difficult to make direct comparisons to existing prevalence estimates because previous research has used specific time points (i.e., two months, six months, one year) on which to base their estimates (e.g., Kainu et al., 2010; Eisenach 2013; Thompson et al., 2002). However, when the PPP group is limited to women who are 6 months postpartum or more (n = 92), 25 women (16.6% of the entire sample) still experience pain—13.4% (n = 16) of all women who had a VB and 28.1% (n = 9) of all women who had a CS.

Using the six to twelve month postpartum time-frame as a benchmark, the best study to draw a comparison to is a large national survey of 1,373 American women (*Listening to Mothers II*) that also examined PPP within women one year postpartum (mean 7.3 months) and presented the data for women six to twelve months postpartum. The authors found that 2% of women who had a VB and 18% of all women who had a CS reported pain into the sixth month postpartum (Declercq et al., 2008). These low rates may be because they only asked women whether they experienced pain in the
perineum/site of incision, and therefore did not capture information about pain located elsewhere. Furthermore, the current study excluded women who did not report any pain immediately after childbirth (n = 8), whereas Declercq and colleagues (2008) included these women in their sample as having no pain. Similarly, Eisenach and colleagues (2013) found much smaller estimates for PPP at six months (1.3% after VB and 1.5% after CS) and 12 months postpartum (0.3% after VB and none after CS) than the estimates found in the current study. The discrepancy may be due to the fact that Eisenach et al. excluded women who experienced any pain during pregnancy, while the current study only excluded women who reported severe pain during pregnancy.

**Pain Intensity**

For women who experienced PPP, the intensity of the pain was, on average, considered mild (SF-MPQ = 6.32 and NRS = 3.23). The SF-MPQ pain scores were lower than scores previously reported by women with vulvodynia (SF-MPQ total = 13.56; Foster et al., 2009), but were comparable to what has been found in women with persistent pelvic pain (SF-MPQ total = 7.3; Low, Edelmann, & Sutton, 1993). Only one study investigating PPP with the SF-MPQ was identified, and the authors found that by six weeks postpartum, all women (regardless of degree of genital trauma) scored 0 on the scale (Macarthur & Macarthur, 2004). Paterson and colleagues (2009) used a NRS to measure PPP intensity from 0 (no pain) to 10 (worst pain ever) and found an average score of 5.60 (SD = 1.60) after two years postpartum, which is higher than what was found in the current study.
Pain Quality

The quality of PPP was described most commonly as “tender” and “aching”, which is somewhat different from the words typically used to describe vulvodynia (“burning”, “sharp”; Bergeron, Binik, Khalife, Pagidas, & Glazer, 2001) and persistent pelvic pain (“sharp”, “dull”; Grace & MacBride-Stewart, 2007). The fact that different words are used to describe the pain suggests that perhaps looking to the vulvodynia and persistent pelvic pain literature for insight into PPP is not the best choice for comparison. Instead, it may be more useful to make comparisons with the findings of the post-surgical pain literature, which has found pain quality to commonly be described as “tender” and “aching” (e.g., Massaron et al., 2007; Wylde, Rooker, Halliday, & Blom, 2011). However, it should be noted that PPP was described as “sharp” by 23 (52.3%) of the 44 women with PPP in this sample. Further studies should investigate the similarities and differences among PPP, vulvodynia, pelvic pain, and post-surgical pain.

Pain Location

In this study, only four women with PPP (9.0%) reported the perineum as the most painful pain location, while most women (27.2%) reported the vaginal opening as the site of most pain. This finding supports Paterson and colleagues’ (2009) claim that the rates of perineal pain obtained in other studies may reflect pain at the posterior vulvar vestibule or other areas on the vulva.

The site of incision was rated as the second most painful area (18.2%) in women with CS. Interestingly, not all women with CS rated the site of incision as the most painful site; some reported that the most painful site was the pelvis (n = 2), the vaginal opening (n = 1), the uterus (n = 1), and the cervix (n = 1). When women with CS were asked to describe any area where they experienced pain, two women who had CS
reported pain inside the vagina and five reported pain in the pelvic or abdomen region. Of the women who reported pain inside the vagina, one tried to give birth vaginally before the CS, and interestingly, the other had an elective CS. Some women who have a CS will go through labour beforehand and incur genital trauma as a result of the labour. None of the women who had a CS in this study also incurred genital trauma and so the rate of PPP in women with genital trauma preceding CS could not be investigated. However, results from one study found that women with planned CS without labour were as likely as those with labour to report problems with postpartum pain (Declercq et al., 2008). This issue deserves more attention in research as many women can experience the pain of labour and potential genital trauma in addition to undergoing a CS.

**Pain Triggers**

While this study did find penile-vaginal intercourse to be the most common trigger for pain, other more day-to-day activities, like sitting and walking, were also relatively common triggers. This finding is consistent with previous research that has found PPP to interfere with common activities such as deep breathing, coughing, sitting, walking, standing up, and carrying heavy bags (Eisenach et al., 2013; Kainu et al., 2010; Sng et al., 2009). That PPP is experienced during common ADLs further supports the need for continued research in this field, as PPP appears to have a pervasive impact on everyday functioning.

**Pregnancy and Birth-related Physical Factors Involved in Persistent Postpartum Pain**

Women with PPP were more likely to report mild to moderate pain during pregnancy and more severe acute pain immediately after giving birth. Ideally, this study would have only included women who reported experiencing no pain during pregnancy
in order to get a better picture of pain caused by labour and delivery, as was done in a large longitudinal study of PPP (Eisenach et al., 2013). However, in this study only 51 (33.8%) women reported experiencing no pain during pregnancy, so excluding women who experienced any pain during pregnancy would have significantly reduced the sample size and power. Still, women with severe pain during pregnancy were removed from the analyses so as to reduce confounds of PPP.

Severity of acute pain in the immediate postpartum has consistently been identified as a risk factor for PPP after VB and CS (Eisenach et al., 2008; Kainu et al., 2010; Nikolajsen et al., 2004). Of these studies, only Eisenach and colleagues (2008) surveyed women immediately after birth (within 36 hours) to determine the severity of acute pain. Similar to the current study, Kainu and colleagues (2010) and Nikolajsen and colleagues (2004) asked participants to recall the severity of acute pain anywhere from six months to 18 months after delivery. A few reasons could explain the finding that women with PPP recall more severe acute pain after birth. First, it may be that women with PPP experience more tissue damage during birth and therefore have a longer healing time than other women. However, the results from this study and others do not suggest that tissue damage is related to PPP. It may also be that women with PPP have a lower pain threshold than women without PPP and therefore, feel more severe acute pain and lingering postpartum pain. Indeed, previous research has suggested that individuals with vulvodynia and pelvic pain have lower thresholds for pain sensation than controls (Davis, Maykut, Binik, Amsel, & Carrier, 2011; Pukall et al., 2002). Finally, because women with PPP are still experiencing pain from their labour and delivery, they may recall more severe pain after the fact, but did not actually experience more pain at the time. It is well
established that there is a positive relationship between memory of intensity of past physical pain and intensity of present pain (Eich, Reeves, Jaeger, & Graff-Radford, 1985). This relationship may also explain why women with PPP were more likely to report mild to moderate pain during their pregnancy.

PPP was found to be more common after CS than VB. This result is consistent with the results of two other studies, which compared the rates of PPP following VB to rates following CS (Declercq et al., 2008; Kainu et al., 2010). This finding is important given that the rates of CS are increasing worldwide, with the rates in Canada (26.9%; Kelly et al., 2013)—almost doubling the World Health Organization’s recommended rate of 15% (World Health Organization, 1985)—and some South American countries’ rates are as high as 45.9% (Gibbons et al., 2012).

CS was originally introduced as a life-saving procedure for both the mother and the baby. In low-income countries where large sectors of the population lack access to basic obstetric care, there is strong evidence to suggest that CS does decrease maternal and infant mortality (Althabe et al., 2006; Betran et al., 2007). However, CS rates above a certain limit (estimated at 10%) have no additional benefit for the mother or the baby (Althabe et al., 2006). In fact, some studies have shown that high CS rates could be linked to negative consequences in maternal health, such as increased risk of cardiac arrest and hysterectomy, although these are rare occurrences (Liu et al., 2007). As a result, there is an abundance of research that has tried to understand why the rates of CS are (unnecessarily) increasing. Maternal request is often pointed as a key force driving the worldwide CS increase (Cohain, 2009), and one of the most common reasons for requesting a CS is fear of pain during VB (Saisto & Halmesmaki, 2003). Given that pain
is often a cited reason in favour of CS, it is interesting that PPP is more common after
cS, and, according to Kainu and colleagues (2010), more debilitating. It is unclear
whether women believe that CS will entail a pain-free delivery or how much they know
and/or are informed about the likelihood of post-surgical pain.

**Psychosocial Factors Involved in Persistent Postpartum Pain**

With respect to the psychosocial factors that were hypothesized to play a role in
PPP, only somatization (functional impairment) and depressive symptoms were higher in
women with PPP. Upon closer investigation it was determined that only functional
impairment significantly predicted pain group membership and was a mediating factor in
the relationship between depressive symptoms and PPP.

The current study defined somatization as functional impairment given the
substantial association between somatization/somatoform disorders and subjective
functional impairment (Lowe et al., 2008). Functional impairment measures the impact of
health and physical complaints on one’s life and includes the extent to which one avoids
or is unable to do certain tasks because of their health. The PCS-SF-36 assesses an
individuals’ perception of their general health, limitations due to health, and interference
with ADLs. That scores on the PCS-SF-36 significantly predicted PPP means that women
who have lower perceptions of their general health and attribute their low general health
to interfering with ADLs are more likely to report PPP. Although this study did not
include an objective measure of physical health, women with PPP did not report any
more persistent health and pain conditions than women who had APP, suggesting that it
is not likely that women with PPP have worse overall health than women who had APP.
Instead, this finding suggests that women with PPP appraise their health as worse and
more limiting than women who have resolved APP. Taken together, this result means that women who experience PPP are at risk of having more perceived day-to-day functional disability, which can exacerbate symptoms of depression (Arnstein, Caudill, Mandle, Norris, & Beasley, 1999), making it more difficult to bond with a newborn (Moehler, Brunner, Wiebel, Reck, & Resch, 2006). It should be noted that questions on the PCS-SF-36 are tailored for a general population and therefore do not ask about activities that would be relevant for new mothers, such as picking up and holding a baby, nursing/bottle-feeding, changing diapers, getting up in the middle of the night, etc. Future studies should investigate how mothers with PPP rate their functional impairment with respect to activities that would affect their ability to care for their newborn(s).

The current study also found that women with PPP had more depressive symptoms than women with APP. It is well-established that persistent pain and depression are highly co-morbid (Dworkin & Gitlin, 1991), though the nature and extent of the relationship is unclear (Gatchel & Dersh, 2002). The current study was not able to address directionality, although directionality may have important implications for prevention and treatment of both depression and PPP. The current study did find, however, that functional impairment mediates the relationship between depressive symptoms and PPP. Studies aimed at better understanding the relationship among depression, functional impairment, and PPP have important clinical implications given that many women have concerns about taking antidepressants in the postpartum period (Turner, Sharp, Folkes, & Chew-Graham, 2008) and the large time commitment that is involved in psychotherapy for postpartum depression (Grigoriadis & Ravitz, 2007). Instead, targeting the pain through non-medical, easily applied effective treatments, such
as physiotherapy (Stuge, Laerum, Kirkesola, & Vollestad, 2004) or cooling treatments (East, Begg, Henshall, Marchant, & Wallace, 2012) might be a useful alternative. In addition, brief cognitive behavioural therapy (CBT), either individually or in group settings, can be used to target somatization (Kroenke & Swindle, 2000). That is not to say that pain treatments or treatments aimed at reducing somatization can do away with depression treatments, especially given the lack of well-researched evidence-based treatments for postpartum pain (East, Begg, et al., 2012) and time commitment that is still involved in CBT. Rather, this suggestion can provide practitioners with some food-for-thought when determining how to best approach postpartum depression, somatization, and/or pain.

Levels of pain catastrophizing and social support did not differentiate women who have PPP from women who had APP. The PCS asks women how they feel and what they think about when they are in pain in terms of rumination, magnification, and helplessness. This questionnaire explicitly asks about pain, and because the severity of pain was rated as mild, women most likely do not see the pain as having a significant impact on their life. For most women, there are many demands from the baby during the first year postpartum and paying attention to mild pain may not be a top priority.

In terms of social support, this sample (both APP and PPP) reported high levels of spousal social support, therefore, there may not have been enough variability in the sample to detect differences. Alternatively, there is evidence to suggest that not all spousal support is equal when it comes to post-surgical and genito-pelvic pain. Specifically, spouses’ supportive responses to pain can affect the course of pain. For example, partners’ solicitious responses to pain (i.e., sympathetic responses, offers of
assistance, and efforts to take over a task) have been implicated in increased pain interference after lower-limb amputation (Hanley et al., 2004) and increased vulvar pain intensity (N. O. Rosen, Bergeron, Leclerc, Lambert, & Steben, 2010). Future research should investigate the role of partner’s responses to PPP, rather than looking at social support as a whole.

**Limitations and Future Directions**

A major limitation of this study is the small sample size of women experiencing PPP. Furthermore, the homogenous sample of Canadian well-educated, Caucasian women makes generalizability problematic. There is some evidence to suggest that ethnicity plays a role in PPP (Landau et al., 2013). Asian women tend to experience greater perineal trauma during childbirth (more likely to have an episiotomy, require perineal suturing, and sustain a third- or fourth-degree perineal tear) and report more perineal pain immediately (one day) after VB (Dahlen & Homer, 2008); however, they may have a lower incidence of PPP after CS (Sia, Sng, Lim, Law, & Tan, 2010). Furthermore, although this study did find that women with PPP were more likely to have a lower annual household income than women who had APP, this sample is not representative of all socioeconomic statuses (SESs). Persistent pain is associated with lower SES (Johannes, Le, Zhou, Johnston, & Dworkin, 2010). With respect to vulvodynia and pelvic pain, lower SES has been associated with more pain (Roth, Punch, & Bachman, 2001), while higher SES has been associated with better treatment outcomes (van Lankveld et al., 2010). More research should be conducted a broader range of education levels and SES to better understand the relationship between SES and PPP.
In addition, the small sample size of women experiencing PPP in the current study meant that not all women who experienced pain during pregnancy could be removed from the analyses. Although previous research in this area stresses the importance of understanding pain that began after labour and delivery (Eisenach et al., 2013), most women will experience some form of pain during pregnancy. To try to account for this problem, data from the 10 women who reported experiencing severe pain during pregnancy were removed from the analyses. The data from eight women who reported experiencing no pain in the postpartum were also removed from the analyses. With a larger sample size, it would have been interesting to compare these two groups of women to APP and PPP women. Fifteen women reported experiencing pain when asked a dichotomous “yes” or “no” questions about the presence of pain, but then selected 0 (no pain) on the NRS. The data from these women were subsequently removed from the analyses and it is unclear why they reported pain in the first place. That these women answered “yes” to a dichotomous question about pain but then reported no pain on the NRS suggests that previous studies, which have only used a dichotomous method of asking women about the presence of pain may not be reporting accurate prevalence rates.

Another limitation is the definition of PPP at two months postpartum. Although the definition used in the current study is consistent with the PPP literature, in general, pain is typically considered “chronic” at three or six months (IASP, 1994). This study was limited in that data were only collected from women up to 12 months postpartum; however, collecting data from a broader range of women and larger sample size (i.e., up to five years postpartum) could allow for better understanding of PPP that lasts much beyond the expected healing time. For example, Blomquist and colleagues (2014)
recently investigated the prevalence of pelvic pain 6–11 years after a first delivery and found evidence for the effect of AVBs on pain much longer after the typical healing period.

Conclusions

The results of the current study indicate that PPP is a common concern, and while the intensity of pain is generally considered mild, it is pervasive in nature and can affect a new mother’s everyday functioning. Furthermore, the current study found that women reported PPP in regions other than the perineum (for VB) and site of incision (for CS), suggesting that previous research, which has asked about the presence or absence of perineal pain after VB and pain at the site of the abdominal incision after CS, may be reporting underestimates of prevalence rates for PPP. The results of the current study found support for the use of a multidimensional approach to PPP that incorporates psychological aspects of pain (i.e., somatization and depressive symptoms), in addition to physical birth-related factors (i.e., mode of delivery). Finally, the results indicate that the relationship between depression and PPP is mediated by somatization (functional impairment).
CHAPTER 3

Study 2: A Biopsychosocial Approach to Postpartum Sexual Function

In the first and second trimesters of pregnancy, women report a wide range of self-report responses and fluctuating patterns of sexual desire. However, by the third trimester, there is a significant drop in sexual interest and activity (De Judicibus & McCabe, 2002; von Sydow, 1999), which persists into the postpartum period (Abdool et al., 2009; Johnson, 2011; Serati et al., 2001; von Sydow, 1999). Indeed, a meta-content analysis of studies on parental sexuality during pregnancy up to the sixth month postpartum found that only 14% of women and 12% of men reported no sexual problems (von Sydow, 1999).

Sexual health is recognized as a basic right and an integral part of life (World Health Organization, 2002), and research shows that problems with sexual function are related to a host of mental health and relationship issues, such as depression, anxiety, and decreased relationship stability (Heiman, 2002). As depression, anxiety, and decreased relationship stability are all problems that are heightened during the postpartum period, understanding postpartum sexuality is an important endeavor.

Given that general practitioners, obstetricians, gynecologists, and midwives tend to conduct the routine 6-week check-ups, they are the front-line individuals who may hear about postpartum sexual problems. However, it should be noted that not all women will spontaneously report issues with sexual function and not all health-care providers will ask about sexual function (A. Olsson et al., 2005). Thus, most of the research on postpartum sexual function has been conducted by medical teams using a biomedical approach to sexuality, which focuses on the physical pathologies that may be affecting
the ability to have pain-free intercourse (e.g., Barrett et al., 2000; Botros et al., 2006; Glazener, 1997; Signorello, Harlow, Chekos, & Repke, 2001; Woranitat & Taneepanichskul, 2007). This trend is shifting towards the use of more comprehensive definitions of postpartum sexuality that investigate the psychological and relationship factors involved (e.g., Chivers et al., 2011; DeJudicibus & McCabe, 2002; Faisal-Cury, Huang, Chan, & Menezes, 2013; Hipp, Kane Low, & van Anders, 2012); however, there is still an abundance of research that uses a strictly biomedical approach.

