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ORIGINAL ARTICLE

Immigrant status, antenatal depressive symptoms, and frequency and source of violence: what's the relationship?

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Abstract This study describes the prevalence of violence during pregnancy and examines the association between the experience of violence since the beginning of pregnancy and the prevalence of antenatal depressive symptoms while taking into account immigrant status. Cross-sectional study including 5,162 pregnant women attending Montreal hospitals for antenatal care was conducted, with 1,400 being born outside of Canada. CES-D scale was used to evaluate depression at 24–26 weeks of pregnancy. The Abuse Assessment Screen scale was used to determine the frequency and severity of violence since the beginning of pregnancy. Relationship with abuser was also considered. All modeling was done using logistic regressions. Threats were the most frequent type of violence, with 63 % happening more than once. Long-term immigrant women reported the highest prevalence of all types of violence (7.7 %). Intimate partner violence (IPV) (15 %) was most frequently reported among the poorest pregnant women. Strong associations exist between more than one episode of abuse and depression (POR=5.21 [3.73; 7.23], and IPV and depression [POR=5.81 [4.19; 8.08]. Immigrant status did not change the associations between violence and depression. Violence against pregnant women is not rare in Canada, and it is associated with antenatal depressive symptoms. These findings support future development of perinatal screening for violence, follow-up, and a culturally sensitive referral system.

Keywords Violence · Depression · Pregnancy · Immigrant status

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Introduction

Violence against women is a major problem with widespread implications for health. Intimate partner violence, domestic violence, different types of violence (physical, emotional, sexual), and different intensities of abuse are all currently being assessed and reported. While domestic violence describes an array of violent actions taking place in a domestic setting, the term intimate partner violence (IPV) describes violence in the context of intimate relationships (Anderson et al. 2008). In Canada, 8 % of women reported physical or sexual abuse by an intimate partner, over 19 % experienced at least one episode of emotional or financial abuse by a current or ex-partner during the previous 5-year period(Du Mont et al. 2005; Hyman et al. 2006c), and 6.6 % reported physical abuse during pregnancy (Stewart and Cecutti 1993). Victims of IPV have a three- to five-fold greater likelihood of depression, suicide, posttraumatic stress disorder, and substance abuse than non-victims (Dutton et al. 2006). A review focused on violence against pregnant women in the USA and other developed countries showed that the reported prevalence of any type of violence varies between 0.9 and 20.6 %(Gazmararian et al. 1996).

Abused pregnant women are at higher risk of depression than non-abused pregnant women (Dunn and Oths 2004; Flach et al. 2011; Melville et al. 2010; Silverman and Loudon 2010) and have more severe depressive symptoms (Pico-Alfonso et al. 2006). They also have higher incidence/

prevalence rates of stress, preterm delivery, low birth weight babies, and infectious complications and are less likely to obtain prenatal care (Janssen et al. 2003; Chambliss 2008; Sharps et al. 2007). Children raised in violent home environments have both immediate and lifelong adverse health outcomes (Flach et al. 2011; Chambliss 2008). Moreover, IPV is likely to have been initiated before pregnancy and to continue into the postpartum period (Chambliss 2008; Stewart 1994). The prevalence of physical and sexual abuse is, however, reported to be lower during pregnancy, rather than before pregnancy or after delivery (Bowen et al. 2005; Guo et al. 2004). Women who have experienced past or current abuse are also at high risk of postpartum depression, which can affect their relationships with their babies and with other adults (Bowen et al. 2005; Guo et al. 2004).

Depression, social isolation, lack of social support, and cessation of breastfeeding are all negative effects of abuse (Kendall-Tackett 2007). Pregnant women who report domestic violence also report significantly higher levels of social adversity that includes financial strain, lower educational qualifications, conflicts in relationships with partners, poor social networks, housing inadequacy, and other social aspects that may increase vulnerability to violence (Bowen et al. 2005). Work-related violence and threats constitute additional sources of violence which may increase risk of depression or disorders associated with stress (Wieclaw et al. 2006).

