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Intimate partner violence as a risk factor for postpartum depression among Canadian women in the Maternity Experience Survey

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Abstract

Purpose—Intimate partner violence is a worldwide public health concern predominantly affecting women of reproductive age. The purpose of this study was to evaluate the effect of exposure to intimate partner violence before, during or after pregnancy on postpartum depression in a nationally representative sample of Canadian women.

Methods—A cross-sectional analysis was performed using data from the Maternity Experience Survey conducted by Statistics Canada in 2006. A population-based sample of 8,542 women 15 years and older who delivered singleton live births was selected from all Canadian provinces and territories; of those, 6,421 completed a computer-assisted telephone interview. Recent experiences with and threats of physical or sexual violence by an intimate partner were examined in relation to postpartum depression assessed through the Edinburgh Postpartum Depression Scale.

Results—The prevalence of postpartum depression was 7.5% (95% CI: 6.8, 8.2). Controlling for confounders, odds of postpartum depression were significantly higher among women who reported partner violence in the past two years as opposed to those who did not (adjusted OR=1.61; 95% CI: 1.06, 2.45).

Conclusions—Intimate partner violence is positively associated with postpartum depression among Canadian women. Implications for healthcare practice are discussed.

Keywords

postpartum depression; intimate partner violence; pregnancy; survey

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INTRODUCTION

Stressful events and situations are environmental exposures that can decrease host resistance and increase host susceptibility to a wide range of physical and mental health problems. Intimate partner violence is a worldwide public health concern and a chronic stressor that predominantly affects women of reproductive age (1). Stress has been previously conceptualized as an imbalance between environmental demands and individual resources (2–5). Such an imbalance can enhance stress perception and maladaptive emotional response leading either directly or indirectly to adverse health outcomes (6).

The Centers for Disease Control and Prevention (CDC) defines intimate partner violence as “physical violence, sexual violence, threats of physical/sexual violence, and psychological/emotional abuse perpetrated by a current or former spouse, common-law spouse, non-marital dating partners, or boyfriends/girlfriends of the same or opposite sex” (1). Violence perpetrated by an intimate partner has been linked with numerous health sequelae; these include injury (7, 8), disability (9, 10), chronic pain (7, 8, 10–12), arthritis (10), headaches or migraine (10, 12), gastrointestinal signs (7, 8, 10), sexually transmitted infections (7, 8, 12, 13), substance use and abuse (7, 14), social dysfunction (7, 8), insomnia (7, 8), post-traumatic stress disorder (11, 15–18), anxiety (7, 8), suicidal thoughts (12, 19, 20) and depression (11, 21–27).

According to the World Health Organization, depression is the leading cause of disability worldwide among people aged 5 years and older; furthermore, the lifetime prevalence of a major depressive disorder is considerably higher among women (25%) compared to men (10%) (28). Risk factors for depression include substance abuse, chronic physical illness, stressful life events, social isolation, a history of physical or sexual abuse, and a family history of depression (28). Recently, Daniels (25) referred to the association between intimate partner violence and depression as a deadly co-morbidity due to the established risk of homicide and suicide in the presence of both conditions.

The association between intimate partner violence and depression has rarely been examined in the context of pregnancy and the postpartum period. The few recent studies were either limited in sample size, used convenience sampling or did not adjust for important confounders (22, 29–33). Postpartum depression affects 8–20% of women and is a severe mood disorder that mainly occurs in the first four weeks after delivery; it can hamper care-giving and mother-child bonding and may also trigger self-harm in some women (34). Although hormonal factors have been shown to influence the risk of postpartum depression, the etiology of this condition appears to be multi-factorial. Socio-behavioural factors that have been linked with postpartum depression include personal and family history of mood disorders, young age, unmarried status, low socioeconomic status, stressful situation during pregnancy, low social support, unplanned pregnancy, use of cigarettes, alcohol and illicit drugs, and poor relationship with an intimate partner (35); the latter risk factor implies that intimate partner violence may promote or exacerbate postpartum depression. The body of research often failed to specifically measure intimate partner violence; therefore, in many cases, poor relationships with partners may actually represent intimate partner violence.