**Biomedical Approach to Postpartum Sexual Function**

Under the biomedical model, postpartum sexual dysfunction is conceptualized as a lack of resumption of penile-vaginal intercourse. As such, many studies exclusively define “sexual activity” as penile-vaginal intercourse (e.g., Fischman, Rankin, Soeken, & Lenz, 1986; Glazener, 1997; Lurie et al., 2013; Robson et al., 1981; Rowland, Foxcroft, Hopman, & Patel, 2005; Signorello et al., 2001; van Brummen et al., 2006; Woranitat & Taneepanichskul, 2007), which is problematic because it assumes that penile-vaginal intercourse is part of the woman’s sexual repertoire and that she has a regular male partner. Furthermore, this focus means that these studies are only able to address issues that are related to intercourse, such as dyspareunia.

The significant attention paid to postpartum dyspareunia in the literature is problematic because, by definition, this information can only be captured in women who have resumed sexual activity; thus, some studies have excluded women who were not sexually active (e.g., Botros et al., 2006; Cai, Zhang, Lin, Xing, & Chen, 2014; DeJudicibus & McCabe, 2002; Signorello et al., 2001). Moreover, in these studies, dyspareunia is typically assessed using a single dichotomous question about painful
sexual intercourse (e.g., Barrett et al., 2000; Bertozzi, Londero, Fruscalzo, Driul, & Marchesoni, 2010; Signorello et al., 2001). In a review of self-report instruments for sexual function, Meana, Binik, and Thaler (2008) assert that although many self-administered sexual functioning measures contain one question to assess dyspareunia, these single-item questions are not sufficient. Currently, the pain subscale of the Female Sexual Function Index (FSFI; R. Rosen et al., 2000), which includes three questions on painful sexual activity, is the most promising tool for accurately identifying dyspareunia (Binik, 2010).

The emphasis on resumption of sexual intercourse is also problematic because, as Kenny (1973) found, many postpartum women report that their sexual desire returns before they felt it was safe to have sex again. Indeed, studies have found that sexual desire returns to pre-pregnancy levels around 3-4 weeks postpartum (Kenny, 1973; Masters & Johnson, 1966), but resumption of intercourse usually happens later, at around 7-8 weeks postpartum (Barrett et al., 1999; Brtnicka, Weiss, & Zverina, 2009). Noncoital sexual activity (i.e., sexual activity that does not involve vaginal penetration) resumes at around 2.7 weeks postpartum (von Sydow, 1999), although it appears that much of this activity is focused on the woman who gave birth aiming to please her partner (e.g., performing oral sex on her partner; Hipp et al., 2012). Taken together, this discrepancy in sexual desire and resumption of sexual activity means that women may engage in sexual activity without having sexual desire or, alternatively, women may have sexual desire although they have not resumed intercourse. While the FSFI includes a desire scale, it is based on two questions and does not differentiate between the desire to be sexual with a partner and the desire to be sexual with oneself. As the birth of a new child and
accompanying stress and fatigue can cause strain in a couple’s relationship (Glenn, 1990), a woman may be more inclined to engage in masturbation than to engage in partnered sexual activity. Understanding the nuances in postpartum sexual desire with respect to solitary and dyadic desire is necessary in order to get a better picture of postpartum sexuality.

Broader conceptualizations of postpartum sexuality are warranted. As such, more recent studies have moved away from the biomedical model and used comprehensive validated measures, such as the FSFI, to examine postpartum arousal, satisfaction, orgasm, desire, and lubrication in addition to pain (e.g., Cai et al., 2014; Chivers et al., 2011; Safarinejad, Kolahi, & Hosseini, 2009). In using these measures, researchers are able to capture those women who are experiencing sexual issues in domains other than dyspareunia.

Many women report that they do not feel well informed about their postpartum sexual health (A. Olsson et al., 2005). At the 6-week check-up, many women will have not resumed sexual activity, and if they have, the main topic of sexual consulting at this check-up tends to be about contraception (Brtnicka et al., 2009). According to von Sydow’s (1999) meta-content analysis, many couples wish to receive more information about sexuality—other than intercourse-focused material—in the postpartum period. However, there is a tendency for medical advice about postpartum sexuality to be focused on intercourse (von Sydow, 1999). Health-care providers should be proactive in informing new mothers about the effects that childbirth may have on their sexuality, especially for those mothers who are at risk for experiencing problems with sexual
function. Below is a review of the some of the physical, psychological, and relationship factors involved in postpartum sexuality.

**Birth-related Physical Factors Involved in Postpartum Sexual Function**

**Mode of delivery.** The role of mode of delivery on postpartum sexual function has been a primary focus in the literature. The vast majority of studies have not found a difference in short-term and long-term sexual functioning between women who had VB and women who had CS using the FSFI (Boroumandfar, Rahmati, Farajzadegan, & Hoseini, 2010; Cai et al., 2014; Chivers et al., 2011; Fehninger et al., 2013; Hosseini et al., 2012; Klein et al., 2009; Lurie et al., 2013; Woranitat & Taneepanichskul, 2007), the Golombok Rust Inventory of Sexual Satisfaction (GRISS; Rust & Golombok, 1986) (Gungor, Baser, Ceyhan, Karasahin, & Acikel, 2007), and other validated and non-validated measures of sexuality and postpartum sexual health (Bertozzi et al., 2010; Blomquist et al., 2014; Connolly et al., 2005; Fehninger et al., 2013; Hannah et al., 2004; Jawed-Wessel, Schick, & Herbenick, 2013; Yee, Kaimal, Nakagawa, Houston, & Kuppermann, 2013).

There is a smaller body of literature that has found differences in sexual function between VB and CS. Two studies have found that women who had a CS reported better sexual function at six months (Pauls, Occhino, & Dryfhout, 2008) and better sexual satisfaction and less dyspareunia at two years postpartum (Griffiths, Watermeyer, Sidhu, Amso, & Nix, 2006) than women who had a VB.

Comparing all types of VBs to all types of CSs does not account for individual risk factors within each mode of birth, most importantly, the genital trauma that may be incurred after VB. Indeed, when compared to women who have suffered genital trauma
from a VB, women who have had CS report better sexual functioning in the first year postpartum (Baksu, Davas, Agar, Akyol, & Varolan, 2007; Safarinejad et al., 2009).

**Genital trauma.** Compared to VB without genital trauma, women who have episiotomies, major tears (second, third, and fourth degree) and AVBs report more pain upon first postpartum attempt at penile-vaginal intercourse (Buhling et al., 2006; Safarinejad et al., 2009; Signorello et al., 2001). Genital trauma is associated with dyspareunia in the immediate postpartum (Barrett et al., 2000; Oboro & Tabowei, 2002; Rathfisch et al., 2010; Signorello et al., 2001), but this association seems to disappear after three months (Barrett et al., 2000; Connolly et al., 2005; Signorello et al., 2001). Indeed, other studies that have investigated the postpartum period at three months and beyond have not found an association between genital trauma and pain scores on the FSFI (Baksu et al., 2007; Chang et al., 2011; Chivers et al., 2011; Fehniger et al., 2013).

Although much of the literature has investigated the impact of genital trauma on postpartum dyspareunia, genital trauma can affect other areas of sexual functioning, such as sexual satisfaction, desire, and orgasm. Genital trauma can damage the pudendal nerve, which innervates the clitoris, vulva, and perineum (Sultan, Kamm, & Hudson, 1994) and may affect sexual sensation; furthermore, genital trauma can result in weak pelvic floor muscles due to vaginal prolapse, which may in turn lead to decreased ability to achieve orgasm (Berman, Berman, & Kanaly, 2003). Using a non-validated questionnaire, Rathfisch and colleagues (2010) found that, compared to women who had an intact perineum, women who had episiotomies and second-degree tears reported lower levels of libido (i.e., sexual desire), orgasm, and sexual satisfaction at three months postpartum. Another study found that women with major genital tract trauma reported
less desire to be held, touched, and stroked by their partners than women with minor trauma (Rogers, Borders, Leeman, & Albers, 2009). However, other studies have not found an association between genital trauma and other areas of sexual functioning as measured by the FSFI (Chang et al., 2011; Chivers et al., 2011; Pauls et al., 2008), the Sexual Desire Inventory (Hipp et al., 2012), and non-validated single questions on orgasm, sexual satisfaction, and sexual sensation (Connolly et al., 2005; Signorello et al., 2001).

**Breastfeeding.** The biological and hormonal changes that accompany breastfeeding can impact women’s postpartum sexual functioning. In women who breastfeed, elevated prolactin levels result in decreased ovarian production of androgens and estrogens. Given that lower estrogen is associated with vaginal dryness (Meston & Frohlich, 2000), it is not surprising that breastfeeding has been associated with dyspareunia (Alder & Bancroft, 1998; Barrett et al., 2000; Bertozzi et al., 2010; Boroumandfar et al., 2010; Connolly et al., 2005); in fact, one study found that women who breastfed were four times more likely to experience dyspareunia at six months postpartum than women who did not breastfeed (Signorello et al., 2001).

It has been hypothesized that the lower level of androgens may lead to a reduction of sexual desire (Glazener, 1997). Indeed, there is considerable evidence to suggest that breastfeeding is related to a later resumption in sexual activity (Glazener, 1997) and a reduction in sexual desire, satisfaction, and frequency of intercourse (Alder & Bancroft, 1998; Avery, Duckett, & Frantzich, 2000; DeJudicibus & McCabe, 2002; Forster, Abraham, Taylor, & Llewellyn-Jones, 1994; Glazener, 1997; Hyde, DeLamater, Plant, & Byrd, 1996; Jawed-Wessel et al., 2013; Kayner & Zagar, 1983; Yee et al., 2013).
However, not all research has found decreased sexual desire in women who breastfeed. Some studies have not found any significant association between breastfeeding and sexual desire, frequency, and enjoyment (Boroumandfar et al., 2010; Hipp et al., 2012; Kenny, 1973; Kumar, Brant, & Robson, 1981; Pauls et al., 2008; Robson et al., 1981; Safarinejad et al., 2009), while other studies—albeit older and less methodologically sound—have actually found increases in sexual function in women who breastfeed (Falicov, 1973; Masters & Johnson, 1966).

**Psychological Factors Involved in Postpartum Sexual Function**

**Fatigue.** Fatigue in the immediate postpartum period is extremely common, affecting between 70-80% of otherwise healthy women (Affonso, Lovett, Paul, & Sheptak, 1990; Rychnovsky & Hunter, 2009), and for many women the effects of fatigue linger (Gjerdingen, Froberg, Chaloner, & McGovern, 1993). Women consistently rank fatigue as playing a major role in interfering with intercourse (Ahlborg, Dahlof, & Hallberg, 2005; Fischman et al., 1986; Kumar et al., 1981; McDonald & Brown, 2013; Rogers et al., 2009; Yee et al., 2013) and sexual desire (Gordon & Carty, 1978; Hipp et al., 2012). Indeed, postpartum fatigue was found to be negatively correlated with a woman’s desire to be sexual with a partner (Hipp et al., 2012; Hyde, DeLamater, & Hewitt, 1998) and was found to predict sexual desire and satisfaction at 12 weeks postpartum (DeJudicibus & McCabe, 2002). Although it does appear that fatigue plays a role in postpartum sexual dysfunction, most of the above studies have not used validated measures to assess fatigue (Ahlborg et al., 2005; Fischman et al., 1986; Glazener, 1997; Hipp et al., 2012).
Depression. Low mood is common after childbirth. Prevalence estimates of the “baby blues” range from 50 to 75%, and estimates of postpartum depression range from 10 to 15% (Beck, 2002). Postpartum depression is defined as episodes of depression beginning within four weeks of giving birth and can last up to several months or even a year (Miller, 2002). Most of the literature to date suggests that postpartum depression and depressive symptoms are associated with decreased postpartum sexual function (S. Brown & Lumley, 2000; Chivers et al., 2011; DeJudicibus & McCabe, 2002; Elliott & Watson, 1985; Huang & Mathers, 2006; Hyde et al., 1998; Kumar et al., 1981; Moel, Buttner, O’Hara, Stuart, & Gorman, 2010; Morof, Barrett, Peacock, Victor, & Manyonda, 2003; Yee et al., 2013). Studies show that depressed women report lower interest in sex, less sexual satisfaction, and more sexual problems in the postpartum period than non-depressed women (Glazener, 1997; Kumar et al., 1981; Moel et al., 2010; Yee et al., 2013), and the relationship between depression and decreased sexual function is evident up to at least 12 months postpartum (Elliott & Watson, 1985).

Relationship Factors Involved in Postpartum Sexual Function

Relationship satisfaction. A large body of literature suggests that the birth of a new child leads to a decrease in relationship quality (e.g., Doss, Rhoades, Stanley, & Markman, 2009; Glenn, 1990), and there is converging evidence to support the hypothesis that relationship problems are associated with decreased sexual desire, satisfaction, and overall sexual intimacy (Ahlborg et al., 2005; S. Brown & Lumley, 2000; DeJudicibus & McCabe, 2002; Gungor et al., 2007). When asked what factors contribute to postpartum sexual problems and desire, women consistently rank
relationship factors, such as feelings towards partner and partner support, as playing an important role (Ellis & Hewat, 1985; Hipp et al., 2012; Pertot, 1981; Yee et al., 2013).

Only one study was identified that has simultaneously investigated the roles of fatigue, depression, and relationship satisfaction on postpartum sexual function. De Judicibus and McCabe (2002) investigated the influence of, among other factors, fatigue, depression, and relationship satisfaction on postpartum sexual desire at 12 weeks and six months postpartum. Postpartum sexual desire was assessed using the Sexual Function Scale (McCabe, 1998), which has been found to lack reliability and validity (Daker-White, 2002). The results of this study indicated that at 12 weeks postpartum, fatigue and relationship satisfaction significantly predicted postpartum sexual desire. However, at six months postpartum fatigue was no longer a significant predictor of sexual desire, but rather, relationship satisfaction and depression significantly predicted desire. Interestingly, depression seemed to exert an unexpected positive influence on women’s sexual desire at six months postpartum, such that more depressive symptoms were predictive of more sexual desire. The authors, however, attributed this finding to problems with the distribution of their sample.

It is clear from the above study that there is likely a complex relationship among postpartum sexual function, fatigue, depression, and relationship satisfaction, which should further be investigated. This study extends the findings of De Judicibus and McCabe (2002) by using a validated measure to assess multiple areas of sexual function and exploring the interrelationships among fatigue, depression, relationship satisfaction, and sexual function.
**Study Goal and Research Questions**

The goal of the present study was to investigate the interrelationship among several physical, psychological, and relationship factors involved in postpartum sexuality using validated measures, as well as validated and comprehensive measures to address multiple areas of sexual function (solitary and dyadic desire, orgasm, satisfaction, arousal, lubrication, and dyspareunia). A secondary goal of this study was to clarify the relationship between depression and postpartum sexual function by exploring potential mediating variables. The following research questions were addressed:

1) How do physical factors (mode of delivery, genital trauma, breast-feeding and parity) affect postpartum sexual function?

   a) How does mode of delivery affect postpartum sexual function? It was hypothesized that women who had a vaginal birth would have lower sexual function than women who had a CS.

   b) How does genital trauma affect postpartum sexual function?

      i) It was hypothesized that women without genital trauma would have less dyspareunia than women with genital trauma at three months postpartum but after three months there would be no difference in dyspareunia scores between women who with no genital trauma and women with genital trauma.

      ii) It was hypothesized that women who had genital trauma would have lower sexual function (less desire, arousal, lubrication, orgasm, satisfaction, and total sexual function) than women who had no genital trauma.

   c) How does breastfeeding affect postpartum sexual function? It was hypothesized that women who breastfed would have lower sexual function than women who did not breastfeed.
2) How do psychological factors (fatigue and depression) affect postpartum sexual function?

a) How does fatigue affect postpartum sexual function? It was hypothesized that women who report more fatigue would have lower sexual function than women who report less fatigue.

b) How do depressive symptoms affect postpartum sexual function? It was hypothesized that women who had higher depression scores would have lower sexual function than women who had lower depression scores.

3) How does relationship satisfaction affect sexual function?

It was hypothesized that women who reported less relationship satisfaction would have lower sexual function than women who reported more relationship satisfaction.

**Method**

**Participants**

Inclusion criteria for this study consisted of the following: 1) biologically female; 2) 18 years of age or over; 3) fluent in English; and 4) gave birth within the past 12 months. A flow chart regarding the inclusion/exclusion of participants is available in Figure 5 and will be referred to in the Data Considerations section. Of the 194 participants completed the survey, two women declined to respond to all questions on the FSFI. One of these women declined to respond to any question on the SDI while the other completed only 57% of items on the SDI. All of the data from both women were subsequently removed from analyses on postpartum sexuality. The data from 192 women were included in the analyses of postpartum sexuality (mean age = 30.97, SD = 4.10; mean months postpartum = 5.95, SD = 3.25).
Figure 5. Flow chart showing the number of participants in each stage of data cleaning.

Procedures

This study was approved by the General Research Ethics Board at Queen’s University in Kingston, Ontario (Appendix A). Participants were recruited through word of mouth and advertisements. Posters were placed around the Kingston area, online advertisements were posted on social media websites, and pamphlets were sent to doctor’s offices across Canada (Appendix B). Women interested in participating were directed to the website. They were also invited to contact a research assistant at the Sexual Health Research Lab (SHRL) if they had any questions or concerns. Once participants reached the website, read a letter of information, and consented to participate (Appendix C), they completed a detailed eligibility questionnaire which included questions about their age, whether they had given birth in the past year, and fluency in English (Appendix D). Participants who were not eligible were directed to a page that thanked them for their time but informed them that they were not eligible to participate.
Following this questionnaire, participants completed a variety of validated measures and other questions (Appendix E). Once the survey was complete, participants read a debriefing form (Appendix F) and had the opportunity to anonymously enter their e-mail addresses into a monthly draw for one of four cash prizes valued at $75 each. E-mail addresses were not linked to responses on the questionnaires. After completing or withdrawing from the study, all participants were provided with resources.