To date, the influence of culture and ethnic background on women's experience of domestic violence has been little explored (Kasturirangan et al. 2004). However, there is a growing concern about high frequencies of domestic violence/IPV in different immigrant groups/communities (Abu-Ras 2007; Adames and Campbell 2005; Hazen and Soriano 2007). Additionally, there is growing awareness that the immigration process may be accompanied by numerous challenges that increase the risk for IPV. Nevertheless, existing evidence in the literature is conflicting, especially with regard to the type of violence assessed. As shown in the General Social Survey (Ahmad et al. 2005), immigrant women reported a higher proportion of emotional spousal abuse compared to Canadian-born women, although domestic violence did not appear to be more prevalent in specific racial or cultural groups (Anderson et al. 2008). In contrast, studies in the USA involving immigrants and non-immigrants have generally found that those born in the USA were at greater risk of all types of IPV (Hazen and Soriano 2007). Similarly, immigrant women in Canada have been found to have lower rates of all types of IPV compared to Canadian-born women (Cohen and Maclean 2003). Despite these differences, IPV has consistently been positively associated with the length of stay in the USA and in Canada (Hyman et al. 2006b; Raj and Silverman 2002). In addition, recent immigrant women, compared with non-recent immigrant women, were significantly more likely to report IPV to police and less likely to use social services. However, the differences in the impact of violence on antenatal mental health of immigrants compared to women of the host country have not been previously examined.

The relationship between violence and depression is well documented in different populations of women in reproductive age. Most studies have focused on the relationship between domestic violence/IPV and depression during the postpartum period (Dutton et al. 2006; La Flair et al. 2012; Ludermir et al. 2010; Rodriguez et al. 2008; Taillieu and Brownridge 2010). Research on violence that includes immigrants focuses on specific minority populations and does not always include mental health status. In our previous work, we have observed high prevalence of depressive symptoms among pregnant immigrant women of minority groups, suggesting that this group may constitute a population with special vulnerability to depression. This work contributes to the research on violence against pregnant women by taking into consideration the mental health and the immigrant status in the population-based sample of pregnant women.

Objectives

The objectives of this study are to describe the phenomenon of violence during pregnancy and to examine the association between the experience of violence since the beginning of pregnancy and the prevalence of antenatal depressive symptoms (ADS) while taking into account immigrant status of pregnant women residing in the Montreal area.

Methods

Data originated from a study conducted in four large maternity hospitals. The study was approved by ethics committees (Kramer et al. 2001). Women were recruited at routine ultrasound examinations (16–20 weeks), at antenatal blood sampling (usually 8–12 weeks), or in antenatal care clinics. Eligibility criteria included age ≥18 years at the expected date of delivery, singleton gestation, and fluency in French or English. Women presenting severe chronic illness, placenta *previa*, cervical incompetence diagnosed in previous pregnancy, impending delivery, or a fetus affected by a major anomaly were excluded from the study. All demographic data, detailed socio-economic information, violence, and health-related measures were obtained from 5,321 women present for the interview at 24–26 weeks at the specially scheduled clinic visit. Statistical analyses were performed on the final sample for which the outcome measure was available, consisting of 5,162 pregnant women, with 1,400 being born outside of Canada.

Outcome

The Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff 1977) was used to investigate major components of depression with an emphasis on affective elements (depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disorders). The CES-D is a 20-item self-report scale with a range from 0 to 60 designed to measure depressive symptomatology in the general population. For epidemiologic studies of depression, the scale is often dichotomized: A score of ≥16 indicates a risk of presenting antenatal depression (AD), defined as experiencing six symptoms of depression for most of the previous week or a majority of symptoms during 1 or 2 days, whereas a score of <16 indicates no signs of AD. This widely accepted cut-off was previously used in other pregnant populations as a screening tool in obstetric settings as well as in a population-based prospective cohort study (Marcus et al. 2003; Li et al. 2009) The scale has been validated in many languages, and it was found to produce equivalent measurements in samples with differential characteristics including race, socio-economic status, health status, and region of origin (Roberts 1980; Giovanni 1983; Stahl et al. 2008; Morton et al. 1989; Nguyen et al. 2004).