The purpose of this study was to examine the effect of exposure to intimate partner violence before, during or after pregnancy on postpartum depression in a nationally representative sample of Canadian women. It was hypothesized that women who experienced violence by their partners, husbands or boyfriends in the two years prior to survey administration were more likely than their counterparts to screen positive for postpartum depression.

METHODS

Database

The analysis of this study was based on the Maternity Experience Survey (MES) that was sponsored by the Public Health Agency of Canada and conducted by Statistics Canada in 2006. The MES is the first nationwide survey to assess pregnancy, delivery and postnatal experiences of mothers and their children. The survey sample was selected from the Canadian Census of Population to include women, aged 15 years, who had singleton live births between February 15, 2006 and May, 2006 in the provinces of Canada and between November 1, 2005 and February 1, 2006 in the territories of Canada. A total of 8,542 Canadian women were selected, out of which 6,421 responded to the survey; the response rate was 75.2%. The data were collected using a computer-assisted telephone interview application. The majority of the interviews were conducted between the 5th and 9th month after delivery and each interview lasted 45 minutes, on average. The MES protocol has been previously described elsewhere (36). Briefly, mothers included in the MES sample were mailed an introductory letter that included a brief description of the survey content, a toll-free number and Statistics Canada's website for further details about the survey. Dealing with sensitive topics such as fertility problems, postpartum depression and abuse were part of the training received by MES interviewers. In situations of self-reported abuse, the interviewer provided the respondent with a toll-free number for victims of family violence, upon request.

Measures

The main outcome of the present study was postpartum depression assessed using the Edinburgh Postpartum Depression Scale (EPDS) (37). The scale consisted of 10 questions with four response categories scored from 0 to 3, whereby the highest values represent depressed moods. Mothers who obtained an EPDS total score of 13 or more were labeled as having had postpartum depression (38). Intimate partner violence experienced in the past 2 years, on the other hand, was the main exposure variable in this study. In the MES, it was measured using a set of 10 dichotomous questions (Yes, No) that cover different experiences with physical and sexual violence, including actual assaults and threats and a question about the relationship of the person inflicting the violence to the MES mother. Women who answered positively to at least one of the 10 questions and reported that a husband, a boyfriend or a partner have inflicted the violence were defined to have experienced intimate partner violence. Women reporting violence but from a family member, a friend, an acquaintance, a stranger or others were considered to have experienced non-partner violence, which was further defined as "violence by other family members" and "violence by acquaintances or strangers". Other violence-related variables that were examined were number of violent incidents, intensity of violence during pregnancy and after birth, and

timing of violent incidents in relationship to the pregnancy. No information was available on psychological/emotional forms of abuse. A wide range of known confounders that have been found to be associated with postpartum depression were controlled for in the analysis. Socioeconomic factors, such as maternal level of education, total household income and place of residence, and demographic factors, consisting of immigration status and province of residence, were considered. Information on maternal characteristics including marital status, current age and previous pregnancies were also assessed. Pregnancy-related factors (pregnancy intention, smoking during the third trimester of pregnancy, alcohol intake during pregnancy, health problems during pregnancy, mother's stress level before and during pregnancy, and number of prenatal care visits) were adjusted for as well. Finally, delivery (type of delivery, infant birth weight, infant gestational age) and postpartum (support after birth, mother's current body mass index) factors were also examined. All these variables, with the exception of mother's stress, were directly self-reported by the mother. In the MES, mother's stress level was measured through a set of 13 questions that examined the mother's experience of stressful events in the past 12 months before the birth of her selected child. The answers for these questions were categorised as "Yes" or "No". Consequently, the sum of the "Yes" responses was calculated for each mother to represent her stress level (38).