**Measures**

**Labour and delivery.** All women were asked questions regarding their most recent labour and delivery experience. Participants were asked to indicate how many babies they delivered and the mode of delivery

**Vaginal birth.** Specific questions regarding the VB experience were presented to the 149 women who had a VB. Women who had a VB were asked whether they experienced a tear in their vagina and/or perineum and if so, what degree of tear. Women who had a VB were asked whether they had an episiotomy and/or an assisted delivery. All women who had an assisted delivery (n = 22) either experienced a second (n = 8) or third (n = 8) degree tear or had an episiotomy (n = 6). A “genital trauma” variable was created which included women who had a genital tear and/or episiotomy (n = 101).

**Caesarean section.** The 42 women who had a CS were asked to report whether their CS was planned in advanced and if so, whether they chose to have it in advance. Women who did not have a CS planned in advance were asked whether their tried to give birth vaginally before the CS. None of the women who tried to give birth vaginally before CS reported any genital tearing.
Breastfeeding. Participants were asked how they feed/fed their baby and for participants who indicated that they exclusively breastfed, they were asked whether they were currently breastfeeding. Only women who reported currently exclusively breastfeeding were considered to be breastfeeding (n = 128). Data regarding current breastfeeding status for women who reported both breast-feeding and bottle-feeding were not available.

Sexual function measures.

The Female Sexual Function Index (FSFI; R. Rosen et al., 2000). The FSFI is a 19-item measure assessing six domains of sexual functioning: desire, arousal, lubrication, orgasm, satisfaction, and pain. The FSFI has been validated on healthy women and women with sexual dysfunctions (R. Rosen et al., 2000). It has proven to be a reliable measure, with both clinical and psychometric validity. Total scores range from 2 to 36 and subscale scores range from 0 to 5 or 1 to 5, with higher scores indicating better sexual functioning (for the pain scale higher scores indicate less pain). The cut-off score for sexual dysfunction is 26.55 (Weigel, Meston, & Rosen, 2005). Only women who reported engaging in sexual activity in the last four weeks before completing the survey (N = 157) were included in the analyses of FSFI arousal, lubrication, orgasm, satisfaction and total FSFI score. With respect to the pain subscale on the FSFI, women who had not attempted intercourse in the past four weeks were given 0 scores. In the postpartum period especially, a lack of intercourse does not necessarily indicate sexual dysfunction; therefore, including women who have not attempted intercourse in the past four weeks may bias the results to show more dysfunction (Meyer-Bahlburg & Dolezal, 2007). In order to eliminate this bias, only women who reported attempting to engage in
intercourse in the last four weeks before completing the survey (N = 145) were included in the FSFI pain analyses. For this sample, high reliability was achieved with the FSFI arousal, lubrication, orgasm, and satisfaction subscales (N = 157), Cronbach’s α = .871 and the FSFI pain subscale (N = 145), Cronbach’s α = .927.

**The Sexual Desire Inventory** (SDI; Spector, Carey, & Steinberg, 1996). The SDI measures static levels of sexual desire based on a total score made up of the combination of two, seven item self-report subscales: the Solitary Sexual Desire scale, which measures an individual’s desire for autoerotic sexual activity, and the Dyadic Sexual Desire scale, which measures an individual’s desire for sexual activity with a partner. Although there is a sexual desire subscale on the FSFI, the SDI was selected *a priori* as it is a comprehensive measure of sexual desire. There is a significant correlation between the FSFI desire subscale score and SDI total (r = .299, p = .001), solitary (r = .165, p = .022), and dyadic (r = .255, p < .001) scores. For this sample, high reliability was achieved, Cronbach’s α = .914.

**Psychological and relationship measures.**

**The Fatigue Symptoms Checklist** (FSC; Yoshitake, 1971). The FSC has been modified from its original 30-item rating scale to a 30-item scale requiring dichotomous (yes/no) responses (Milligan, Parks, Kitzman, & Lenz, 1997). The modified version was used in the current study, as it has been validated in postpartum women (Milligan et al., 1997). The modified FSC asks respondents to answer questions since the time of their delivery. Two women did not provide data for at least 85% of the FSC and therefore, their data could not be included in the FSC analyses. For this sample, high reliability was achieved (N = 190) Cronbach’s α = .903.
**The Edinburgh Postnatal Depression Scale** (EPDS; Cox et al., 1987). The EPDS is a 10-item questionnaire that detects depressive symptoms in perinatal women. The EPDS is widely used in postpartum research (Dennis et al., 2012; O'Hara & Swain, 1996) and has well-established psychometric properties (Berle et al., 2003; Jadresic et al., 1995). For this sample, high reliability was achieved, *Cronbach’s α = .898.*

**The Relationship Assessment Scale** (RAS; Hendrick, 1988). The RAS is a 7-item Likert-type scale that assesses general satisfaction with one’s relationship. Item responses range from 1 (not satisfied) to 5 (very satisfied). Higher total scores represent higher relationship satisfaction. The RAS has shown good internal consistency and convergent validity across samples of different ethnicities and ages (Hendrick, Dicke, & Hendrick, 1998; Vaughn & Matyastik Baier, 1999). Only women who reported being in a relationship at the time of completing the survey (N = 188) were asked to complete the RAS. For this sample, good reliability was achieved, *Cronbach’s α = .901.*

**Results**

**Data Considerations**

Before beginning the data cleaning process, the data from certain participants were removed from the dataset. Of those who visited the website (N = 2167), 1805 did not provide consent. Of the 362 who did consent, the data from one was excluded because the individual was not biologically female, the data from 11 were excluded because they had not given birth in the last 12 months, and the data from 156 were excluded because they did not complete the survey. To prevent the analysis of duplicate data, all datasets were screened based on date given birth, baby weight, and user response information. No duplicates were identified. Of the 194 participants who completed the
survey, two women declined to respond to all questions on the FSFI. One of these women declined to respond to any question on the SDI while the other completed only 57% of items on the SDI. All of the data from both women were subsequently removed from the analyses on postpartum sexual function. The data from 192 women were included in the analyses of postpartum sexual function. When women who underwent VB or CS were directly compared on measures of sexuality, the data from the one woman who underwent both VB and CS were excluded from the analyses. For all other postpartum sexuality analyses, the data from this woman were included.

Prior to conducting analyses, the data were examined for missing values, appropriate ranges, normality, and univariate and multivariate outliers. Overall, less than 5% of the data were coded as missing. Missing values were only imputed for validated scales; no missing values were imputed for the sociodemographic and birth and labour experiences questions. For a given scale, if less than 15% of the questions were missing, those missing values were replaced with estimated sample means for that particular item using an expectation maximization algorithm provided by IBM SPSS Version 20. For a given scale, if more than 15% of the questions were missing then the data from those individuals were removed from the analyses.

Based on skewness and a visual inspection of histograms, if the variables violated the normality assumption, appropriate transformations were performed until the variables resembled a normal distribution. Analyses, conducting using SPSS Version 20, were then performed on the transformed and non-transformed variables. If the results of both were similar, the results from the non-transformed variables are presented for ease of interpretation. The data were also checked to make sure they met assumptions for \( t \)-tests
and regressions. Where assumptions were not met, appropriate accommodations were made (e.g., non-parametric tests). As multiple comparisons were used to determine whether how risk factors differ on nine different measures of sexual functioning, a Bonferroni-corrected alpha level was set at .00556. Data were expressed as mean ± standard deviation and mean ranks. For regression analyses, alpha values were set at \( p \leq .05 \).

Sample Characteristics

Sociodemographic variables. Sociodemographic information is presented for the entire sample (N=192) in Table 7.

Table 7

Sociodemographic Characteristics for the Entire Sample

<table>
<thead>
<tr>
<th></th>
<th>Entire Sample (N = 192)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Some high school</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>High school graduate</td>
<td>4 (2.1)</td>
</tr>
<tr>
<td>Some trade school</td>
<td>2 (1.0)</td>
</tr>
<tr>
<td>Trade school graduate</td>
<td>6 (3.1)</td>
</tr>
<tr>
<td>Some college/ undergraduate degree</td>
<td>22 (11.5)</td>
</tr>
<tr>
<td>College/ undergraduate degree</td>
<td>81 (42.2)</td>
</tr>
</tbody>
</table>
Some graduate school/ professional training 15 (7.8)
Graduate school/professional degree 61 (31.8)

**Place of Birth**

<table>
<thead>
<tr>
<th>Place</th>
<th>Count (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>163 (84.9)</td>
</tr>
<tr>
<td>USA</td>
<td>17 (8.9)</td>
</tr>
<tr>
<td>Middle East</td>
<td>3 (1.6)</td>
</tr>
<tr>
<td>Western Europe</td>
<td>3 (1.6)</td>
</tr>
<tr>
<td>Asia</td>
<td>2 (1.0)</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>2 (1.0)</td>
</tr>
<tr>
<td>Australia</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>Caribbean</td>
<td>1 (0.5)</td>
</tr>
</tbody>
</table>

**Ethnicity**

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Count (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian</td>
<td>176 (91.7)</td>
</tr>
<tr>
<td>Mixed Race</td>
<td>4 (2.1)</td>
</tr>
<tr>
<td>North East Asian</td>
<td>3 (1.6)</td>
</tr>
<tr>
<td>African American</td>
<td>2 (1.0)</td>
</tr>
<tr>
<td>Afro-Caribbean</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>Arab</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>Latin American</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>Metis</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>South East Asian</td>
<td>1 (0.5)</td>
</tr>
</tbody>
</table>
### Annual Household Income Before Taxes

<table>
<thead>
<tr>
<th>Income Range</th>
<th>Count (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0 - $19,999</td>
<td>9 (4.7)</td>
</tr>
<tr>
<td>$20,000 - $39,999</td>
<td>8 (4.2)</td>
</tr>
<tr>
<td>$40,000 - $59,999</td>
<td>20 (10.4)</td>
</tr>
<tr>
<td>$60,000 - $79,999</td>
<td>27 (14.1)</td>
</tr>
<tr>
<td>$80,000 - $99,999</td>
<td>27 (14.1)</td>
</tr>
<tr>
<td>$100,000 - $119,999</td>
<td>27 (14.1)</td>
</tr>
<tr>
<td>$120,000 - $139,999</td>
<td>21 (10.9)</td>
</tr>
<tr>
<td>$140,000 - $159,999</td>
<td>17 (8.9)</td>
</tr>
<tr>
<td>$160,000 and up</td>
<td>29 (15.1)</td>
</tr>
<tr>
<td>Decline response</td>
<td>7 (3.6)</td>
</tr>
</tbody>
</table>

### Relationship Status

<table>
<thead>
<tr>
<th>Status</th>
<th>Count (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>160 (83.3)</td>
</tr>
<tr>
<td>Common law</td>
<td>16 (8.3)</td>
</tr>
<tr>
<td>Cohabitating but not yet common law</td>
<td>3 (1.6)</td>
</tr>
<tr>
<td>Engaged and cohabitating</td>
<td>5 (2.6)</td>
</tr>
<tr>
<td>Engaged</td>
<td>3 (1.6)</td>
</tr>
<tr>
<td>Dating and committed</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>Separated</td>
<td>2 (1.0)</td>
</tr>
<tr>
<td>Single</td>
<td>2 (1.0)</td>
</tr>
</tbody>
</table>

### Self-identified sexual orientation

<table>
<thead>
<tr>
<th>Orientation</th>
<th>Count (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heterosexual</td>
<td>181 (94.3)</td>
</tr>
<tr>
<td>Bisexual</td>
<td>8 (4.2)</td>
</tr>
</tbody>
</table>
Labour, delivery, and postpartum variables. Information regarding women’s labour and delivery experiences is presented for the entire sample in Table 8.

Table 8

Labour and Delivery Experiences for Entire Sample

<table>
<thead>
<tr>
<th></th>
<th>Entire Sample (N = 192)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
</tr>
<tr>
<td>Number of children delivered</td>
<td></td>
</tr>
<tr>
<td>Singleton</td>
<td>188 (97.9)</td>
</tr>
<tr>
<td>Twins</td>
<td>3 (1.6)</td>
</tr>
<tr>
<td>Decline response</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
</tr>
<tr>
<td>Primiparous</td>
<td>113 (58.9)</td>
</tr>
<tr>
<td>Multiparous</td>
<td>79 (41.1)</td>
</tr>
<tr>
<td>Second child</td>
<td>54 (28.1)</td>
</tr>
<tr>
<td>Third child</td>
<td>21 (10.9)</td>
</tr>
<tr>
<td>Fourth child</td>
<td>4 (2.1)</td>
</tr>
<tr>
<td>Vaginal birth (VB)</td>
<td>149 (77.6)</td>
</tr>
<tr>
<td>AVB*</td>
<td>22 (14.8)</td>
</tr>
<tr>
<td>Episiotomy*</td>
<td>17 (11.4)</td>
</tr>
<tr>
<td>Genital tear*</td>
<td>94 (63.1)</td>
</tr>
<tr>
<td>Category</td>
<td>Count (%)</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>First degree</td>
<td>33 (35.1)</td>
</tr>
<tr>
<td>Second degree</td>
<td>37 (39.3)</td>
</tr>
<tr>
<td>Third degree</td>
<td>12 (12.8)</td>
</tr>
<tr>
<td>Caesarean section (CS)</td>
<td>42 (21.9)</td>
</tr>
<tr>
<td>Planned CS</td>
<td>22 (52.3)</td>
</tr>
<tr>
<td>Elective CS</td>
<td>12 (54.5)</td>
</tr>
<tr>
<td>Emergency CS</td>
<td>20 (47.6)</td>
</tr>
<tr>
<td>Labour before CS</td>
<td>15 (75.0)</td>
</tr>
<tr>
<td>Genital tear</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Currently exclusively breastfeeding</td>
<td>128 (66.7)</td>
</tr>
<tr>
<td>Began menstruating again</td>
<td>73 (38.0)</td>
</tr>
<tr>
<td>Experience stress incontinence</td>
<td>57 (29.7)</td>
</tr>
</tbody>
</table>

*a* Percentages shown out of N = 149 (i.e., women who had vaginal birth); *b* Percentages shown out of N = 94 (i.e., women who had a genital tear); *c* Percentages shown out of N = 42 (i.e., women who had a Caesarean section); *d* Percentages shown out of N = 19 (i.e., women who had a planned Caesarean section); *e* Percentages shown out of N = 21 (i.e., women who had an emergency Caesarean section.

**Sexual function, psychological, and relationship variables.** Data for sexual function, psychological, and relationship variables are presented for the entire sample in Table 9. Women who reported not attempting intercourse in the past four weeks (n = 47) had given birth more recently (*M* = 4.04, *SD* = 3.38, *M rank* = 65.01) than women who attempted intercourse (n = 145; *M* = 6.57, *SD* = 2.96, *M rank* = 106.71), *U* = 1927.5, *p* < .001, abs(*r*) = .32. Women who attempted intercourse did not differ on age, SDI score, FSC, and EPDS score from women who did not attempt intercourse, *ps* > .05.
### Table 9

**Sexual Function, Psychological, and Relationship Variables**

<table>
<thead>
<tr>
<th></th>
<th>Entire Sample (N = 192)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD), Med (Range)</td>
</tr>
<tr>
<td>Sexual Function Variables</td>
<td></td>
</tr>
<tr>
<td>SDI Total</td>
<td>47.73 (20.57), 48.25 (0 − 94)</td>
</tr>
<tr>
<td>SDI Dyadic</td>
<td>30.51 (13.43), 33 (0 − 62)</td>
</tr>
<tr>
<td>SDI Solitary</td>
<td>14.28 (8.92), 14 (0 − 36)</td>
</tr>
<tr>
<td>FSFI Total (n = 157)</td>
<td>24.19 (5.29), 24.3 (11.6 − 33)</td>
</tr>
<tr>
<td>FSFI Arousal (n = 157)</td>
<td>3.88 (0.89), 3.9 (1.5 − 6)</td>
</tr>
<tr>
<td>FSFI Lubrication (n = 157)</td>
<td>4.33 (1.58), 4.8 (1.2 − 6)</td>
</tr>
<tr>
<td>FSFI Orgasm (n = 157)</td>
<td>4.15 (1.52), 4.4 (1.2 − 6)</td>
</tr>
<tr>
<td>FSFI Satisfaction (n = 157)</td>
<td>4.03 (1.47), 4.0 (.80 − 6)</td>
</tr>
<tr>
<td>FSFI Pain (n = 145)</td>
<td>4.56 (1.48), 4.8 (1.20 − 6)</td>
</tr>
<tr>
<td>Psychological Variables</td>
<td></td>
</tr>
<tr>
<td>FSC (n = 190)</td>
<td>11.86 (6.77), 11.25 (0 − 29)</td>
</tr>
<tr>
<td>EPDS</td>
<td>6.93 (5.63), 6.00 (0 − 27)</td>
</tr>
<tr>
<td>Relationship Variables</td>
<td></td>
</tr>
<tr>
<td>RAS (n = 188)</td>
<td>29.85 (5.20), 31 (7 − 35)</td>
</tr>
</tbody>
</table>

*Note. SDI = Sexual Desire Inventory; FSFI = Female Sexual Function Index; FSC = Fatigue Symptom Checklist; EPDS = Edinburgh Postnatal Depression Scale; RAS = Relationship Assessment Scale.*
Physical Factors Involved in Postpartum Sexual Function

In order to answer the first research question, differences were examined between women who endorsed any of the physical risk factors and those who did not on all sexual function measures.

How does mode of delivery affect postpartum sexual function? It was hypothesized that women who had a VB would have lower sexual function than women who had a CS. To examine this hypothesis (1.a.), nine Mann Whitney U tests were used to compare women who had a VB (n = 149) to women who had a CS (n = 42) on the SDI scores and FSFI scores. Only the data from women who reported engaging in sexual activity within the last four weeks (n = 156; VB n = 122, CS n = 34) were used in the analyses for the FSFI. Only the data from women who reported attempting to engage in sexual activity within the last four weeks (n = 145; VB n = 112, CS n = 33) were used in the FSFI pain subscale analyses. There were no differences between women who had a VB and women who had a CS on the SDI or FSFI, ps > .00556.