Violence

Occurrence, frequency, and perpetrator of violence were assessed using an adapted scale from McFarlane that addressed only those episodes of violence occurring since the beginning of pregnancy (McFarlane et al. 1992). Women were considered as abused if they answered "yes" to any of the following questions: Since the beginning of pregnancy have you been (a) hit, slapped, kicked, or otherwise physically hurt by someone? (b) forced to perform sexual activities? (c) receiving threats of physical violence or violence with a weapon? The frequency of any type of violence was dichotomized as one versus more than one episode of violence. Source of violence was dichotomized as intimate partner violence (IPV) versus other sources of violence based on women's identification of perpetrator: current husband or boyfriend and ex-husband were classified as intimate partner, while family members, strangers, and other were classified as "other source of violence."

Immigrant status

Immigrant status was defined as being born outside of Canada and categorized as: recent immigrants (living in Canada up to 2 years), intermediate-term immigrants (living in Canada for 3 to 8 years), and long-term immigrants (living in Canada 9 years or more) based on the year of immigration to Canada (Vissandjee et al. 1999; Vissandjee et al. 2004).

Socio-demographic factors

Women's age was categorized (18–24; 25–34; 35 and more years old). Marital status included categories that captured partnership realities regarding living together or separately with or without marriage. Based on their answers, women were categorized as those who do not have a partner, those who do not live with a partner, those who live with a partner but are not married, and those who are married and live with a partner.

Socio-economic variables

Education was categorized as "primary school," "secondary school," and "some college or university degree." Working status was categorized as "working," "not working," and "studying/studying and working during pregnancy." Lack of money for basic needs was based on the woman's assessment of financial difficulties in covering five basic needs during pregnancy (rent, electricity/heating, medication, food, and other necessities). It was coded based on four categories ("none," "lacking money for one item," "lacking money for two items," and "lacking money for three or more items") (Ehounoux et al. 2009). Crowding at home was assessed by calculating the ratio of the number of rooms to the number of people living in the place of residence.

Psychosocial factors

Pregnancy desire included questions investigating if the pregnancy was wanted, unwanted, or wanted at different time (earlier or later). Social support assessment adapted from Barrera (1981), previously used in highly heterogeneous woman/immigrant populations (Zelkowitz et al. 2004; Osborne and Rhodes 2001; Barrera 1981), was based on two questions: "Among family and friends, is there someone who would help you in a time of need?" and "Among family and friends, is there someone you can confide in or talk to freely about your problems?" Absence of social support was then defined as having neither a person to provide help nor someone to talk to.

Prenatal stressful life events were assessed using the Prenatal Life Event Scale (PLES), a 16-item measurement that was treated as a continuous variable (Lobel 1997). Specific events since the beginning of pregnancy included, for example, moving, being robbed, a death of someone close, or problems with "welfare insurance." Women also rated each event on how undesirable or negative it was from "not at all" (0) to "very much" (3). The number of stressful life events, corresponding to the sum of declared events,

was then averaged based on a rating for each event to create an adverse life events summary score (Lobel et al. 1992).

Health status was assessed by asking women to qualify their health in general as being "excellent," "very good," "good," "fair," or "bad" when compared to other pregnant women. Women who answered excellent or very good were pooled together as well as those who answered fair and bad, thus reducing this variable into three categories.