Statistical analysis

Prevalence of postpartum depression and violence related variables were estimated through population weights. At the bivariate level, differences in the proportion of postpartum depression were assessed among the different levels of partner violence and other known confounders using normalized weights. Odds ratios (OR) using 95% confidence intervals (95% CI) were performed for all variables. Partner violence and all other confounders were considered for a multivariate logistic regression analysis. Adjusted OR and 95% CI were reported for the final model. To account for the complex sampling design, bootstrapping was performed to calculate all the 95% CI estimates. Population weights, normalized weights and bootstrap weights were all created by Statistics Canada and provided with the MES data file. Bootstrapping is used to calculate valid variance estimates in order to accommodate for complex sampling design. All analyses, except for bootstrapping, were conducted using the Statistical Package for Social Sciences (SPSS, version 16.0). Bootstrapping was performed using the Statistical Analysis Software (SAS, version 9.2).

RESULTS

The sample size for the population analyzed in this study was 6,421 weighted to represent 76,508 Canadian women. On average, the MES mother scored 5.3% (95% CI: 5.2–5.4, SD=4.4) on the EDPS. The prevalence of postpartum depression, however, was 7.5% (95% CI: 6.8–8.2). Moreover, a total of 8,373 mothers (11.0%, 95% CI: 10.3–11.8) reported to have had experienced actual or threatened violence in the past 2 years. The characteristics of violence experienced by these women are displayed in Table 1. Over half of them were victimized by a partner and the vast majority reported physical rather than sexual forms of violence. In 43% of these women, violence was limited to one incident. Most victimized mothers (84.3%) experienced the abuse prior to their pregnancy and only a small proportion reported an increase in the violence during their pregnancies or after childbirth. The

prevalence rates of partner and non-partner violence were estimated to be 5.7% (N=4324, 95% CI: 5.1, 6.3) and 5.4% (N=4105, 95% CI: 4.8, 6.0), respectively. For women who experienced partner violence in the past 2 years, almost 18% suffered from postpartum depression as compared to 7% of women who did not experience partner violence (unadjusted OR=3.00; 95% CI: 2.22–4.05). Similarly, the prevalence of postpartum depression was 14% among women who have experienced non-partner violence in the past 2 years and 7% among their counterparts (unadjusted OR=2.18; 95% CI: 1.58, 3.01). Table 2 presents the crude and adjusted associations between violent experiences in the past 2 years and postpartum depression. After adjustment for key confounders, the odds of postpartum depression remained significantly higher among women who experienced violence by a partner (adjusted OR=1.61; 95% CI: 1.06, 2.45). By contrast, violence perpetrated a family member (adjusted OR=1.76; 95% CI: 0.92, 3.34) or by an acquaintance/stranger (adjusted OR=1.41; 95% CI: 0.83, 2.40) were not significantly related to postpartum depression in the multivariate analysis. In the fully adjusted model, other characteristics besides violent experiences were also significantly related to the outcome of interest. Of note, postpartum depression was 4–6 times more frequent among women reporting no, little or some social support after childbirth.

DISCUSSION

In this study, we evaluated the role of intimate partner violence around the time of pregnancy on postpartum depression in a nationally representative sample of Canadian women. The following key results were obtained: (i) 11% of women reported experiencing violence by a husband, boyfriend, life partner, a family member, a friend, an acquaintance or a stranger around the time of their pregnancy; (ii) perpetrators of violence were equally likely to be a partner or a non-partner; (iii) women were at higher risk of experiencing violence prior to a pregnancy rather than intra- or postpartum; (iv) controlling for non-partner forms of violence and other known confounders, partner violence was found to be significantly related to postpartum depression; specifically, the odds of postpartum depression was 60% higher among women who had experienced physical or sexual abuse by a partner as opposed to those who did not experience partner violence; (v) Although not statistically significant, a positive association was observed between postpartum depression and violence perpetrated by a non-partner; (vi) The strength of the association between postpartum depression and lack of social support after childbirth was considerably higher than that of the association between postpartum depression and violence experienced by an intimate partner.