How does genital trauma affect postpartum sexual function? The first hypothesis for this research question (1.b.i) stated that women with genital trauma would have more dyspareunia than women with no genital trauma at three months postpartum, but that this difference would not be found after three months postpartum. In order to examine this hypothesis, two independent samples t-tests were used to compare genital trauma and the FSFI pain subscale score in women who were three months postpartum or less (n = 29) and women who were more than three months postpartum (n = 116). For women who were three months postpartum or less, there was no difference on the FSFI pain subscale score between women with genital trauma (n = 12) and women with no genital trauma (n =17), p > .00556. There was no difference in the FSFI pain subscale
score between women who were more than three months postpartum and had genital trauma (n = 62) and no genital trauma (n = 54), \( p > .00556 \).

In order to investigate the second part of this research question (1.b.ii) regarding how women with genital trauma (n = 101) differ from women with no genital trauma (n = 90) on other sexual function measures, eight independent samples t-tests were used to compare scores on the SDI and FSFI (total scores). It was hypothesized that women with genital trauma would have lower sexual function than women with no genital trauma. Only the data from women who reporting engaging in sexual activity were included in the FSFI analyses (n = 157; genital trauma n = 83, no genital trauma n = 74). There were no differences between women who had genital trauma and those who did not on the SDI and FSFI, \( ps > .00556 \).

**How does breastfeeding affect postpartum sexual function?** It was hypothesized (1.c.) that women who were breastfeeding would have lower sexual function than women who were not breastfeeding. In order to examine this hypothesis, nine Mann Whitney U tests were used to compare women who were breastfeeding (n = 128) and women who were not breastfeeding (n = 64) on the SDI subscale and total scores. Ninety-nine women who were breastfeeding and 58 women who were not breastfeeding were included in the FSFI total score analyses. Ninety-one breastfeeding women and 54 non-breastfeeding women were included in the FSFI pain subscale score analyses. There were no differences between women who were breastfeeding and women who were not breastfeeding on SDI and FSFI total scores, \( ps > .00556 \).
Psychological and Relationship Factors Involved in Postpartum Sexual Function

Table 10 shows the Pearson’s correlations between the psychosocial variables (FSC score, EPDS score, and RAS score) sexual function variables (SDI total and subscale scores and FSFI total and subscale scores).

How does fatigue affect postpartum sexual function? It was hypothesized that women who reported more fatigue would have lower sexual function than women who reported less fatigue (2.a.). In order to examine this hypothesis, nine Pearson correlations were used to determine whether fatigue was significantly correlated with the sexual function measures. Only women who provided data for at least 85% of the FSC were included in the analyses (n = 190). Only women who reported engaging in sexual behaviour in the last four weeks and provided data for at least 85% of the FSC (n = 155) were included in the FSFI total score analyses. Finally, only women who reported attempting intercourse in the last four weeks and provided data for at least 85% of the FSC (n = 143) were included in the FSFI pain subscale score analyses. The FSC was significantly negatively correlated with FSFI arousal score, Pearson’s $r(153) = -.40$, $p < .001$, lubrication score, Pearson’s $r(153) = -.22$, $p = .005$, orgasm score, Pearson’s $r(153) = -.26$, $p < .001$, pain score, Pearson’s $r(141) = -.24$, $p = .004$, and total FSFI score, Pearson’s $r(155) = -.29$, $p < .001$. Fatigue was not correlated with the SDI subscale and total scores or with the FSFI satisfaction subscale score, $ps > .00556$.

How do depressive symptoms affect sexual function? In order to investigate the next hypothesis (2.b.) that women who had higher depression scores would have lower sexual function than women who had lower depression scores, nine Pearson’s correlations were used to determine if there was a relationship between EPDS score and the sexual function variables. There were no significant correlations between EPDS score
and SDI subscale and total scores, $ps > .00556$. Only women who were in a relationship and reported engaging in sexual activity in the last four weeks were included in the FSFI total and subscale analyses ($n = 157$). Only women who reported attempting to engage in intercourse in the past four weeks were included in the FSFI pain subscale score analyses ($n = 145$). There were significant negative correlations between EPDS and the FSFI sexual arousal subscale score, Pearson’s $r(155) = -.24, p = .003$, the FSFI satisfaction subscale score, Pearson’s $r(155) = -.24, p = .003$, and the total FSFI score, Pearson’s $r(155) = -.24, p = .002$. There were no significant correlations between the EPDS score and FSFI lubrication and pain subscale scores, $ps > .00556$.

**How does relationship satisfaction affect sexual function?** In order to examine the next hypothesis (3.a.) that women who reported lower relationship satisfaction would have lower sexual function than women who report higher relationship satisfaction, nine Pearson correlations were conducted to determine if there were significant correlations between the RAS total score, and the SDI solitary, dyadic, or total scores, and the FSFI total and subscale scores. Only women who reported being in a relationship at the time of the study ($n = 188$) were included in the relationship analyses. Only women who were in a relationship and reported engaging in sexual activity in the last four weeks ($n = 156$) were included in the FSFI total score analyses. Only women who were in a relationship and reported attempting intercourse in the last four weeks ($n = 145$) were included in the FSFI pain subscale score analysis.

There were no significant correlations between the SDI scores and the RAS. The RAS was positively correlated with the FSFI arousal subscale score, Pearson’s $r(154) = .22, p = .005$, the FSFI lubrication subscale score, Pearson’s $r(154) = .27, p = .001$, the
FSFI satisfaction subscale score, Pearson’s $r(154) = .41, p < .001$, and the FSFI total score, Pearson’s $r(154) = .33, p < .001$. There was no significant correlation between the FSFI orgasm and satisfaction subscale scores and the RAS, $p > .00556$. 
### Pearson’s Correlations Between Psychosocial and Sexual Function Variables

<table>
<thead>
<tr>
<th>Psychosocial Variables</th>
<th>SDI-T</th>
<th>SDI-D</th>
<th>SDI-S</th>
<th>FSFI-T</th>
<th>FSFI-A</th>
<th>FSFI-O</th>
<th>FSFI-L</th>
<th>FSFI-S</th>
<th>FSFI-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSC</td>
<td>-0.04</td>
<td>-0.07</td>
<td>0.09</td>
<td>-0.29 **</td>
<td>-0.40 **</td>
<td>-0.26 *</td>
<td>-0.22 *</td>
<td>-0.18</td>
<td>-0.24 *</td>
</tr>
<tr>
<td>EPDS</td>
<td>0.01 d</td>
<td>0.00 d</td>
<td>0.07 d</td>
<td>-0.24 e</td>
<td>-0.24 e</td>
<td>-0.20 e</td>
<td>-0.16 e</td>
<td>-0.24 e</td>
<td>-0.14 f</td>
</tr>
<tr>
<td>RAS</td>
<td>0.08 g</td>
<td>0.18 g</td>
<td>-0.11 g</td>
<td>0.33 ** h</td>
<td>0.22 h</td>
<td>0.15 h</td>
<td>0.27 h</td>
<td>0.41 ** h</td>
<td>0.03 f</td>
</tr>
</tbody>
</table>

* p < .00556, **p < .001

**Note.** SDI-T = Total SDI score; SDI-D = Dyadic subscale of SDI; SDI-S = Solitary subscale of SDI; FSFI-T = Total FSFI score; FSFI-A = Arousal subscale of FSFI; FSFI-O = Orgasm subscale of FSFI; FSFI-L = Lubrication subscale of FSFI; FSFI-S = Satisfaction subscale of FSFI; FSFI-P = Pain subscale of FSFI

* a N = 190, b N = 155, c N = 143; d N = 192, e N = 157, f N = 145; g N = 188; h = 156
Multiple Regression Analyses

To obtain more precise estimates of the association between the biopsychosocial factors and the FSFI subscales (specifically the FSFI subscales that were related to multiple psychosocial variables), multiple regressions models were developed with arousal, lubrication, satisfaction and total sexual function as the outcome variables. Given that the RAS score was significantly related to the FSFI total and subscale scores and that it was only assessed in women who were in relationships, the data from women who were not in relationships (n = 4) were excluded from the regression analyses. All psychosocial risk factors that were found to be significantly associated with each FSFI subscale score were included in the regression models. The multiple regression results are displayed in Table 11 and Table 12 summarizes the major findings from the Pearson’s correlation and multiple regression analyses.

First, the linear combination of fatigue, depressive symptoms, and relationship satisfaction was significantly related to arousal, $R^2 = .17$, adjusted $R^2 = .16$, $F(3, 150) = 10.34$, $p < .001$. Only FSC total score, $t(150) = -4.03$, $p < .001$, significantly predicted arousal. Second, the linear combination of fatigue and relationship satisfaction was significantly related to lubrication, $R^2 = .10$ adjusted $R^2 = .09$, $F(2, 151) = 8.12$, $p < .001$. The RAS total score, $t(151) = 2.80$, $p = .006$, and FSC total score, $t(151) = -2.06$, $p = .041$ significantly predicted lubrication. Third, the linear combination of depressive symptoms and relationship satisfaction was significantly related to satisfaction, $R^2 = .18$, adjusted $R^2 = .17$, $F(2, 153) = 16.85$, $p < .001$. Only the RAS total score significantly predicted satisfaction $t(153) = 4.90$, $p < .001$. Finally, the linear combination of fatigue, depressive symptoms, and relationship satisfaction was significantly related to total sexual function,
\( R^2 = .15, \text{ adjusted } R^2 = .13, F(3, 150) = 8.81, p < .001. \) RAS total score, \( t(150) = 3.25 \) \( p = .001 \) and FSC score \( t(150) = -2.13, p = .035 \) significantly predicted total FSFI score.

Table 11

*Multiple Linear Regression of Relationship between Psychosocial Factors and Postpartum Sexual Function*

<table>
<thead>
<tr>
<th>FSFI Subscale</th>
<th>B</th>
<th>SE B</th>
<th>( \beta )</th>
<th>( R^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arousal</td>
<td></td>
<td></td>
<td></td>
<td>.17***</td>
</tr>
<tr>
<td>FSC</td>
<td>-0.05</td>
<td>0.01</td>
<td>-.38***</td>
<td></td>
</tr>
<tr>
<td>EPDS</td>
<td>0.01</td>
<td>0.07</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>RAS</td>
<td>0.02</td>
<td>0.02</td>
<td>.13</td>
<td></td>
</tr>
<tr>
<td>Lubrication</td>
<td></td>
<td></td>
<td></td>
<td>.10***</td>
</tr>
<tr>
<td>FSC</td>
<td>-0.04</td>
<td>0.02</td>
<td>-.17*</td>
<td></td>
</tr>
<tr>
<td>RAS</td>
<td>0.08</td>
<td>0.03</td>
<td>.22**</td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td></td>
<td></td>
<td></td>
<td>.19***</td>
</tr>
<tr>
<td>EPDS</td>
<td>-0.13</td>
<td>0.10</td>
<td>-.10</td>
<td></td>
</tr>
<tr>
<td>RAS</td>
<td>0.12</td>
<td>0.03</td>
<td>.38***</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>.16***</td>
</tr>
<tr>
<td>FSC</td>
<td>-0.16</td>
<td>0.07</td>
<td>-.20*</td>
<td></td>
</tr>
<tr>
<td>EPDS</td>
<td>-0.15</td>
<td>0.44</td>
<td>-.03</td>
<td></td>
</tr>
<tr>
<td>RAS</td>
<td>0.30</td>
<td>0.09</td>
<td>.26**</td>
<td></td>
</tr>
</tbody>
</table>

* \( p < .05, \ **, p < .01, \ ***p < .001 \)

*Note. FSFI = Female Sexual Function Index; FSC = Fatigue Symptom Scale; EPDS = Edinburgh Postnatal Depression Scale; RAS = Relationship Assessment Scale.*
Table 12

*Summary of Results from Pearson’s Correlations and Multiple Regression Analyses*

<table>
<thead>
<tr>
<th>Psychosocial Variables</th>
<th>Sexual Function Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FSFI Subscales</strong></td>
<td></td>
</tr>
<tr>
<td>✅ Total</td>
<td>✅ Arousal</td>
</tr>
<tr>
<td></td>
<td>✅ Lubrication</td>
</tr>
<tr>
<td></td>
<td>✅ Orgasm</td>
</tr>
<tr>
<td></td>
<td>✅ Satisfaction</td>
</tr>
<tr>
<td></td>
<td>✅ Dyspareunia</td>
</tr>
<tr>
<td>EPDS</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>FSC</td>
<td>β = -.20</td>
</tr>
<tr>
<td></td>
<td>β = -.38</td>
</tr>
<tr>
<td></td>
<td>β = -.17</td>
</tr>
<tr>
<td></td>
<td>r = -.26</td>
</tr>
<tr>
<td></td>
<td>r = -.24</td>
</tr>
<tr>
<td>RAS</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>β = -.26</td>
</tr>
<tr>
<td></td>
<td>β = -.22</td>
</tr>
<tr>
<td></td>
<td>β = -.38</td>
</tr>
</tbody>
</table>

*Note.* FSFI = Female Sexual Function Index; EPDS = Edinburgh Postnatal Depression Scale; FSC = Fatigue Symptom Checklist; RAS = Relationship Assessment Scale; ns = not significant
**Mediation Analyses**

In order to elucidate the interrelationship among fatigue, depressive symptoms, and relationship satisfaction and their impact on sexual function, two mediation models were created. A mediated regression (Figure 6), using the Baron and Kenny (1986) approach was conducted to determine if the relationship between depressive symptoms and postpartum sexual function was mediated by relationship satisfaction. The IV (depressive symptoms) and the DV (sexual function) were significantly related, such that more depressive symptoms were associated with lower sexual function, $B = -0.05, t(154) = -3.04, p = .003$. The mediator (relationship satisfaction) and the IV were also significantly related, such that more depressive symptoms were associated with less relationship satisfaction, $B = -1.31, t(154) = -4.31, p < .001$. Therefore, the relationship between the mediator and the DV controlling for the IV was examined and was significant, $B = 0.32, t(153) = 3.50, p = .001$, while the relationship between the DV and the IV was no longer significant, $B = -0.67, t(153) = -1.82, p = .070$. A Sobel’s test was conducted to determine if the mediation was significantly large. Sobel’s test was significant, Sobel value = $-2.71, p = .006$, indicating that relationship satisfaction significantly mediated the relationship between depressive symptoms and sexual function.
Figure 6. Fatigue completely mediates the relationship between depressive symptoms and postpartum sexual function.

A second mediated regression (Figure 7), using the Baron and Kenny (1986) approach was conducted to determine if the relationship between depressive symptoms and postpartum sexual function was mediated by fatigue. The IV (depressive symptoms) and the DV (sexual function) were significantly related, such that more depressive symptoms were associated with lower sexual function, $B = -0.06$, $t(156) = -3.45$, $p = .001$. The mediator (fatigue) and the IV were also significantly related, such that more depressive symptoms were associated with more fatigue, $B = 3.44$, $t(154) = 9.21$, $p < .001$. Therefore, the relationship between the mediator and the DV controlling for the IV was examined and was significant, $B = -0.17$, $t(153) = -2.13$, $p = .035$, while the relationship between the DV and the IV was no longer significant, $B = -0.69$, $t(153) = -$
1.05, \( p = .131 \). A Sobel’s test was conducted to determine if the mediation was significantly large. Sobel’s test was significant, Sobel value = -2.07, \( p = .038 \), indicating that fatigue significantly mediated the relationship between depressive symptoms and sexual function.

\[
\begin{align*}
\text{Depressive Symptoms} & \rightarrow \beta = -.24, \ p = .003 \rightarrow \text{Postpartum Sexual Function (FSFI Total)} \\
\text{Depressive Symptoms} & \rightarrow \beta = -.15, \ p = .070 \rightarrow \text{Postpartum Sexual Function (FSFI Total)} \\
\text{Relationship Satisfaction} & \rightarrow \beta = .28, \ p = .001
\end{align*}
\]

*Figure 7.* Relationship satisfaction completely mediates the relationship between depressive symptoms and postpartum sexual function.

**Discussion**

The results of this study indicated that postpartum sexuality is multidimensional in nature and may be best addressed using a psychosocial approach rather than a biomedical one. In this study, psychosocial factors, particularly, fatigue and relationship satisfaction were independently predictive of multiple aspects of postpartum sexual function, whereas birth-related physical factors (i.e., mode of delivery, genital trauma,
and breastfeeding) were not related to postpartum sexual function. Furthermore, the current study found that both relationship satisfaction and fatigue independently mediate the relationship between depressive symptoms and postpartum sexual function. That is, women with more depressive symptoms have lower relationship satisfaction and more fatigue, and it is through this decreased relationship satisfaction and increased fatigue that the negative association between depressive symptoms and sexual function emerges.

Overall, the average FSFI total score for women in this sample was below the cut-off for sexual dysfunction provided by Wiegel and colleagues (2005). This finding is consistent with previous research suggesting that the postpartum is a high-risk period for sexual problems (e.g., von Sydow, 1999; Leeman & Rogers, 2012; Yeniel & Petri, 2014). Although the total FSFI score was below the cut-off for sexual dysfunction, none of the FSFI subscale scores were in the clinical range, that is, below the weighted mean subscale score provided by Wiegel et al. Of note, women in the current sample did not report FSFI pain scores in the clinical range, i.e. they reported less pain (FSFI pain subscale score mean of 4.56) than women with sexual pain disorders (FSFI pain subscale score of 2.02 or less; Wiegel et al., 2005). This finding supports the stance that a broader definition of sexual function should be applied to postpartum populations.