Statistical analysis

The proportion of different types of violence according to perpetrator and frequency of the event was first assessed, followed by estimation of crude prevalence and 95 % confidence intervals (CI) for any type of violence and frequency of violence by immigrant status and length of stay in Canada. We then examined the associations between violence indicators (any type of violence, IPV, other perpetrator violence, and overall frequency of violence) and demographic, socio-economic, and psychosocial factors using chi-squared tests. Prevalence odds ratio (POR) and 95 % CI were obtained using simple logistic regression to assess the association of violence with depressive symptoms in all women and separately for Canadian-born and immigrant women. Multiple regression models were constructed separately to investigate the relationship between depression and frequency of violence (once or more than once) and between depressive symptoms and source of violence (intimate partner or other source). Explanatory factors (potential confounders and mediating variables) were first included one by one into the models. Factors that did not improve the model likelihood ratio significantly ($p<0.05$) were excluded from the final models. The construction of final models consisted of inclusion of all significant explanatory factors by blocks (immigrant status, socio-economic variables, psychosocial variables, and health status). Finally, multiplicative interactions between ADS, violence, and immigrant status were tested between and within the groups of Canadian-born and immigrant women. All analyses were conducted with STATA statistical software (version 11). All reported p-values are two-sided, and p-value <0.05 was considered statistically significant.

Results

Three hundred sixty eight (6.9 %) women reported any type of violence since the beginning of pregnancy. Among these, half declared more than one episode of violence (Table 1). An intimate partner (husband or boyfriend) or previous partner (ex-husband) accounted for more than half of the perpetrators of the reported types of violence. Threats with a weapon and sexual violence were mostly done by a current partner. A substantial number of women reported different types of violence received from a family member, stranger, or some other source. Threats were the most frequent type of violence, with 63 % happening more than once, followed by sexual violence with almost half reportedly happening more than once.

Figure 1 shows the prevalence of violence by frequency and perpetrator according to immigrant status. Long-term immigrant women reported the highest prevalence of all types of violence (7.7 %), whereas recent immigrants reported the lowest (4.4 %). Further, one episode of violence was more frequently reported by Canadian-born women, while more than one episode of violence was more frequent in immigrant women. When comparing prevalence of IPV to other sources of violence, the latter was more prevalent for Canadian-born and recent immigrant women, whereas IPV was more often experienced by intermediate and long-term immigrants.

Prevalence of violence by selected women's risk factors is presented in Table 2. Violence was reported across all strata for all studied risk factors. Prevalence of any type of violence was particularly high among younger women (19.6 %) and those reporting not having partner (24.5 %)

Table 1 Proportion and absolute number of different types of violence according to perpetrator and frequency of event among pregnant women who reported any type of violence

Total	Physical violence 3.2 % (n=172)	Threats 4.1 % (n=217)	Armed treats 0.5 % (n=26)	Sexual violence 0.6 % (n=31)
Perpetrator				
Husband	37.1 (63)	26.5 (58)	84.6 (22)	51.6 (16)
Ex-husband	8.2 (14)	15.1 (33)	11.5 (3)	16.1 (5)
Boyfriend	6.5 (11)	4.1 (9)	0	12.9 (4)
Family member	8.2 (14)	9.1 (20)	0	6.4 (2)
Stranger	10.6 (18)	15.1 (33)	3.8 (1)	12.9 (4)
Other	29.4 (50)	30.1 (66)	0	0
Frequency				
One episode	59 (102)	37 (80)	73 (22)	42 (16)
More than once	41 (70)	63 (137)	27 (4)	48 (15)