Over the past 20 years, the body of the literature focusing on intimate partner violence has grown considerably. Although physical, sexual and psychological sub-types of violence are clearly distinct components that often cluster in the same individual (39), the conceptualization and operationalization of intimate partner violence varied among epidemiologic studies, with most studies focusing on episodic incidents of physical or sexual assaults (40–48) as opposed to chronic forms of psychological abuse (10, 39, 49, 50). Previous studies have confirmed that intimate partner violence is highly prevalent among women in the general population and those identified in clinical settings (9, 10, 12, 49, 51–58). The estimated two-year prevalence of intimate partner violence (5.7%) in the MES

sample is within the expected range. Based on national surveys, 2–12% of women in the United States report physical or sexual abuse by a partner over the course of one year (59–61). In clinical studies, the prevalence of intimate partner violence was estimated to be 4–44% in the past year (1). In 2005, the Behavioral Risk Factor Surveillance System (BRFSS) introduced for the first time an intimate partner violence module to collect data on a nationally representative sample of 70,000 respondents from 16 states and 2 territories (62, 63). Among women, the estimated 12-months prevalence of completed physical or sexual violence was 1.4% (95% CI: 1.2%–1.7%) (63). The CDC Pregnancy Risk Assessment Monitoring Surveillance (PRAMS) estimates that 2.4%–6.6% may have experienced physical or sexual abuse by an intimate partner during pregnancy (64).

Although the focus of many studies has been on victimization of women by their partners, our study and that of a few others (65–67) have also examined non-partners as perpetrators of violence. The finding of an equal likelihood of violence by a partner and a non-partner appears to be unusual, when the overall evidence is taken into consideration. Also, the finding that violence was most frequently inflicted prior to pregnancy, and did not escalate intra- or postpartum is consistent with several previous studies. Using data from the 1996–1998 CDC PRAMS, Saltzman *et al.* calculated the levels and patterns of physical abuse before and during pregnancy; the prevalence of intimate partner violence across the 16 states was found to be 7.2% (95% CI, 6.9–7.6) during the 12 months before pregnancy, 5.3% (95% CI, 5.0–5.6) during pregnancy, and 8.7% (95% CI, 8.3–9.1) around the time of pregnancy (before or during pregnancy) (47). In a British Longitudinal Study of 7,591 pregnant women, prevalence rates of intimate partner violence were examined during pregnancy and after delivery; compared to the post-partum period, the risk of intimate partner violence was consistently lower during pregnancy (68). A community-based survey of Chinese population was conducted by Guo *et al.* to examine patterns of intimate partner violence against women before, during and after pregnancy; the prevalence of intimate partner violence against women during the 9 months of pregnancy (4.3%) was relatively lower than that during the 12 months before the pregnancy (9.1%) and during the 11 months postpartum period (8.3%) (45, 69). Although evidence suggests that violent events mostly occur prior to pregnancy, the prevalence of postpartum depression in our study was significantly increased for abused women, implying that intimate partner violence may have long-term health consequences.

The effect of intimate partner violence on depression in the context of pregnancy has been examined in a limited number of recent studies (22, 29–33), and a few of those assessed postpartum depression as the outcome of interest (31–33). Despite methodological variations, intimate partner violence was found to be consistently associated with poor mental health outcomes among pregnant women at different stages of their pregnancies. In a study by Martin *et al.*, women who were victims of psychological aggression by an intimate partner during the year before pregnancy were not at elevated risk for depression except when the psychological aggression was very frequent. However, during pregnancy, psychological aggression was more closely tied to women's depression levels, regardless of its frequency; in addition, women who experienced any level of physical assault or sexual coercion by their intimate partners (before or during pregnancy) were more likely to be depressed compared to non-victims (22). Rodriguez *et al.* described depression among 210