**Birth-related Factors Involved in Postpartum Sexual Function**

The results from the current study support a shift away from the biomedical approach of sexual function to a more psychosocial approach. The birth-related physical factors examined (i.e., mode of delivery, genital trauma, and breastfeeding) were not associated with sexual function. The current study found that breastfeeding was not related to any area of sexual function. That breastfeeding was not related to dyspareunia...
was surprising given the extensive literature that has found increased dyspareunia in women who breastfeed (e.g., Barrett et al., 2000; Boroumandfar et al., 2010; Connolly et al., 2005; Signorello et al., 2001). This finding may be due to that fact that breastfeeding was pre-defined as women who were exclusively breastfeeding, and data about the current breastfeeding status from women who were breast and bottle-feeding were not collected. Women who breastfed and bottle-fed were included in the non-breastfeeding group, and this blurring of groups may have confounded the results. Not only are there hormonal differences between women who are breastfeeding in any capacity and women who exclusively bottle-feed, but there also social and emotional implications of breastfeeding. For example, women who breastfeed may experience embarrassment/hesitation about engaging in sexual activities with a partner for fear of milk ejection during orgasm or may experience altered sexual function based on their increased breast size and change in body image (Avery et al., 2000). Future research should investigate the differences in sexual function between women who are exclusively breastfeeding, women who are breastfeeding and bottle-feeding, and women who are exclusively bottle-feeding.

**Psychological and Relationship Factors Involved in Postpartum Sexual Function**

All three psychosocial variables (fatigue, depressive symptoms, and relationship satisfaction) were related to postpartum sexual function, such that more fatigue, more depressive symptoms, and less relationship satisfaction were related to lower sexual function. However, upon closer investigation, it was determined that only relationship satisfaction and fatigue independently predicted different aspects of sexual function and both independently mediated the relationship between depressive symptoms and sexual
function. Whereas previous research has found that postpartum depression is related to lower postpartum sexual function (e.g., S. Brown & Lumley, 2000; Chivers et al., 2011; DeJudicibus & McCabe, 2002), this study is the first to closely investigate this relationship by exploring the role of potential mediating variables. Marital problems and postpartum fatigue are both positively related to postpartum depression, and research suggests that these relationships are bidirectional (Beck & Indman, 2005; Bozoky & Corwin, 2002; O’Hara & Swain, 1996; Whisman, Davila, & Goodman, 2011). Thus, implementing preventative or therapeutic interventions which target improving the couple’s relationship or decreasing fatigue may not only have a positive effect on improving sexual function, but may also help reduce depressive symptoms.

Fatigue and relationship satisfaction predicted overall sexual function as women with low relationship satisfaction and women who had high levels of fatigue reported the lowest sexual function. It is not surprising that high relationship satisfaction is predictive of greater postpartum sexual function given that there is much literature to suggest a positive association between the two in non-postpartum populations (Byers, 2005; Witting et al., 2008). Likewise, the finding that fatigue is positively associated with sexual dysfunction is consistent with reports from women in which they rank fatigue as playing a major role in interfering with postpartum intercourse and sexual desire (Ahlborg, Dahlof, Hallberg, 2005; Fischman et al., 1986; Gordon & Carty, 1978; Hipp et al., 2012; Kumar et al., 1981; McDonald & Brown, 2013; Rogers et al., 2009; Yee et al., 2013).

**Fatigue.** The results of the multiple regression analyses indicated that fatigue independently predicts sexual arousal, vaginal lubrication, and dyspareunia such that
more fatigue is predictive of less sexual arousal, less vaginal lubrication, and more
dyspareunia. In addition, fatigue was negatively correlated with orgasmic function. These
findings are consistent with what is known about the role that fatigue plays in the sexual
response cycle.

According to Masters and Johnson’s (1966) sexual response cycle, the first phase
of sexual response (excitement) signals the beginning of sexual arousal whereby the body
reacts to sexual information and triggers (i.e., genital/nongenital stimulation or sexual
thoughts). Fatigue can lengthen the response time between sexual triggers and the
excitement phase (Pukall & Wassersug, 2014). Furthermore, previous research shows
that fatigue alters the way in which the mind processes sexual information, which can
reduce subjective arousal (Basson et al., 2005). What this can mean is that new mothers
who experience fatigue may not be processing sexual information and reacting to sexual
triggers in the same manner as they would in their non-fatigued state, and therefore, do
not report feeling aroused during sexual activity.

If women with fatigue are experiencing less sexual arousal, then it makes sense
that they may report less lubrication, as vaginal lubrication is generally an objective
indicator female sexual arousal (Basson et al., 2003). Furthermore, that fatigue increases
the response time between sexual triggers and the excitement phase of the sexual
response cycle may be important in understanding the role of fatigue in vaginal
lubrication. Specifically, vasocongestion occurs during the excitement phase of the sexual
response cycle, which for women results in vaginal lubrication (Pukall & Wassersug,
2014). Thus, a delay in the excitement phase may have a negative impact on vaginal
lubrication. Given the impact of fatigue on vaginal lubrication, it also follows that fatigue
would be predictive of dyspareunia as a lack of lubrication can result in dyspareunia (Sutton, Boyer, Goldfinger, Ezer, & Pukall, 2012). Finally, achieving orgasm may be difficult or impossible in the absence of sufficient sexual arousal and lubrication (Basson, Wierman, van Lankveld, & Brotto, 2010).

**Relationship satisfaction.** The current study found that relationship satisfaction was predictive of sexual satisfaction, such that greater relationship satisfaction was associated with greater sexual satisfaction. These results are consistent with previous research, as there is a known strong positive relationship between relationship satisfaction and sexual satisfaction (Byers, 2005). The results of this study also showed that relationship satisfaction predicted vaginal lubrication. This finding is interesting considering the biological and hormonal mechanisms that are involved in lubrication. However, as noted by Kleinplatz (2014), a lack of vaginal lubrication during a sexual encounter may not be indicative of a physiological problem, but rather, a lack of response to an unappealing sexual encounter. That couples with more relationship satisfaction tend to have better sexual communication (MacNeil & Byers, 2005, 2009) means that women who report more relationship satisfaction may be more likely to discuss their sexual preferences with their partner, leading to more appealing sexual encounters, and in turn, increased vaginal lubrication. Furthermore, partners of women who have difficulty with lubrication may perceive their lack of lubrication as disinterest or absence of desire to engage in sexual activities (Kleinplatz, 2014); this assumption can lead to relationship conflict and decreased relationship satisfaction (Davies, Katz, & Jackson, 1999).

**Postpartum sexual desire.** In the current study, none of the biopsychosocial factors were associated with postpartum sexual desire (solitary or dyadic), or with the
FSFI desire subscale. It is likely that postpartum sexual desire is a complex phenomenon, and future research should investigate what factors are related to postpartum sexual desire. Using the SDI, Hipp and colleagues (2012) found that postpartum dyadic sexual desire was positively related to a woman’s perceptions of her partner’s desire. Furthermore, the majority of the women in their study indicated that the degree of intimacy with their partner and their partner’s interest in being sexual most strongly contributed to their experiences of high postpartum sexual desire. Therefore, it may not be relationship satisfaction per se that is related to postpartum sexual desire, but rather, relationship intimacy and a woman’s perceptions of her partner’s sexual desire.

**Limitations and Future Directions**

A major limitation in this study is that pre-pregnancy sexual, psychological, and relationship functioning were not assessed and so it is impossible to determine whether these relationships are a continuation of sexual/psychological/relationship difficulties experienced prior to pregnancy or the development of new symptoms in the postpartum. Future research should use prospective designs where women can be followed from pre-pregnancy, through pregnancy, and to the postpartum period. However, with the large sample size included in this study, hopefully confounds of pre-existing sexual dysfunction were reduced. Although this study did have a large sample size, it was quite a homogeneous sample of white, well-educated, partnered Canadians. There is evidence to suggest that this group would be at a lowest risk of sexual dysfunction (Laumann, Paik, & Rosen, 1999). Furthermore, data were collected from study volunteers in an online format, which limits responses from women with limited access to computers or time to complete the study. Collecting data on postpartum sexual functioning from a
more heterogeneous population sample would allow for greater generalization of results to a more broad sample of women in the postpartum period.

Another limitation to this study is the use of self-report measures to address sexual function. Early research into postpartum sexuality found that some women self-reported experiencing increases in their sexual functioning postpartum, although the physiological changes in the genitals of these women showed decreased lubrication, delayed vasocongestive reactions, and a reduction in the vividness of colour change in the labia minora as compared to their pre-pregnancy levels (Masters & Johnson, 1966). Taken together, this discrepancy between self-report measures and physiological measures means that although some women may not be self-reporting sexual dysfunction in the postpartum period, psychophysiological measures of sexual arousal, vulvar sensitivity, and pain may suggest otherwise. To the best of my knowledge, no studies have been conducted using current sexual psychophysiological measures (such as Laser Doppler imaging) or psychophysical methods (such as quantitative sensory testing) to address postpartum sexual functioning and genital sensory changes. Future research should include these objective measures to get a more comprehensive picture of postpartum sexual function.

Conclusions

The postpartum is a high-risk period for problems with sexual function; thus, it is important for researchers and clinicians to address this issue in the most effective manner. The results of the current study indicate that postpartum sexual function is best conceptualized using a psychosocial framework rather than a biomedical one, given that birth-related physical factors were not related to postpartum sexual function, whereas
psychosocial factors were. Furthermore, the results of the current study indicate that interventions that target fatigue and relationship function may be the most effective to address issues related to postpartum sexual function.
CHAPTER 4

General Discussion

The primary goal of the current studies was to apply a biopsychosocial framework to the study of PPP and postpartum sexual function while using comprehensive methods to define and assess “pain” and “sexual function” that go beyond biomedical conceptualizations of these issues. The findings from these studies suggest that psychological and social factors are related to the maintenance of pain and sexual problems in the postpartum period. Furthermore, the results of these studies suggest using a strictly biomedical approach may lead to underestimates of the prevalence and pervasiveness of PPP and postpartum sexual problems. Specifically, the results of the first study indicate that previous research, which has used a strictly biomedical approach to investigate PPP, may have underestimated pain prevalence by assuming that pain is located in the perineum and incision scar. Likewise, the results from the second study suggest that previous research that has used a strictly biomedical approach to investigate postpartum sexual dysfunction may have overlooked the role of psychological and relationship factors involved in multiple aspects of sexual function (i.e., desire, arousal, lubrication, orgasm, satisfaction), in addition to dyspareunia. A secondary goal of the current study was to elucidate the relationship between depression and PPP as well as the relationship between depression and postpartum sexual function by investigating the role of potential mediating variables. The current studies found that while depressive symptoms are related to PPP and postpartum sexual function, the effects of depressive
symptoms on PPP and sexual function are mediated by other psychosocial variables, namely, functional impairment, fatigue, and relationship satisfaction.

**Persistent Postpartum Pain**

**Pain characteristics.** More than one quarter of women in this study who reported having some form of pain after childbirth reported experiencing pain beyond two months postpartum. The prevalence of post-CS and post-VB pain at or beyond six months postpartum in this study (28.1% of all women who had a CS and 13.4% of all women who had a VB) is higher than the rate found in a large national study of 1,573 mothers, which found that 18% of women with CS and 2% of women with VB reported pain at or beyond six months postpartum. It is hypothesized that the smaller estimate found in the aforementioned study is due to the fact that the authors asked women to indicate whether or not they had pain in the perineum or the site of incision, depending on mode of delivery. In contrast, the current study asked whether women experienced *any* genito-pelvic pain, regardless of their mode of delivery. Indeed, the results of the current study found that women may experience pain in many other locations aside from the perineum and site of incision.

Though the current study found that PPP was, on average, described as mild in intensity, it was experienced during many common ADLs (such as walking and sitting), as well as in many locations in the genito-pelvic region. Taken together, the results of this study indicate that PPP is a common concern that is pervasive in nature and can affect a new mother’s everyday functioning.

**Biopsychosocial factors involved in persistent postpartum pain.** In this study, PPP was more common after CS than VB, which supports the findings of two previous
studies investigating PPP at or beyond six months (Declercq et al., 2008) and one year postpartum (Kainu et al., 2010). That PPP may be more common after CS than VB has important clinical implications, especially considering the increasing rates of CS worldwide. There is some evidence to suggest that these rates are increasing because of maternal request due to fear of pain during VB. More research should be conducted to determine women’s perspectives on pain during labour, delivery, and in the postpartum, and how that relates to mode of delivery preference.

The current study did not find evidence for an increased prevalence of PPP in women who had a VB with genital trauma, women who had an AVB, women who had a CS under general anesthesia, or women who had an emergency CS. These findings support Eisenach and colleagues’ (2013) claim that birth-related physical factors, which cause tissue damage during labour and delivery, do not play a role in the maintenance of pain after childbirth.

Women with PPP in this study reported more somatization (functional impairment) and had more depressive symptoms than women who had resolved APP. Upon closer investigation, it was determined that only functional impairment significantly predicted PPP and that functional impairment is a mediating variable in the relationship between depression and PPP. Given that poor maternal physical and mental health is related to poor child and adolescent outcomes, such as delayed language, behavioural problems, insecure attachment, and overall adverse effects on cognitive and emotional development (Beck, 1998; Khan et al., 2002; Righetti-Veltema et al., 2003), future research should investigate the link among postpartum depression, functional
impairment, and PPP. By further elucidating this complex relationship, health-care providers can decide on appropriate treatment targets.

**Postpartum Sexual Function**

The results of the current study support the claim that the postpartum is a high-risk period for sexual problems. Interestingly, women in the current sample did not report dyspareunia in the clinical range (i.e., they reported less pain on average than women with sexual pain disorders; Wiegel et al., 2005). This finding provides further support for the stance that research regarding postpartum sexuality should investigate many facets of sexuality. Furthermore, it supports the claim that the information provided to new mothers by health-care professionals should go beyond the resumption of and ability to have pain-free intercourse to include other areas of sexual function that may be disturbed in the postpartum period.

**Factors related to postpartum sexual function.** In the current study, none of the pre-determined birth-related physical factors (i.e., mode of delivery, genital trauma, and breastfeeding) were associated with postpartum sexual function. Rather, psychological (fatigue and depressive symptoms) and relationship (relationship satisfaction) variables were related to multiple areas of postpartum sexual function. Upon closer investigation, it was determined that only fatigue and relationship satisfaction independently predicted sexual function, and both independently mediate the relationship between depressive symptoms and sexual function. This finding suggests that interventions regarding sexual problems in the postpartum should target improving relationship satisfaction and reducing fatigue. Given that there are bidirectional relationships between depression and fatigue and depression and relationship satisfaction, targeting these variables may not
only improve sexual function, but also potentially reduce depressive symptoms. None of the biopsychosocial variables analyzed in this study were related to postpartum sexual desire. It is hypothesized that postpartum sexual desire may be best studied within the partner dyad, as previous research has found postpartum sexual desire to be positively associated with a woman’s perceptions of her partner’s desire (Hipp et al., 2012).

**Fatigue.** This study found that postpartum fatigue was related to less sexual arousal, less lubrication, lower orgasmic functioning, and more dyspareunia. The interrelationship among sexual arousal, lubrication, and orgasmic functioning is well established (Basson, 2000). It is hypothesized that fatigue may impact this relationship by affecting a woman’s ability to process sexual information (Basson et al., 2005) and by lengthening the response time between sexual triggers and the excitement phase of the sexual response cycle (Pukall & Wassersug, 2014), thereby decreasing arousal and vaginal lubrication. Decreased arousal and lubrication can also impact dyspareunia, as dyspareunia can occur in response to a lack of lubrication (Sutton et al., 2012). While previous research has found associations between postpartum fatigue and sexual desire (DeJudicibus & McCabe, 2002; Gordon & Carty, 1978; Hipp et al., 2012; Hyde et al., 1998), to the best of my knowledge, this study is the first that has found relationships among postpartum fatigue and sexual arousal, lubrication, orgasmic functioning, and dyspareunia.

**Relationship satisfaction.** Consistent with previous research conducted with non-postpartum women, more relationship satisfaction was found to predict better sexual function and sexual satisfaction (Byers, 2005). The current study also found that reports of higher relationship satisfaction were related to less problems with vaginal lubrication.
It is suggested that these results do not reflect the biological and hormonal mechanisms involved in lubrication, but rather, increased sexual communication in some relationships, which allows for open discussions of what preferred sexual activities would lead to more lubrication.

**Limitations of the Current Research and Future Directions**

The current studies’ samples were made up of mostly Canadian well-educated, Caucasian women. This homogeneous sample makes generalizability of the results problematic. There is evidence to suggest that ethnicity and SES may play a role in PPP and sexual function (Landau et al., 2013; Laumann et al., 1999). Collecting data from a more heterogeneous sample would allow for greater generalization of results to a broader sample of women in the postpartum period.

A major limitation in these studies is that pre-pregnancy and pregnancy information was either retrospective (i.e., pain during pregnancy) or not collected (i.e., pre-pregnancy sexual, psychological, and relationship functioning). The reliance on retrospective self-report data for pain is problematic because there is a tendency for individuals who are currently in pain to have a memory for more intense past physical pain than individuals who are not currently experiencing pain (Eich et al., 1985). Thus, the retrospective reports of pain may be overestimated in individuals with PPP. To control for the effect of amplified memories of pain, prospective studies should be conducted which follow women from pre-pregnancy (or pregnancy) into the postpartum period. This design would also allow for more precise estimates of when postpartum pain resolves. As for the study on postpartum sexual function, future research should include questions regarding pre-pregnancy functioning. Alternatively, this line of research would
also benefit from prospective studies that can follow women from pre-pregnancy (or pregnancy) into the postpartum.

The current studies collected self-report data from study volunteers in an online format. The reliance on self-report data for pain is problematic because an individual’s self-reported pain can be influenced by a variety of contextual factors, such as where they are, what time of day it is, and who is around them when they are responding to questions about pain (Jensen & Karoly, 2001). Likewise, the reliance on self-report measures to address sexual function may be problematic given that previous research has found discrepancies in self-report measures of postpartum sexual function and physiological measures (Masters & Johnson, 1966). Future research should incorporate current psychophysical methods, such as quantitative sensory testing using von Frey filaments or vulvalgesiometers to assess genital sensory changes and pressure-pain thresholds, as well as Laser Doppler imaging to assess genital blood flow associated with sexual arousal.