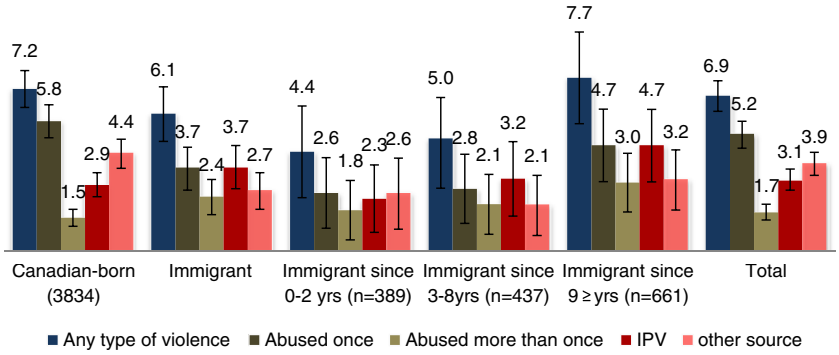

Fig. 1 Prevalence and 95 % CI of any type of violence, frequency of violence (one or more than one episode), and perpetuator (intimate partner or other) by immigrant status

or not living with their partner (16.9 %), both being mostly subjected to IPV (including ex-husband). A gradient between woman's education and sources and frequency of violence was observed, with the most educated women reporting the lowest rates of abuse and the less educated the highest. Working women and those who did not lack money for basic needs reported the lowest prevalence of violence. However, the highest proportions of IPV (15 %) and of more than one episode of violence (14 %) among socio-economic groups were observed in the women reporting lack of money for three or more basic needs. Women with unwanted pregnancy and those reporting poor/bad general health all presented a higher proportion of IPV and more frequent abuse. Finally, women who reported violence lived in more crowded houses, experienced more adverse life events, and had poorer health than those who did not report any violence.

Women who experienced IPV or any type of violence more than once since the beginning of pregnancy are more than five times more likely to present ADS (model 1 and model 2 in Table 3). When exposed to the same level of violence (source and frequency), immigrant women presented a slightly higher likelihood of ADS than Canadian-born women while compared to Canadian-born women who do not report any violence (model 3 and model 4 in Table 3). However, the difference was not statistically significant. Prevalence odds ratios of depressive symptoms were assessed for frequency and source of violence (Fig. 2). The strongest associations exist between more than one episode of abuse and depressive symptoms (POR=5.21 [3.73; 7.23]), as well as between IPV and depression [POR=5.81 [4.19; 8.08]]. Adjusting for immigrant status slightly increased these associations, whereas inclusion of demographic and socio-economic factors largely explained the relationship in all four models. Subsequent inclusion of psychosocial factors (models 4 and 5) further reduced the association between frequency of violence, sources of violence, and AD; however, a large proportion of these associations remained unexplained and significant for those reporting more than one episode of violence and IPV exposure: POR=2.38 [1.64; 3.56] and 2.32 [1.59; 3.38], respectively. The associations of experiencing one episode of violence and perpetrators being a person other than the intimate partner with AD were attenuated and did not reach statistical significance after adjustment for all potential explanatory factors.

Discussion

This study adds evidence to document the adverse effects of experiencing violence during pregnancy on mental health and adds knowledge on the pervasive effects of violence from all sources in both immigrant and Canadian-born pregnant women. To our knowledge, this study provides new findings on depression in Canadian-born and immigrant women experiencing violence during pregnancy. We have documented the frequency of violence during pregnancy perpetrated by the intimate partner and other perpetrators. In other studies, a high exposure to violence was reported, ranging from 7.4 to 20.1 %, as assessed during multiple, detailed in-person interviews or during the third trimester of pregnancy. The lowest estimate (0.9 %) was reported in women who attended a private clinic and responded to a self-administered questionnaire provided by a person who was not a health care provider (Gazmararian et al. 1996). In our study, the prevalence of violence varied between 1.5 and 7.7 % across different groups of women and types/sources of violence. Because estimates of the prevalence of violence are affected by the mode and timing of the inquiry, and the way components of violence were defined and assessed (Gazmararian et al. 1996), our estimates corroborate with the literature when considering that violence was assessed during scheduled maternity visits in the second trimester of pregnancy and that the questionnaire was administrated by health care staff. Moreover, our estimates reflect the prevalence rates for the first two trimesters of pregnancy, since the questions addressed the issues of violence only for the period from the beginning to 24–26 weeks of pregnancy. Therefore, these results are not only alarming with regard to the pregnant mother's antenatal health and further birth outcomes but also to the prognosis for the postpartum period.