pregnant Latinas attending prenatal care clinics by abuse status and found that significantly more women who had been exposed to partner violence scored at or above the cutoff point for depression than women who were not (41% vs. 18.6%; $P<0.001$) (30). Varma *et al.* estimated the prevalence of intimate partner violence during pregnancy and evaluated its relationship with mental health outcomes among 203 pregnant women attending an antenatal clinic at a public hospital; self-reported physical violence in the last year was prevalent in 14% of women, psychological abuse in 15%, and sexual coercion in 9%; depression, somatic, and PTSD symptoms were higher in those with a history of abuse or sexual coercion, and life satisfaction was poorer in those with any form of violence (29). Using a prospective cohort study of 838 women who delivered at a university teaching hospital, Leung *et al.* assessed the relationship between postpartum depression and physical, sexual and/or psychological abuse in a Chinese community. Women who experienced abuse were found to have significantly higher postpartum depression scores than those who did not (31).

To our knowledge, this is one of few studies to specifically evaluate the association of intimate partner violence with postpartum depression, after adjusting for non-partner violence and other key confounders. Existing studies have indicated that depression may be a risk factor, a correlate or a health consequence of intimate partner violence in the context of a pregnancy. Many of those studies were conducted in healthcare institutions limiting generalization to women in a broader context. The current study was population-based, used standard questions and a large sample size. Although the detrimental effect of intimate partner violence on postpartum depression has been reported elsewhere (31), the finding of a nearly equal effect of partner and non-partner abuse on postpartum depression is unique and needs further investigation.

Our results should, nevertheless, be interpreted cautiously and in light of certain limitations. These include cross-sectional design, self-selection bias, retrospective reporting and exposure assessment. First, because it is plausible that pre-existing depression can also affect a woman's propensity for victimization by her partner, it is difficult to establish a temporal relationship between the main exposure and outcome of interest using a cross-sectional design (70). Second, self-selection bias is plausible given that women with a history of abuse may be less likely to take part in the survey. Third, reliance on retrospective reports and a lack of face-to-face interviewing may have influenced the accuracy of exposure and outcome data; for instance, non-disclosure may have resulted in under-reporting of experiences with physical or sexual violence. Fourth, although similarly phrased to the Abuse Assessment Screen which is frequently employed in healthcare settings (71–79), the questions used to evaluate violent experiences are specific to MES and have not been validated elsewhere. Finally, other forms of violence including psychological/emotional abuse were not evaluated in this study even though they may be playing an important role in postpartum depression.

In conclusion, intimate partner violence is positively and significantly associated with postpartum depression among Canadian women. This finding needs to be further replicated in large prospective cohort studies. Women who experience violence before, during or after pregnancy need to be supported in ending the violence through various preventive strategies. For example, healthcare professionals should provide these women with information about

resources available within and outside of the healthcare institution. Moreover, many healthcare professionals still believe that postpartum depression is mostly hormonal in origin. Therefore, professionals caring for women around pregnancy should become aware of the possibility of violence and its relationship to depression even in the postpartum period. Counseling of women in prenatal and postpartum care settings should take into account the mental disorder-related healthcare needs of those who experience violence in their lives.

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LIST OF ABBREVIATIONS AND ACRONYMS

BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centers for Disease Control and Prevention
CI	Confidence Interval
EPDS	Edinburgh Postpartum Depression Scale
MES	Maternity Experience Survey
OR	Odds Ratio
PRAMS	Pregnancy Risk Assessment Monitoring System
SAS	Statistical Analysis Software
SPSS	Statistical Package for Social Sciences

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Table 1Characteristics of threatened or experienced violence in the past 2 years* (N[†] = 8,373)