**Clinical Implications and Conclusions**

Over the last few decades, there has been a push for a maternal-focused continuum of postpartum care (World Health Organization, 1998). However, this model of care typically focuses on risk assessment related to postpartum depression (Gunn et al., 2006). While postpartum depression is a serious concern that can have enormous negative repercussions on the welfare of the family and development of the child (Beck, 1998), other areas such as PPP and postpartum sexual function may go unaddressed by health-care professionals. The results of the current study confirm the findings of previous research, which has found that postpartum depression is related to PPP and postpartum sexual function, such that women who have more depressive symptoms are
more likely to have PPP and problems with sexual function. However, upon closer investigation, it was determined that these relationships are mediated by other psychosocial variables, namely functional impairment, fatigue, and relationship satisfaction. Clinical interventions that target these mediating variables may be successful in not only decreasing PPP and enhancing sexual function, but also in decreasing depressive symptoms.

The results of the current study indicate that PPP and problems with postpartum sexual function are common and best addressed using a multidimensional approach, which focuses on the psychosocial aspects of pain and sexual function, as well as uses comprehensive definitions of “pain” and “sexual function”. The fact that most previously identified birth-related physical risk factors were not related to PPP and postpartum sexual function has significant implications for knowledge translation to health-care professionals and the general public. This finding is especially important given the increasing rates of CS and perceptions from the lay public that VB will have a negative impact on postpartum sexual function.

In moving beyond the biomedical conceptualizations of “pain” and “sexual function”, health-care professionals can provide mothers-to-be with information about the risks associated with their labour and delivery options. Furthermore, health-care professionals can incorporate psychosocial interventions to address issues related to PPP and postpartum sexual function.
References


primiparous women and their husbands. *Journal of Sexual Medicine, 6*(6), 1645-1667. doi: 10.1111/j.1743-6109.2009.01232.x


Appendix A

Queen’s University Ethics Approval

October 03, 2013

Miss Jaclyn Cappell
Master’s Student
Department of Psychology
Queen’s University
Kingston, ON K7L 3N6

GREB Ref #: GPSYC-631-13; Romec # 6010850
Title: "GPSYC-631 13 A Biopsychosocial Model of Persistent Postpartum Pain and Postpartum Psychosocial Functioning"

Dear Miss Cappell:

The General Research Ethics Board (GREB), by means of a delegated board review, has cleared your proposal entitled "GPSYC-631 13 A Biopsychosocial Model of Persistent Postpartum Pain and Postpartum Psychosocial Functioning" for ethical compliance with the Tri-Council Guidelines (TCPS) and Queen’s ethics policies. In accordance with the Tri-Council Guidelines (article D.1.6) and Senate Terms of Reference (article G), your project has been cleared for one year. At the end of each year, the GREB will ask if your project has been completed and if not, what changes have occurred or will occur in the next year.

You are reminded of your obligation to advise the GREB, with a copy to your unit REB, of any adverse event(s) that occur during this one year period (access this form at [https://services.queenu.ca/romeo_researcher/](https://services.queenu.ca/romeo_researcher/) and click Events - GREB Adverse Event Report). An adverse event includes, but is not limited to, a complaint, a change or unexpected event that alters the level of risk for the researcher or participants or situation that requires a substantial change in approach to a participant(s). You are also advised that all adverse events must be reported to the GREB within 48 hours.

You are also reminded that all changes that might affect human participants must be cleared by the GREB. For example you must report changes to the level of risk, applicant characteristics, and implementation of new procedures. To make an amendment, access the application at [https://services.queenu.ca/romeo_researcher/](https://services.queenu.ca/romeo_researcher/) and click Events - GREB Amendment to Approved Study Form. These changes will automatically be sent to the Ethics Coordinator, Gail Irving, at the Office of Research Services or irvingg@queenu.ca for further review and clearance by the GREB or GREB Chair.

On behalf of the General Research Ethics Board, I wish you continued success in your research.

Yours sincerely,

Joan Stevenson, Ph.D.
Chair
General Research Ethics Board

c: Dr. Caroline Pukall, Faculty Supervisor
   Dr. Stanka Fiteeva, Chair, Unit REB
   Marie Tooley, Dept. Admin.
Appendix B
RECRUITMENT POSTER AND PAMPHLET

Postpartum Sexuality

Seeking women over 18 years old who have given birth in the past 12 months to complete an online study about postpartum functioning

Research

Study Procedures:

- Online study asking about postpartum functioning, such as pain, sexual functioning, and social support

Participation will take approximately 1 hour
All information is strictly confidential

Prize Draws Available

For more information, please contact the Sexual Health Research Lab

(613) 533-3276 | SHRL@queensu.ca

Investigators: Jaclyn Cappell, MSc Candidate
Caroline Pukall, Ph.D.

This study has been granted clearance according to the recommended principles of Canadian ethics guidelines, and Queen's policies
Postpartum Sexuality
Online Study

Sexual Health Research Laboratory
Queen's University

Researchers in the Department of Psychology at Queen's University are recruiting women over 18 years of age who have given birth within the last year to complete a secure online survey.

All information is kept strictly confidential and there will be four chances each month to win $75.

For more information, please contact the Sexual Health Research Laboratory (613-533-3276) or email (SHRL@queensu.ca). You can also access the survey directly at:

https://surveys.psyc.queensu.ca/Checkbox/Post-Partum-Pain.aspx

Or scan here and go directly to the survey

(613) 533-3276
SHRL@queensu.ca

Postpartum Sexuality
Online Study

Your participation in this study would entail completing an online survey, which includes questions about your pregnancy and childbirth experience, pain, sexuality, mood and relationships. The survey will take approximately 30-45 minutes to complete and all information is kept strictly confidential.

To thank you for your participation, you will have the option of providing your email address after finishing the survey to be considered for a draw for $75. Four draws of $75 each will take place at the end of each month while the study is ongoing.

Sexual Health Research Laboratory
Queen's University

Investigators:
Jaclyn Cappell, BA
Caroline Pukall, PhD

https://surveys.psyc.queensu.ca/Checkbox/Post-Partum-Pain.aspx

(613) 533-3276
SHRL@queensu.ca
Appendix C

A Biopsychosocial Model of Persistent Postpartum Pain and Postpartum Psychosexual Functioning

Letter of Information and Consent

Investigators:

Caroline Pukall, Ph.D., Associate Professor, Department of Psychology, Queen’s University
Jaclyn Cappell, B.A., M.Sc. Candidate, Department of Psychology, Queen’s University

Introduction:

You are being invited to participate in a research study directed by two researchers in the Department of Psychology at Queen’s University. This study seeks to understand factors involved in adjusting to the postpartum period. We are interested in physical, mental and sexual health factors and how they relate to pain in the postpartum period. Many women will experience pain after they give birth. For some women, this pain will last for weeks, months or even years after childbirth. While the immediate pain after childbirth is usually related to factors directly related to the birth, such as vaginal tearing or a C-section incision, the research suggests that persistent postpartum pain is more complex and involves factors spanning physical, psychological, and sexual domains. We are interested in examining these factors in women who experience persistent postpartum pain.

Purpose of the Study:

The purpose of the study is to (1) determine the risk factors and protective factors for acute and persistent postpartum pain, and (2) investigate postpartum sexual functioning and how it is impacted by pain and other variables such as stress and fatigue.

Eligibility:

In order to participate, you must be a woman who has had a live birth within the past twelve months. You must also speak, read and write English fluently, and be 18 years of age or older.

Study Procedures:

Your participation in this study is voluntary and you are free to withdraw at any time by simply closing your web browser. Should you choose to participate, you will complete a variety of questionnaires online. The questionnaires will take approximately 30-60 minutes to complete and will contain questionnaires asking for information on sociodemographic information (e.g., age, education), your pregnancy and birthing experience, life experiences, sexual functioning, mental and physical health and sense of social support. Members of the research team will be available by phone and e-mail to answer any questions that you may have about the questionnaires and/or the study. You are able to go back to previously completed pages by pressing the Back button. If you cannot complete all questionnaires at the same time, you may press the Save and Exit button. You will be given a URL to use when you wish to resume the survey. You may copy this link yourself, or you may choose to have the survey program e-mail you the link. If you Save and Exit, you MUST use this link to resume. If you prefer to complete the survey on paper, please send us an e-mail at shrl@queensu.ca. This study has been granted clearance according to the recommended principles of Canadian ethics guidelines and Queen’s policies.
Compensation:
As a thank you for your time and effort, you will be eligible to entered in a draw to win a monthly prize of $75 CDN. If you wish to discontinue the survey, you will still be eligible to enter the draw and your chances of your name being drawn will not be impacted.

Advantages of Participating in this Study:
There are no direct benefits of participating in this study. The information gathered in the study will potentially help increase our understanding of how giving birth can affect a woman’s physical, mental, and sexual health. Some participants may find the opportunity to reflect on their own pregnancy, birth, and postpartum experiences to be personally rewarding.

Disadvantages of Participating in this Study:
There are no known physical, psychological, economic, or social risks associated with participating in this study. However, some of the questions cover sensitive topics, such as pain, mental health, and sexual functioning. It is possible that you might experience some discomfort answering these questions. However, you are not in any way obligated to answer any material that you find objectionable or that makes you feel uncomfortable; there will be a decline response option for each question. You may also withdraw from the study at any time. Withdrawing from the study will not impact your ability to enter the prize draw.

Confidential Nature of this Study:
Your participation in this study is strictly confidential. The investigators will take all reasonable measures to protect the confidentiality of your records. At no point during the questionnaire do we ask for personal information that can be identifying (e.g. name, address, city). You will not be identified in any publication or reports of this research; data will be aggregated in all reports of this study. All answers are strictly confidential and will be kept safe on a private and secure server located at Queen’s University.

Discontinuation of this Study:
You are under no obligation to participate in this study, and your acceptance or refusal will not affect access to services. Furthermore, you may choose to withdraw at any time without penalty and you are free to refuse to answer any of the questions asked without providing an explanation. All of the online questions have been programmed to either not require an answer, or provide a “decline response” option. Should you wish to withdraw from the study, please complete the withdrawal form located on your survey portal page. You will have the option to indicate whether or not you would like the data you’ve already provided to be removed from the database. Withdrawing from the study will in no way impact your ability to enter into the prize draw; you will still be given the option to enter into the prize draw upon withdrawing. If you would like further information about the study, or have additional questions or concerns may be directed to the principal investigator, Jaclyn Cappell at SHRL@queensu.ca or her supervisor, Dr. Caroline Pukall, at pukalle@queensu.ca. Any ethical concerns about the study may be directed to the Chair of the General Research Ethics Board, Joan Stevenson, at chair.GREB@queensu.ca or 613-533-6081.
Consent Form

I consent to the information contained in the Letter of Information and Consent and understand what is required for my participation in the study. I understand that I will complete a series of questionnaires, and that I am to complete these questionnaires by myself. However, I also understand that trained members of the research team are available by telephone or email should I have any questions or require further information about any aspect of the study. I understand that some of the questions may be quite personal in nature, and that some of them concern mental health sexual functioning and pain. I understand that my participation in the study is completely voluntary and that I am free to withdraw at any time. If I choose to withdraw, I can still enter the prize draw. I also understand that my confidentiality will be protected throughout the study, and that the information I provide will be available only to researchers with relevant scholarly interests.

I understand that upon completion of all questionnaires, I will be given the option to enter my e-mail address into a prize draw that will occur at the end of each month for the duration of the study. Selecting the option to participate in the prize draw will open a browser page with a new survey, also hosted on the Checkbox website, that is in no way linked to the questionnaire I filled out. I understand that my e-mail address will not be linked to my responses in any way, as my address and responses are saved to two different databases. I further understand that members of the research team will use this e-mail address to contact me only in the case that I have been selected as a winner of the draw. I recognize that I am under no obligation to provide my e-mail address to members of the research team.

Should I have further questions, I understand that I can contact any of the following individuals:

Jaclyn Cappell, (613.533.3276, 11jc83@queensu.ca), Primary Investigator, MSc Candidate, Department of Psychology, Queen’s University

Dr. Caroline Pukall (613.533.3200; caroline.pukall@queensu.ca), Associate Professor, Department of Psychology, Queen’s University

Dr. Joan Stevenson (613.533.6000 ext. 74579; stevensj@queensu.ca), Chair of the General Research Ethics Board, Queen’s University
Appendix D

Eligibility Criteria

1. Please select one of the following:
   O I have read the above statements and freely consent to participate in this research.
   O I have read the above statements and do not wish to participate at this time.

2. I confirm that I am over the age of 18.
   O Yes
   O No

3. I confirm that I am biologically female
   O Yes
   O No

4. I confirm that I have had a live birth in the last 12 months.
   O Yes
   O No

5. I confirm that I read, write, and speak English fluently
   O Yes
   O No

If individuals were not eligible for this study, they were directed to a page that read:

We are sorry, but you are not eligible at this time to participate in the study.
Thank you for your time.
Appendix E
STUDY QUESTIONNAIRE
Sociodemographic Questions

We are interested in learning about your background. Please answer the following questions to the best of your ability. If you do not want to answer the question, please select "Decline Response".

6. What is your age? _______
If you do not wish to respond, please type 999 in the space below.

7. What is the highest level of formal education that you have received?
O Less than high school
O Some high school
O High school graduate
O Some trade school
O Trade school graduate
O Some college/undergraduate degree
O College/undergraduate degree
O Some graduate school/professional training
O Graduate school/professional degree
O Decline response

8. What is your place of birth?
O Canada
O United States
O Eastern Europe
O Western Europe
O Africa
O Asia
O Australia
O Middle East
O Latin/South America
O Caribbean
O Decline Response
O Other: __________

9. Please select the answer that best describes your ethnicity.
If you select "Mixed Race", please specify in the "Other" box.
O Caucasian
O North East Asian
O Pacific
O South East Asian
O Native American
O West African
O African American
O Mixed race
O Decline response
O Other: __________
10. What was your occupation status before you gave birth?
O Employed full-time
O Employed part-time
O Unemployed
O Retired
O Student
O On Disability
O On Employment Insurance
O On Social Assistance
O Decline response
O Other: __________

11. Are you currently on parental leave?
O Yes
O No
O Decline response

12. What is the approximate total annual income of your household before taxes?
O 0 - $19,999
O $20,000 - $39,999
O $40,000 - $59,999
O $60,000 - $79,999
O $80,000 - $99,999
O $100,000 - $119,999
O $120,000 - $139,999
O $140,000 - $159,999
O $160,000 and up
O Decline response

13. Are you currently in a relationship?
O Yes
O No
O Decline response

14. What is your current relationship status?
O Married
O Common Law
O Civil Union
O Commitment Ceremony
O Dating
O Engaged
O Engaged and cohabitating
O Cohabitating but uncommitted
O Cohabitating but not yet common-law
O Separated
O Divorced
O Multiple Relationships
O Single
O Widowed
O Decline response
O Other: _______
15. Are you currently raising the child(ren) with a partner?
   O Yes
   O No, I am a single parent
   O Decline response
   O Other: __________

16. What sexual orientation do you identify with?
   O Heterosexual (other-sex attracted)
   O Lesbian (same-sex attracted)
   O Bisexual
   O Queer
   O Decline response
   O Other: __________

**Pregnancy Questions**

We would now like to ask you some questions about your most recent pregnancy experience. Please answer these questions to the best of your ability. If you do not wish to respond, please select “Decline Response”.

17. During your most recent pregnancy only, did you have significant problems with pain in any area of your body? By significant, we mean problems with pain that interfere with your daily life.
   O No pain
   O Yes, mild pain
   O Yes, moderate pain
   O Yes, severe pain
   O Decline response

18. You indicated on the previous page that you had pain during your most recent pregnancy. Please select ALL locations where you experienced this pain.
   O Upper back and/or neck
   O Lower back
   O Legs
   O Headache
   O Abdominals
   O Breasts
   O Arms
   O Pelvis
   O Genitals
   O Decline response
   O Other:
Birth Experience Questions

We would now like to ask you some questions about your most recent birth experience. Please answer the following questions to the best of your ability. If you do not want to answer a question, please select "Decline Response".

19. *In what month did you give birth? (Option to select from dropdown list)

20. *How many babies did you deliver at that time?
   O One baby
   O Two babies (twins)
   O Three babies (triplets)
   O Four babies or more
   O Decline response

21. At what gestational age did you give birth?
   Please respond in weeks and days (e.g. 35 weeks, 3 days).
   If you do not wish to respond, please type 999 in the space below.

22. *Who delivered your child(ren)?
   O Doctor
   O Nurse
   O Midwife
   O Spouse
   O Self
   O Other family member
   O Decline response
   O Other: ________

23. *How many live births did you have prior to the delivery on this date?
   O None, this was my first time having a live birth
   O 1
   O 2
   O 3
   O 4 or more
   O Decline response
24. *How much did your baby weigh?  
Please answer this question to the best of your ability using lbs (pounds) and ounces. 
For example: 8 lbs, 2 ounces.  
If you do not wish to respond, please type 999 in the space below.

25. *What kind of delivery did you have?  
O Vaginal delivery  
O Caesarean section (C-section)  
O Both Vaginal delivery and Caesarean section (C-section) (e.g. if you had multiples and gave birth vaginally and then had a C-section)  
O Decline response

25. *Was your labour induced?  
O Yes  
O No  
O Decline response

Questions for Women who had a Vaginal Birth

26. *During your delivery, did your doctor (nurse, midwife, etc.) make a cut to widen your vaginal opening for delivery (called an episiotomy)?  
O Yes  
O No  
O I don't know  
O Decline response

30. *Sometimes when a woman gives birth she will be given pain medications. 
When you gave birth, were you given epidural or spinal pain medications (pain medications given by an injection in the back)?  
O Yes  
O No  
O I don't know  
O Decline response

31. *Sometimes during delivery, instruments such as forceps or a vacuum will be used to help pull the baby out. This is also known as an assisted delivery. 
During your delivery, did the person who delivered your child(ren) use forceps or vacuum extraction to help pull the baby out?  
O Yes  
O No  
O I don't know  
O Decline response

32. Sometimes during delivery, a woman will experience a tear in her vagina or perineum (area between vagina and anus).  
During your delivery, did you experience a tear in the vagina or in the perineum?  
O Yes  
O No  
O I don't know  
O Decline response
33. *What was the degree of the tear?
O First Degree - Superficial tear involving the perineal (area between vagina and anus) or vaginal skin only
O Second Degree - Perineal (area between vagina and anus) skin and/or vaginal skin and muscles torn but intact anal sphincter
O Third or Fourth Degree - Perineal (area between vagina and anus) skin and/or vaginal skin, muscles, and anal sphincter torn
O I don't know
O Decline response

34. *Did you require suturing (stitches) for the tear?
O Yes
O No
O I don't know
O Decline response

Questions for Women who had a C-section

35. *For some women, a Caesarean section (C-section) will be scheduled in advance. Was your C-section planned in advanced?
O Yes
O No
O Decline response

36. *Some women will choose to have a C-section in advance. Did you choose to have the C-section in advance?
O Yes
O No
O Decline response

37. Sometimes there are reasons why a woman should not give birth vaginally and therefore the C-section will be planned in advance. Why was your C-section planned in advance?
Please select all that apply.