Table 2 Distribution of the prevalence (%) and corresponding absolute numbers (*n*) of any type of violence, source, and frequency of violence by women's risk factors

	Any type of violence	IPV	Other perpetuator	One episode	More than 1 episode
Socio-demographic factors					
Age group					
18–21	19.6 (82)	8.3 (35)	11.2 (47)	11.0 (46)	8.6 (36)
22–34	6.1 (241)	2.8 (110)	3.4 (135)	3.3 (131)	2.7 (107)
35 and more	4.7 (46)	2.3 (23)	2.5 (25)	2.4 (24)	2.2 (22)
Marital status					
Don't have partner	24.5 (59)	17.0 (41)	7.5 (18)	11.6 (28)	12.9 (31)
Do not live with partner	16.1 (51)	7.6 (24)	8.5 (27)	6.9 (22)	9.1 (29)
Live with partner	7.1 (167)	2.9 (67)	4.3 (100)	3.9 (92)	3.2 (74)
Married and live with partner	3.7 (89)	1.4 (34)	2.5 (61)	2.3 (56)	1.3 (931)
Socio-economic factors					
Education					
No high school diploma	15.0 (125)	7.0 (58)	8.3 (69)	7.9 (66)	7.1 (59)
Some college or some university	6.9 (172)	3.3 (83)	3.6 (89)	3.5 (87)	3.4 (84)
University degree	3.6 (72)	1.3 (27)	2.4 (49)	2.4 (48)	1.1 (22)
Employment status					
Working during pregnancy	6.0 (225)	2.5 (95)	3.5 (132)	3.4 (128)	2.5 (96)
Not working	10.6 (97)	5.6 (51)	5.4 (50)	5.2 (48)	5.2 (48)
School and work	7.2 (47)	3.4 (22)	3.9 (25)	3.9 (25)	3.2 (21)
Financial situation					
Do not lack money	4.5 (196)	1.8 (78)	2.9 (124)	2.8 (120)	1.7 (74)
Lack money (1 item)	14.6 (77)	8.0 (42)	6.6 (35)	6.8 (36)	7.8 (41)
Lack money (2 items)	16.3 (48)	6.5 (19)	9.9 (29)	8.5 (25)	7.8 (23)
Lack money (≥3 items)	24.5 (47)	15.1 (29)	9.4 (18)	10.4 (20)	14.1 (27)
Living conditions					
Mean crowding when violence	0.6	0.7	0.6	0.6	0.7
Mean crowding when no violence	0.6				
Psychosocial factors					
Pregnancy desire					
Pregnancy wanted	4.9 (141)	1.8 (53)	3.2 (93)	2.7 (78)	2.1 (62)
Wanted at different time	8.4 (171)	3.7 (75)	4.7 (96)	4.6 (95)	3.7 (75)
Unwanted	12.8 (47)	8.4 (31)	4.3 (16)	6.0 (22)	6.8 (25)
Social support					
Someone to talk and help	6.3 (322)	2.6 (134)	3.8 (34)	3.5 (179)	2.8 (140)
No social support	17.6 (47)	12.7 (193)	5.2 (14)	8.2 (22)	9.4 (25)
Life events					
Mean adverse life event when violence	1.9	1.9	1.8	1.9	1.9
Mean adverse life event when no violence	1.3				
Perceived health					
Excellent/very good health	5.3 (182)	2.2 (74)	3.2 (110)	3.1 (107)	2.1 (72)
Good health	7.7 (88)	3.8 (43)	4.2 (48)	4.1 (47)	3.6 (41)
Poor/bad health	12.3 (94)	6.5 (50)	5.9 (45)	5.6 (43)	6.6 (51)
Missing	45.4 (5)	9.1 (1)	36.4 (4)	36.4 (4)	9.1 (1)