	Number [†]	Percent	(95% CI) [‡]
Partner violence in past 2 years	4324	52.0	(48.1 – 56.0)
Non-partner violence in past 2 years	4105	49.4	(45.4 – 53.3)
Physical violence in past 2 years	8250	98.5	(97.7 – 99.4)
Sexual violence in past 2 years	503	6.0	(43.4 – 7.7)
Number of violent incidents			
1 time	3538	43.4	(39.6 – 47.1)
2 times	1624	19.9	(16.8 – 23.0)
3 to 6 times	1629	20.0	(17.0 – 23.0)
7 to 10 times	362	4.4	(2.9 – 6.0)
11 or more times	1005	12.3	(9.9 – 14.8)
Violent incidents during your pregnancy	2548	30.7	(27.2 – 34.3)
Violent incidents before your pregnancy	6313	84.3	(81.6 – 87.1)
Violent incidents after birth	1725	32.8	(28.4 – 37.2)
Violent incidents during pregnancy			
Increased	71	5.4	(1.6 – 9.3)
Decreased	613	47.0	(37.8 – 56.2)
Stayed the same	620	47.6	(38.1 – 57.0)
Violent incidents after birth			
Increased	157	16.3	(8.3 – 24.2)
Decreased	496	51.6	(41.0 – 62.1)
Stayed the same	309	32.1	(22.4 – 41.9)

* The Maternity Experience Survey includes questions on experiences with and threats of physical/sexual violence.

[†] Sample size is estimated using population weights.[‡] 95% CI were calculated using bootstrapping technique.

Table 2

Associations between intimate partner violence over the past two years and postpartum depression

	Unadjusted odds ratio		Adjusted odds ratio	
	OR	(95% CI) †	OR	(95% CI) †
Intimate Partner Violence				
No	1		1	
Yes	3.00 *	(2.22 – 4.05)	1.61 *	(1.06 – 2.45)
Violence by Family Member				
No	1		1	
Yes	2.25 *	(1.33 – 3.82)	1.76	(0.92 – 3.34)
Violence by Acquaintance/Stranger				
No	1		1	
Yes	2.07 *	(1.39 – 3.08)	1.41	(0.83 – 2.40)
<i>Socioeconomic characteristics</i>				
Level of education				
High school or less	2.03 *	(1.32 – 3.11)	1.29	(0.75 – 2.22)
Some post-secondary education	1.21	(0.80 – 1.83)	1.06	(0.64 – 1.75)
Undergraduate education	1.09	(0.70 – 1.70)	1.29	(0.79 – 2.12)
Graduate education	1		1	
Household income				
< \$30,000	3.25 *	(2.29 – 4.63)	1.76 *	(1.09 – 2.85)
\$30,000 to less than \$60,000	1.55 *	(1.08 – 2.23)	1.14	(0.73 – 1.79)
\$60,000 to less than \$100,000	1.15	(0.79 – 1.67)	1.22	(0.80 – 1.84)
\$100,000	1		1	
Urban-rural residence				
Rural area	1		1	
Urban, population 499,999	1.00	(0.73 – 1.36)	1.05	(0.73 – 1.51)
Urban, population 500,000	1.56 *	(1.17 – 2.07)	1.39	(0.97 – 1.98)
<i>Demographic characteristics</i>				
Immigrant status				
No	1		1	
Yes	2.19 *	(1.75 – 2.74)	1.64 *	(1.21 – 2.22)
Province ‡				
Eastern- Atlantic	1		1	
Eastern- Central	1.33 *	(1.02 – 1.72)	0.89	(0.63 – 1.25)
Western- Prairies	1.18	(0.87 – 1.62)	0.89	(0.59 – 1.32)
Western- British Columbia	1.06	(0.73 – 1.55)	0.73	(0.46 – 1.17)
Northern territories	1.81 *	(1.28 – 2.57)	0.89	(0.54 – 1.47)
<i>Maternal characteristics:</i>				
Current age (years)				