O The baby (or babies) were breech (feet or bottom-first) position in the womb
O The baby (or babies) were transverse (sideways) position in the womb
O The baby (or babies) had certain birth defects, such as severe hydrocephalus (also known as "water in the brain")
O There were problems with the placenta, such as placenta previa (when the placenta sits too low in the uterus and covers the cervix)
O You have a medical condition that could make vaginal delivery risky for yourself or the baby (such as HIV or an active case of genital herpes)
O You previously had surgery on your uterus or a previous C-section
O I don't know
O Decline response
O Other (please specify): __________
38. *Some women will have to undergo an emergency C-section that was not planned in advance. Was your C-section considered an emergency C-section?
   O Yes
   O No
   O Decline response

39. There are different reasons why a woman will have to have an emergency C-section. Why was your C-section an emergency? Please select all that apply.
   O Your labour stopped or wasn't progressing as it should (and medications weren't helping)
   O The placenta separated from the uterine wall too soon (called placental abruption)
   O The umbilical cord became pinched (which could affect the baby's oxygen) or entered the birth canal before the baby (called umbilical cord prolapse)
   O The baby was in fetal distress (e.g., the baby's heart rate changed meaning that it wasn't getting enough oxygen)
   O The baby's head or entire body was too big to fit through the birth canal
   O I don't know
   O Decline response
   O Other (please specify): ______________________

40. *Some women will first try to give birth vaginally and go through labour and pushing before they have a C-section. Did you try to give birth vaginally before the C-section?
   O Yes
   O No
   O I don't know
   O Decline response

41. *How long were you in labour (trying to give birth vaginally) before the C-section?
   O Less than 1 hour
   O 1 - 6 hours
   O More than 6 hours
   O I don't know
   O Decline response

42. *Sometimes during a vaginal delivery, a woman will experience a tear in her vagina or perineum (area between vagina and anus) from pushing. Did you experience a tear while pushing in labour before the C-section?
   O Yes
   O No
   O I don't know
   O Decline response
43. *What was the degree of the tear?
   O First Degree - superficial tear involving the perineal (area between vagina and anus) or vaginal skin only
   O Second Degree - perineal (area between vagina and anus) skin and/or vaginal skin and muscles torn, but intact anal sphincter
   O Third or Fourth Degree - perineal (area between vagina and anus) skin and/or vaginal skin, muscles, and anal sphincter torn
   O I don't know
   O Decline response

44. *Did you require suturing (stitches) for the tear?
   O Yes
   O No
   O I don't know
   O Decline response

45. *Sometimes during a C-section, a woman will be put in a medically induced coma (or sleep) so that she is not awake for the surgery. This is also known as general anesthesia. Was your C-section performed under general anesthesia?
   O Yes
   O No
   O I don't know
   O Decline response

46. *There are different types of cuts (or incisions) that will be made in order to get the baby out during a C-section. Was the cut vertical (from the bellybutton down to the pubic hair line) or horizontal (1-2 inches above the pubic hairline, sometimes called a "bikini cut")?
   O Vertical
   O Horizontal
   O I don't know
   O Decline response

47. *We are interested in learning the length of your incision (cut). If you have a ruler or measuring tape near you, will you please measure the length of your scar from the incision of your cesarean section. How long is the scar? (If you do not have a measuring instrument around you, please estimate). Please indicate whether you are measuring in inches OR centimeters. If you do not wish to respond, please type 999 in the space below.
Pregnancy and Labour/Delivery Complications

48. *What complications, if any, did you have during your pregnancy? Please select all that apply.
   O I did not have any complications
   O Anemia
   O High blood pressure/ hypertension
   O Pre-eclampsia (high blood pressure and protein in urine)
   O Gestational diabetes
   O Cholestatis
   O Preterm birth
   O Decline response
   O Other (please specify): _____________

49. What complications, if any, did you experience during your labour and delivery? Please select all that apply.
   O I did not experience any complications
   O Failure to Progress (prolonged labour)
   O Abnormal Presentation (presentation refers to the position of the fetus in your womb, abnormal presentation would be anything not head first, facing mother’s back)
   O Umbilical Cord Prolapse (when the umbilical cord comes out before the baby)
   O Umbilical Cord Compression (involves the obstruction of blood flow through the umbilical cord due to pressure from an external object or misalignment of the cord)
   O Fetal Distress (when the baby is unwell or distressed during labour or delivery)
   O Decline response
   O Other (please specify): _________________
50. (For VB) Most women will experience some form of pain right after they give birth. We are interested in looking at the genital and/or pelvic pain that a woman experiences after she gives birth.

On the following scale from 0 to 10, please rate the average intensity of the genital and/or pelvic pain immediately after delivery (within the first day).

No pain 0 1 2 3 4 5 6 7 8 Worst Pain Ever 9 10 Decline response

51. (For CS) Most women will experience some form of pain right after they give birth. We are interested in looking at the genital and/or pelvic pain and/or pain at the site of incision from your C-section that a woman experiences after she gives birth.

On the following scale from 0 to 10, please rate the average intensity of the genital and/or pelvic pain immediately after delivery (within the first day).

No pain 0 1 2 3 4 5 6 7 8 Worst Pain Ever 9 10 Decline response

Most women experience some kind of pain following childbirth, but this pain usually goes away quickly. For some women, this pain lasts for longer.

We are interested in knowing whether you are still experiencing pain since you gave birth.

52. Are you currently experiencing pain?
O Yes
O No
O decline response

53. On the following scale from 0 to 10 please rate the average intensity of your current genital and/or pelvic pain and/or pain at site of incision that you experience

No pain 0 1 2 3 4 5 6 7 8 Worst Pain Ever 9 10 Decline response

54. When did you stop having this pain? (Shown to women who reported that they were not currently experiencing pain)
O I never experienced pain after giving birth
O Within 1 day of giving birth
O Within 1 - 7 days after giving birth
O Between 1 – 4 weeks after giving birth
O Between 1 – 2 months after giving birth
O I don’t know
O Decline response
O Other: __________
**The drawings referred to are displayed in the current thesis**
Please use the drawings below to describe where you experience pain.

55. Do you regularly feel pain in the following areas?
   - On the vulva
   - At the vaginal opening
   - Inside the vagina
   - In the pelvic or abdominal region
   - At the site of incision (for women who have had a C-section)
   - Decline Response
   - Other (please specify): ________

56. You indicated that you experience pain on the vulva.
   Please select all the areas on the vulva where you experience pain.
   If you feel pain all over the vulva, select everywhere.
   - Mons Pubis
   - Clitoris
   - Labia Majora
   - Labia Minora
   - Urethral Opening
   - Vestibule
   - Vaginal Opening
   - Perineum
   - Everywhere
   - Decline Response
   - Other (please specify): ________

57. You indicated that you experience pain in the pelvic or abdominal region.
   Please describe where you experience this pain.
   If you do not wish to respond, type 999 in the space below.

58. Did you regularly feel pain in the following areas? Please select all that apply.
   - On the vulva
   - At the vaginal opening
   - Inside the vagina
   - In the pelvic or abdominal region
   - At the site of incision (for women who have had a C-section)
   - Decline response
   - Other (please specify): ____________
61. Since you gave birth, have you regularly experienced genital and/or pelvic pain during or after the following situations? By regularly, we mean most times (over half) that you engage in the activity listed below.
If you do not wish to respond, please select “Decline Response”.
If the question is not applicable to you, e.g., menstruation (your period), but you have not resumed your period since you gave birth, please select “n/a”

<table>
<thead>
<tr>
<th>Activity</th>
<th>Genital/and or pelvic Pain DURING Activity</th>
<th>Genital/and or pelvic Pain AFTER Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Sitting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wearing tight pants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinating after intercourse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinating in general</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Menstruation (your period)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inserting a tampon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Removing a tampon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>During a gynecological exam when the doctor inserts a speculum (a long medical tool used to see inside the vagina)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>During a gynecological exam when the doctor takes a swab of the vagina and/or the cervix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>During a gynecological exam when the doctor inserts 1 and/or 2 fingers and palpates the ovaries (applies pressure with the other hand on your lower stomach)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masturbating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A partner stimulating you manually (with fingers or hand without insertion)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A partner stimulating you orally (with mouth or tongue)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finger or dildo/vibrator insertion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal penetration with a penis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
62. Please list any other situations DURING which you regularly experience genital or pelvic pain since you gave birth (including physical activities or sports).
If you do not experience pain during other activities, please type NO in the space below.
If you do not wish to respond, please type 999 in the space below.

63. Please list any situations AFTER which you regularly experience genital or pelvic pain since you gave birth (including physical activities or sports).
If you do not experience pain after other activities, please type NO in the space below.
If you do not wish to respond, please type 999 in the space below.

64. Since you gave birth, have you experienced unprovoked (i.e., without engaging in any of the activities listed above, also known as spontaneous) genital and/or pelvic pain and/or pain at the site of incision (for C-sections) that was not related to any specific activity?
O Yes
O No
O Decline response

65. Where have you experienced this unprovoked (i.e., without engaging in activity) or spontaneous pain that was not related to any specific area?
Please select all that apply
O In the genital (vulvar) area
O In the pelvic area
O At the site of incision
O Decline response

66. *Do you currently experience this unprovoked or spontaneous genital and/or pelvic pain and/or pain at the site of incision (for women who have had C-sections)?
O Yes
O No
O Decline response

Lots of women will experience pain in many different areas. For the next sections we would like you to answer the questions regarding the area of pain that you consider to be the most painful.

67. *Using the drawings, please list the area that you consider to be the most painful.
If you do not wish to respond, please type 999 in the space below.
**Short Form McGill Pain Questionnaire**

The next section provides you with a list of words that describes some of the different qualities of pain and related symptoms. Please indicate the number that best describes the intensity of the pain and related symptoms you felt during the past week.

Use 0 if the word does not describe your pain or related symptoms. Please refer to the pain that you listed on the previous page (i.e. your most painful area)

<table>
<thead>
<tr>
<th></th>
<th>Throbbing Pain</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
<td>Decline</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>response</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Shooting Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Stabbing Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Sharp Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Cramping Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Gnawing Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Hot burning Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Aching Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Heavy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Tender</td>
</tr>
<tr>
<td>---</td>
<td>--------</td>
</tr>
<tr>
<td>78.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Splitting pain</th>
<th>None</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>79.</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Tiring-exhausting</th>
<th>None</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>80.</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Sickening</th>
<th>None</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>81.</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Fearful</th>
<th>None</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>82.</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Punishing-cruel</th>
<th>None</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>83.</td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
91. Since you gave birth, have you begun to regularly accidentally leak urine (experience stress incontinence), for example, while laughing or coughing?
   O Yes
   O No
   O Decline response

92. Since you gave birth, have you started menstruating (having your period again)?
   O Yes
   O No
   O Decline response

93. How is/was your baby fed?
   O Exclusively breastfed from the breast
   O Bottle-fed with breast milk
   O Fed from the breast and bottle-fed with breast milk
   O Fed from the breast and bottle-fed with formula
   O Exclusively bottle-fed with formula
   O Decline response
   O Other: ___________

94. Are you currently breastfeeding?
   O Yes
   O No
   O Decline response

We are interested in learning about your health before you became pregnant.
97. Have you ever been diagnosed with a chronic health condition or disease?
   Not including chronic pain conditions.
   O Yes
   O No
   O Decline response

98. Please list all of the chronic conditions and/or diseases you have been diagnosed with. If you do not wish to respond, please type 999 in the space below.
   Not including chronic pain conditions.

99. Have you ever been diagnosed with any chronic pain condition?
   O Yes
   O No
   O Decline response

100. What chronic pain condition(s) have you been diagnosed with? Please list all.
    If you do not wish to respond, please type 999 in the space below.
101. In general, would you say your health is:
O Excellent
O Very good
O Good
O Fair
O Poor
O Decline response

102. Compared to one year ago, how would you rate your health in general now?
O Much better now than one year ago
O Somewhat better now than one year ago
O About the same
O Somewhat worse now than one year ago
O Decline response

103. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes, limited a lot</th>
<th>Yes, limited a little</th>
<th>No, not limited at all</th>
<th>Not applicable</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vigorous activities, such as running, lifting heavy objects, participating in strenuous activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate activities, as moving a table, pushing a vacuum cleaner, bowling or playing gold</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifting or carrying groceries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climbing several flights of stairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climbing one flight of stairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bending, kneeling, or stooping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking more than a mile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking several blocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathing or dressing yourself</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
104. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Not applicable</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut down the amount of time you spent on work or other activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accomplished less than you would like</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Didn’t do work or other activities as carefully as possible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

105. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

O Not at all
O Slightly
O Moderately
O Quite a bit
O Extremely
O Not applicable
O Decline response

106. How much bodily pain have you had during the past 4 weeks?

O None
O Very mild
O Moderate
O Severe
O Very Severe
O Not applicable
O Decline response

107. During the past 4 weeks, how much did the pain interfere with your normal work (both work outside the home and housework)?

O Not at all
O Slightly
O Moderately
O Quite a bit
O Extremely
O Not applicable
O Decline response
106. How much bodily pain have you had during the past 4 weeks?
O None
O Very mild
O Moderate
O Severe
O Very severe
O Not applicable
O Decline response

107. During the past 4 weeks, how much did the pain interfere with your normal work (both work outside the home and housework)?
O Not at all
O Slightly
O Moderately
O Quite a bit
O Extremely

108. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?
O All of the time
O Most of the time
O Some of the time
O A little of the time
O None of the time
O Not applicable
O Decline response

109. How TRUE or FALSE is each of these statements for you?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Definitely true</th>
<th>Mostly true</th>
<th>Don’t know</th>
<th>Mostly false</th>
<th>Definitely false</th>
<th>N/a</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>I seem to get sicker a lot easier than other people</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am as healthy as anybody I know</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I expect my health to get worse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My health is excellent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pain Catastrophizing Scale

For PPP Group
Everyone experiences physically painful situations at some point in their lives. Such experiences may include headaches, dental procedures, or surgery. People are often exposed to situations that may cause pain such as illness, injury, dental procedures, or surgery.

We are interested in the types of thoughts and feelings that you have when you are in pain. Specifically, we are interested in the types of thoughts and feelings that you have when you experience your worst pelvic and/or genital pain and/or pain at the site of incision (from a C-section). Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing your worst pain in the pelvic and/or genital region and/or at the site of incision from a C-section.

For APP Group
Everyone experiences physically painful situations at some point in their lives. Such experiences may include headaches, tooth pain, joint or muscle pain. People are often exposed to situations that may cause pain such as illness, injury, dental procedures, or surgery.

We are interested in the types of thoughts and feelings that you have when you are in pain. Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.
<table>
<thead>
<tr>
<th>111. When I am in pain....</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>a) I worry all the time about whether the pain will end</td>
</tr>
<tr>
<td>b) I feel I can’t go on</td>
</tr>
<tr>
<td>c) It’s terrible and I think it’s never going to get better</td>
</tr>
<tr>
<td>d) It’s awful and I feel that it overwhelms me</td>
</tr>
<tr>
<td>e) I feel I can’t stand it anymore</td>
</tr>
<tr>
<td>f) I become afraid that the pain will get worse</td>
</tr>
<tr>
<td>g) I keep thinking of other painful events</td>
</tr>
<tr>
<td>h) I anxiously want the pain to go away</td>
</tr>
<tr>
<td>i) I can’t seem to keep it out of my mind</td>
</tr>
<tr>
<td>j) I keep thinking about how much it hurts</td>
</tr>
<tr>
<td>k) I keep thinking about how badly I want the pain to stop</td>
</tr>
<tr>
<td>l) There’s nothing I can do to reduce the intensity of the pain</td>
</tr>
<tr>
<td>m) I wonder whether something serious may happen</td>
</tr>
</tbody>
</table>
Multidimensional Scale of Perceived Social Support

112. We are interested in knowing about your connection with the people who you care about. Read each statement carefully. Indicate how you feel about each statement

<table>
<thead>
<tr>
<th></th>
<th>Very strongly disagree</th>
<th>Strongly disagree</th>
<th>Mildly disagree</th>
<th>Neutral</th>
<th>Mildly agree</th>
<th>Strongly agree</th>
<th>Very strongly agree</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) There is a special person who is around when I am in need</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) There is a special person whom I can share my joys and sorrows</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) My family really tries to help me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) I get the emotional help and support I need from my family</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) I have a special person who is a real source of comfort to me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) My friends really try to help me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) I can count on my friends when things go wrong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) I can talk about my problems with my family</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) I have friends with whom I can share my joys and sorrows</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j) There is a special person in my life who cares about my feelings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>k) My family is willing to help me make decisions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>l) I can talk about my problems with my friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Edinburgh Postnatal Depression Scale

For the next section, we would like to know how you are feeling. Please check the answer that comes closest to how you have felt in the past 7 days, not just how you feel today.