	Unadjusted odds ratio		Adjusted odds ratio	
	OR	(95% CI) †	OR	(95% CI) †
< 20	1.98 *	(1.01 – 3.88)	2.18 *	(0.91 – 5.25)
20–29	0.81	(0.46 – 1.41)	1.13	(0.56 – 2.27)
30–39	0.92	(0.53 – 1.62)	1.43	(0.71 – 2.86)
40	1		1	
Marital status				
No partner	1.84 *	(1.39 – 2.43)	0.84	(0.54 – 1.30)
Has a partner	1		1	
Number of past pregnancies				
None	1		1	
1 or more	1.35 *	(1.08 – 1.68)	1.27	(0.96 – 1.69)
Pregnancy-related characteristics				
Wanted the pregnancy				
Then	1		1	
Sooner	1.65 *	(1.27 – 2.14)	1.44 *	(1.06 – 1.97)
Later	1.95 *	(1.52 – 2.51)	1.20	(0.87 – 1.66)
Not at all	2.71 *	(1.93 – 3.79)	1.41	(0.91 – 2.19)
Cigarette smoking during pregnancy				
No	1		1	
Yes	1.61 *	(1.23 – 2.11)	1.10	(0.76 – 1.60)
Alcohol drinking during pregnancy				
No	1		1	
Yes	1.15	(0.83 – 1.59)	1.22	(0.84 – 1.77)
Health problems during pregnancy				
No	1		1	
Yes	1.56 *	(1.26 – 1.94)	1.39 *	(1.06 – 1.84)
Number of stressful events				
None	1		1	
1	1.70 *	(1.22 – 2.36)	1.62 *	(1.12 – 2.35)
2	2.37 *	(1.67 – 3.37)	1.87 *	(1.25 – 2.80)
3+	5.47 *	(4.10 – 7.31)	3.99 *	(2.77 – 5.76)
Number of prenatal visits				
5 visits	1.39	(0.74 – 2.61)	1.07	(0.46 – 2.48)
6 to 10 visits	0.82	(0.63 – 1.08)	0.97	(0.69 – 1.37)
11 to 15 visits	0.65	(0.50 – 0.84)	0.92	(0.67 – 1.27)
16 visits	1		1	
Delivery characteristics				
Type of delivery				
Vaginal	1		1	
Caesarean	0.92	(0.74 – 1.16)	0.98	(0.75 – 1.28)

	Unadjusted odds ratio		Adjusted odds ratio	
	OR	(95% CI) †	OR	(95% CI) †
Birth weight at delivery (grams)				
< 2500	1.33	(0.87 – 2.04)	1.34	(0.75 – 2.39)
2500	1		1	
Gestational age at delivery (weeks)				
< 37	1.03	(0.69 – 1.54)	0.87	(0.51 – 1.47)
37	1		1	
<i>Postpartum characteristics</i>				
Current BMI (kg/m ²)				
Underweight (<18.5)	1		1	
Normal (18.5 & <25)	1.44	(0.75 – 2.77)	1.53	(0.71 – 3.32)
Overweight (25 & <30)	1.35	(0.70 – 2.61)	1.41	(0.64 – 3.10)
Obese (30)	1.63	(0.82 – 3.22)	1.40	(0.62 – 3.14)
Support after birth				
None/Little of time	6.43*	(4.81 – 8.58)	4.24*	(2.91 – 6.16)
Some of the time	4.46*	(3.48 – 5.71)	3.15*	(2.33 – 4.27)
Most/All of time	1		1	

* $p < 0.05$ for null hypothesis that $\text{Log}_e(\text{OR}) = 0$ in bivariate or multivariate logistic regression model based on Wald test. Multivariate logistic regression models are fully adjusted;

† 95% CI were calculated using bootstrapping technique;

‡ Eastern Atlantic: Newfoundland & Labrador, Nova Scotia, Prince Edward Island & New Brunswick; Eastern Central: Quebec & Ontario; Western Prairies: Manitoba, Saskatchewan, & Alberta; Western British Columbia: British Columbia; and Northern Territories: Yukon Territory, Nunavut & Northwest Territories.