113. In the past 7 days:
I have been able to laugh and see the funny side of things
O As much as I always could
O Not quite so much now
O Definitely not so much now
O Not at all
O Decline response

114. In the past 7 days:
I have looked forward with enjoyment to things
O As much as I ever did
O Rather less than I used to
O Definitely less than I used to
O Hardly at all
O Decline response

115. In the past 7 days
I have blamed myself unnecessarily when things went wrong
O Yes, most of the time
O Yes, some of the time
O Not very often
O No, never
O Decline response

116. In the past 7 days:
I have been anxious or worried for no good reason
O No, not at all
O Hardly ever
O Yes, sometimes
O Yes, very often
O Decline response

117. In the past 7 days:
I have felt scared or panicky for no good reason.
O Yes, quite a lot
O Yes, sometimes
O No, not much
O No, not at all
O Decline response

118. In the past 7 days:
Things have been getting on top of me
O Yes, most of the time I haven't been able to cope at all
O Yes, sometimes I haven't been coping as well as usual
O No, most of the time I have coped quite as well
O No, I have been coping as well as ever
O Decline response
119. In the past 7 days:
I have been so unhappy that I have had difficulty sleeping
O Yes, most of the time
O Yes, sometimes
O Not very often
O No, not at all
O Decline response

120. In the past 7 days:
I have felt sad or miserable
O Yes, most of the time
O Yes, quite often
O Not very often
O No, not at all
O Decline response

121. In the past 7 days:
I have been so unhappy that I have been crying
O Yes, most of the time
O Yes, quite often
O Not very often
O No, not at all
O Decline response

122. In the past 7 days:
The thought of harming myself has occurred to me.
O Yes, quite often
O Sometimes
O Hardly ever
O Never
O Decline response
123. In the past 4 weeks, have you engaged in either:

SEXUAL ACTIVITY which can include caressing, foreplay, masturbation and vaginal intercourse and/or
SEXUAL INTERCOURSE defined as receiving vaginal/anal penetration with penis, fingers or sex toys or penetrating your partner's vagina/anus with fingers or sex toys.

O Yes (only women who responded YES received FSFI)
O No
O Decline response

Female Sexual Function Index

INSTRUCTIONS: These questions ask about your sexual feelings and responses during the past 4 weeks. Please answer the following questions as honestly and clearly as possible. Your responses will be kept completely confidential. In answering these questions the following definitions apply:

Sex, sexual activity, lovemaking, and foreplay refer to:
- caressing, kissing, manual stimulation of the genitals/anus/breasts by yourself or your partner
- oral stimulation of the genitals/anus/breasts
- vaginal or anal penetration with penis, fingers, or sex toys

Sexual intercourse refers to:
- penetration of your partner's vagina/anus with fingers or sex toys
- receiving vaginal/anal penetration with penis, fingers, or sex toys

Sexual stimulation refers to sexual situations such as the following:
- foreplay with your partner, stimulating your partner, receiving stimulation from your partner
- self-stimulation (masturbation), sexual fantasy
- viewing erotic films, pictures, or reading erotic material

Sexual desire or interest is a feeling that includes wanting to have a sexual experience, feeling receptive to a partner’s sexual initiation, and thinking or fantasizing about having sex.

124. Over the past 4 weeks, how often did you feel sexual desire or interest?
O Almost always or always
O Most times (more than half the time)
O Sometimes (about half the time)
O A few times (less than half the time)
O Almost never or never
O Decline Response

125. Over the past 4 weeks, how would you rate your level (degree) of sexual desire or interest?
O Very high
O High
O Moderate
O Low
O Very low or none at all
O Decline Response
Sexual arousal is a feeling that includes both physical and mental aspects of sexual excitement. It may include feelings of warmth or tingling in the genitals, lubrication (wetness), or muscle contractions.

126. Over the past 4 weeks, how often did you feel sexually aroused ("turned on") during sexual activity or intercourse?
- No sexual activity
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never
- Decline Response

127. Over the past 4 weeks, how would you rate your level of sexual arousal ("turn on") during sexual activity or intercourse?
- No sexual activity
- Very high
- High
- Moderate
- Low
- Very low or none at all
- Decline Response

128. Over the past 4 weeks, how confident were you about becoming sexually aroused during sexual activity or intercourse?
- No sexual activity
- Very high confidence
- High confidence
- Moderate confidence
- Low confidence
- Very low or no confidence
- Decline Response

129. Over the past 4 weeks, how often have you been satisfied with your arousal (excitement) during sexual activity or intercourse?
- No sexual activity
- Almost always or always
- Most times (more than half the time)
- Sometimes (about half the time)
- A few times (less than half the time)
- Almost never or never
- Decline response
130. Over the past 4 weeks, how often did you become lubricated ("wet") during sexual activity or intercourse?
O No sexual activity
O Almost always or always
O Most times (more than half the time)
O Sometimes (about half the time)
O A few times (less than half the time)
O Almost never or never
O Decline response

131. Over the past 4 weeks, how difficult was it to become lubricated ("wet") during sexual activity or intercourse?
O No sexual activity
O Extremely difficult or impossible
O Very difficult
O Difficult
O Slight difficult
O Not difficult
O Decline response

132. Over the past 4 weeks, how often did you maintain your lubrication ("wetness") until completion of sexual activity or intercourse?
O No sexual activity
O Almost always or always
O Most times (more than half the time)
O Sometimes (about half the time)
O A few times (less than half the time)
O Almost never or never
O Decline response

133. Over the past 4 weeks, how difficult was it for you to maintain your lubrication ("wetness") until completion of sexual activity or intercourse?
O No sexual activity
O Extremely difficult or impossible
O Very difficult
O Difficult
O Slightly difficult
O Not difficult
O Decline response

134. Over the past 4 weeks, when you had sexual stimulation or intercourse, how often did you reach orgasm (climax)?
O No sexual activity
O Almost always or always
O Most times (more than half the time)
O Sometimes (about half the time)
O A few times (less than half the time)
O Almost never or never
O Decline response
135. Over the past 4 weeks when you had sexual stimulation or intercourse, how difficult was it for you to reach orgasm (climax)?
- O No sexual activity
- O Extremely difficult
- O Very difficult
- O Difficult
- O Slightly difficult
- O Not difficult
- O Decline response

136. *Over the past 4 weeks, how satisfied were you with your ability to reach orgasm (climax) during sexual activity or intercourse?
- O No sexual activity
- O Very satisfied
- O Moderately satisfied
- O About equally satisfied and dissatisfied
- O Moderately dissatisfied
- O Very dissatisfied
- O Decline response

137. Over the past 4 weeks, how satisfied have you been with the amount of emotional closeness during sexual activity between you and your partner?
- O No sexual activity
- O Very satisfied
- O Moderately satisfied
- O About equally satisfied and dissatisfied
- O Moderately dissatisfied
- O Very dissatisfied
- O Decline response

138. Over the past 4 weeks, how satisfied have you been with your sexual relationship with your partner?
- O Very satisfied
- O Moderately satisfied
- O About equally satisfied and dissatisfied
- O Moderately dissatisfied
- O Very dissatisfied
- O Decline response

139. *Over the past 4 weeks, how satisfied have you been with your overall sexual life?
- O Very satisfied
- O Moderately satisfied
- O About equally satisfied and dissatisfied
- O Moderately dissatisfied
- O Very dissatisfied
- O Decline response
140. Over the past 4 weeks, how often did you experience discomfort or pain during vaginal penetration?
O Did not attempt intercourse
O Almost always or always
O Most times (more than half the time)
O Sometimes (about half the time)
O A few times (less than half the time)
O Almost never or never
O Decline response

141. Over the past 4 weeks, how often did you experience discomfort or pain following vaginal penetration?
O Did not attempt intercourse
O Almost always or always
O Most times (more than half the time)
O Sometimes (about half the time)
O A few times (less than half the time)
O Almost never or never
O Decline response

142. Over the past 4 weeks, how would you rate your level (degree) of discomfort or pain during or following vaginal intercourse?
O Did not attempt intercourse
O Very high
O High
O Moderate
O Low
O Very low or none at all
O Decline response
Sexual Desire Inventory

These next questions ask about your level of sexual desire. By desire, we mean interest in or wish for sexual activity. For each item, please select the number that best shows your thoughts and feelings.

143. During the last month, HOW OFTEN would you have LIKED TO engage in sexual activity with a partner (for example, touching each other’s genitals, giving or receiving oral stimulation, intercourse, etc.)?
   O Not at all
   O Once a month
   O Once every two weeks
   O Once a week
   O Twice a week
   O 3-4 times a week
   O Once a day
   O More than once a day
   O Decline response

144. During the last month, HOW OFTEN have you had sexual thoughts involving a partner?
   O Not at all
   O Once a month
   O Once every two weeks
   O Once a week
   O Twice a week
   O 3-4 times a week
   O Once a day
   O More than once a day
   O Decline response

145. When you have had sexual thoughts HOW STRONG is your desire to engage in sexual behaviour with a partner?

<table>
<thead>
<tr>
<th>No Desire</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Decline response</th>
</tr>
</thead>
</table>

146. When you first see an attractive person, HOW STRONG is your sexual desire?

<table>
<thead>
<tr>
<th>No Desire</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Decline response</th>
</tr>
</thead>
</table>

147. When you are in romantic situations (such as candle-lit dinner, a walk on the beach, etc.) HOW STRONG is your sexual desire?

<table>
<thead>
<tr>
<th>No Desire</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Decline response</th>
</tr>
</thead>
</table>
148. When you spend time with an attractive person (for example, at work or school) HOW STRONG is your sexual desire?

<table>
<thead>
<tr>
<th>No Desire</th>
<th>Strong Desire</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7</td>
<td>8</td>
<td>response</td>
</tr>
</tbody>
</table>

149. HOW STRONG is your desire to engage in sexual activity with a partner?

<table>
<thead>
<tr>
<th>No Desire</th>
<th>Strong Desire</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7</td>
<td>8</td>
<td>response</td>
</tr>
</tbody>
</table>

150. How IMPORTANT is it for you to fulfill your sexual desire through activity with a partner?

<table>
<thead>
<tr>
<th>Not at all Important</th>
<th>Extremely Important</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7</td>
<td>8</td>
<td>response</td>
</tr>
</tbody>
</table>

151. Compared to other people your age and sex, how would you rate your desire to behave sexually with a partner?

<table>
<thead>
<tr>
<th>Much less desire</th>
<th>Much more desire</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7</td>
<td>8</td>
<td>response</td>
</tr>
</tbody>
</table>

152. * During the last month, HOW OFTEN would you have LIKED to behave sexually by yourself (for example, masturbating, touching your genitals, etc.)

- O Not at all
- O Once a month
- O Once every two weeks
- O Once a week
- O Twice a week
- O 3-4 times a week
- O Once a day
- O More than once a day
- O Decline response

153. *HOW STRONG is your desire to engage in sexual behaviour by yourself?

<table>
<thead>
<tr>
<th>No Desire</th>
<th>Strong Desire</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7</td>
<td>8</td>
<td>response</td>
</tr>
</tbody>
</table>
154. *HOW IMPORTANT is it for you to fulfill your desires to behave sexually by yourself?*

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Extremely Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

**Decline response**

155. *Compared to other people of your age and sex, how would you rate your desire to behave sexually by yourself?*

<table>
<thead>
<tr>
<th>Much less desire</th>
<th>Much more Desire</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

**Decline response**

156. HOW LONG could you go comfortably without having sexual activity of some kind?

- O Forever
- O A year or two
- O Several months
- O A month
- O A few weeks
- O A week
- O A few days
- O One day
- O Less than one day
- O Decline response
Relationship Assessment Scale
Only presented to women who indicated that they were currently in a relationship

Please indicate the number for each item which best answers that item for you.

157. How well does your partner meet your needs?

<table>
<thead>
<tr>
<th>Poorly</th>
<th>Average</th>
<th>Extremely well</th>
<th>Decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

158. In general, how satisfied are you with your relationship?

<table>
<thead>
<tr>
<th>Unsatisfied</th>
<th>Average</th>
<th>Extremely satisfied</th>
<th>Decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

159. How good is your relationship compared to most?

<table>
<thead>
<tr>
<th>Poor</th>
<th>Average</th>
<th>Excellent</th>
<th>Decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

160. How often do you wish you hadn't gotten into this relationship?

<table>
<thead>
<tr>
<th>Never</th>
<th>Average</th>
<th>Very often</th>
<th>Decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

161. To what extent has this relationship met your original expectations?

<table>
<thead>
<tr>
<th>Hardly at all</th>
<th>Average</th>
<th>Completely</th>
<th>Decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

162. How much do you love your partner?

<table>
<thead>
<tr>
<th>Not much</th>
<th>Average</th>
<th>Very much</th>
<th>Decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

163. *How many problems are there in your relationship?

<table>
<thead>
<tr>
<th>Very few</th>
<th>Average</th>
<th>Very many</th>
<th>Decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

178
Fatigue Symptom Checklist

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Yes</th>
<th>No</th>
<th>Decline response</th>
</tr>
</thead>
<tbody>
<tr>
<td>My head feels heavy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My body feels tired</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My legs feel tired</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I yawn a lot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My brain feels hot and muddled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am drowsy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My eyes feel strained (tired)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My movements are rigid or clumsy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am unsteady when standing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I want to lie down</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It’s difficult to think</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I get weary talking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am nervous</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can’t concentrate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am unable to get interested in things</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am apt to forget things</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I lack self-confidence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I’m anxious about things</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can’t straighten my posture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I lack patience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have a headache</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My shoulders feel stiff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My back hurts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It’s hard to breathe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I’m thirsty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My voice is husky</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel dizzy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My eyes twitch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My legs or arms tremble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel ill</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix F
Debriefing Form

THANK YOU! You are now done the survey.

The purpose of the study is to determine the risk factors and protective factors for acute and persistent postpartum pain and to investigate postpartum sexual functioning and how it is impacted by pain and other variables such as stress and fatigue. The information gathered from this study could potentially have implications for the future of pregnancy and postpartum care. This study was conducted for educational purposes. We recruited women who had given birth within the past 12 months. All participants were over the age of 18 and were fluent in English.

As stated previously, all information that you provided throughout the study is confidential. The research team members working directly on this project are the only individuals who have access to your responses, and they will not link your name with your responses. If you provide your e-mail address or phone number for the monthly prize draw, your e-mail address will not be linked to the data you provided. Your data and e-mail address are saved in two different databases. If you provide your e-mail address, it will only be used to contact you in the case that you win a monthly prize draw.

Thank you for your participation in this study; it is greatly appreciated. Should you have any further questions, comments or concerns or wish to obtain more information, such as resulting publications, please do not hesitate to contact the Sexual Health Research Laboratory at (613) 533-3276 or SHRL@queensu.ca or Dr. Caroline Pukall (phone: (613)533-3200; e-mail: caroline.pukall@queensu.ca). Any ethical concerns about the study may be directed to the Chair of the General Ethics Board at chair.GREB@queensu.ca or (613) 533-6081. If you would like more information about postpartum physical, mental, and sexual health, please visit the following websites or contact our research team.

Postpartum Support International: http://www.postpartum.net
Center for Postpartum Health: http://www.postpartumhealth.com
Motherisk: http://www.motherisk.org/women/index.jsp
Mayo Clinic on Labour, Delivery, and Postpartum Care: http://www.mayoclinic.com/health/labor-and-delivery/MY003300
## Table 1

### Activities of Daily Living that Trigger Pain

<table>
<thead>
<tr>
<th>Activity</th>
<th>During Activity</th>
<th>After Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal penetration with penis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>28 (63.6%)</td>
<td>24 (54.5%)</td>
</tr>
<tr>
<td>N/A</td>
<td>5 (11.4%)</td>
<td>5 (11.4%)</td>
</tr>
<tr>
<td>During a Gynecological exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When speculum is inserted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>25 (56.8%)</td>
<td>14 (31.8%)</td>
</tr>
<tr>
<td>N/A</td>
<td>11 (25.0%)</td>
<td>12 (27.3%)</td>
</tr>
<tr>
<td>When cervix is swabbed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>19 (43.2%)</td>
<td>11 (25.0%)</td>
</tr>
<tr>
<td>N/A</td>
<td>13 (29.5%)</td>
<td>183 (29.5%)</td>
</tr>
<tr>
<td>When ovaries are palpated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>17 (38.6%)</td>
<td>10 (22.7%)</td>
</tr>
<tr>
<td>N/A</td>
<td>16 (36.4%)</td>
<td>17 (38.6%)</td>
</tr>
<tr>
<td>Finger or vibrator insertion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13 (29.5%)</td>
<td>9 (20.5%)</td>
</tr>
<tr>
<td>N/A</td>
<td>15 (34.1%)</td>
<td>15 (34.1%)</td>
</tr>
<tr>
<td>Walking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12 (27.3%)</td>
<td>14 (31.8%)</td>
</tr>
<tr>
<td>Sitting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>11 (25.0%)</td>
<td>8 (18.2%)</td>
</tr>
<tr>
<td>Partner manually stimulating you</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10 (22.7%)</td>
<td>6 (13.6%)</td>
</tr>
<tr>
<td>N/A</td>
<td>7 (15.9%)</td>
<td>7 (15.9%)</td>
</tr>
<tr>
<td>Menstruating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8 (16.4%)</td>
<td>3 (6.8%)</td>
</tr>
<tr>
<td>N/A</td>
<td>26 (59.1%)</td>
<td>26 (59.1%)</td>
</tr>
<tr>
<td>Wearing tight pants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6 (13.6%)</td>
<td>4 (9.1%)</td>
</tr>
<tr>
<td>N/A</td>
<td>3 (6.8%)</td>
<td>3 (6.8%)</td>
</tr>
<tr>
<td>Urinating after intercourse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>5 (11.4%)</td>
<td>5 (11.4%)</td>
</tr>
<tr>
<td>N/A</td>
<td>6 (13.6%)</td>
<td>6 (13.6%)</td>
</tr>
<tr>
<td>Inserting tampon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4 (9.1%)</td>
<td>3 (6.8%)</td>
</tr>
<tr>
<td>Activity</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Removing a tampon</td>
<td>29 (65.9%)</td>
<td>3 (6.8%)</td>
</tr>
<tr>
<td>Masturbating</td>
<td>28 (63.6%)</td>
<td>3 (6.8%)</td>
</tr>
<tr>
<td>Urinating in general</td>
<td>13 (29.5%)</td>
<td>2 (4.5%)</td>
</tr>
<tr>
<td>Partner stimulating you orally</td>
<td>17 (38.6%)</td>
<td>2 (4.5%)</td>
</tr>
</tbody>
</table>