We have also shown a dose–response resembling effect of violence of any type on depressive symptoms. These results were expected since greater severity of traumatic experiences as well as continuing IPV during the course of a year was shown to be associated with higher levels of depression (Cambell et al. 1997; Dutton et al. 2006). The

Table 3 Crude prevalence odds ratio for associations between frequency of abuse, source of violence, and antenatal depressive symptoms (CES-D≥16) in total sample and by immigrant status with non-abused Canadian-born women as the reference

	POR	[95 % CI]
Frequency of abuse		
Non-abused	1	
Abused once	2.51*	[1.88; 3.55]
Abused > than once	5.21*	[3.76; 7.23]
Source of violence		
Non-abused	1	
IPV	5.81*	[4.18; 8.07]
Other sources	2.18*	[1.63; 2.92]
Frequency of abuse by immigrant status		
Canadian non-abused	1	
Immigrant, non-abused	1.66*	[1.44; 1.92]
Canadian, abused once	3.52*	[2.66; 4.65]
Immigrant, abused once	4.28*	[2.48; 7.39]
Canadian abused > than once	4.78*	[2.78; 8.23]
Immigrant abused > than once	7.01*	[3.45; 14.23]
Source of violence by immigrant status		
Canadian non-abused	1	
Canadian, IPV	6.32*	[4.25; 9.39]
Immigrant, IPV	7.84*	[4.37; 14.1]
Canadian, other source	2.55*	[1.84; 3.53]
Immigrant, other source	2.48*	[1.29; 4.79]

* Corresponds to p-value <0.05

effects of violence on ADS remained strong for IPV and frequent abuse independently of immigrant status even after extensive adjustment for known socio-economic and psychosocial risk factors of depression. These findings contribute to the very scarce knowledge on the differences in mental health status of abused immigrant and Canadian-born pregnant women and show that violence exposure has similar adverse effects on depression in both populations, independently of immigration status. The association between violence and ADS was mainly attenuated by socio-economic factors, underlining the context in which the occurrence of violence may prevail (Hyman et al. 2006a). Previous research revealed that severe poverty increases the risk for IPV, with lower household income associated with higher reported IPV rates, and that IPV impairs women's capacity to find employment (Carlson et al. 2000; Meisel et al. 2003). Our results showed that violence concentrates among women who are experiencing lack of money, have lower education, are not married, or live in more disadvantaged conditions in general.

Although the effect of violence on depression did not differ with regard to immigrant status, long-term immigrant women reported the highest prevalence of violence. There is a gap in knowledge considering the consistently lower reports of violence in immigrant women and the dose–response resembling relationship between violence and the length of stay. A complex interplay of individual characteristics and immigration-related circumstances may, in fact, affect the way that immigrant women report violence. These may include cultural aspects where violence is differentially perceived, understood, or socially accepted. Fear of reporting due to lack of understanding of the referral and legal system or due to immigrant status issues enlarges the barriers to reporting (Raj and Silverman 2002). Our sample included immigrant women from different countries of origin, with a higher proportion of African and Maghreb origin among newly arrived immigrant women and European origin among long-term immigrant women (Miszkurka et al. 2010). Consequently, high variability, social vulnerability, and other cultural barriers in reporting violence cannot be excluded. For instance, qualitative analysis among African immigrant survivors of IPV indicates that acceptance and endurance of abuse is believed to be "normal" in the male–female relationship (Ting 2010). Thus, the lower rates of IPV that we report in recent immigrant women could be explained by their origin.

Moreover, Canadian immigration policies based on a scoring system which selects candidates with high education may also explain the lower prevalence of violence since higher education of newcomers is an important protective factor for violence. Thus, educated newcomers may not only perceive and accept their low socio-economic situation as being transitional but, more importantly, could be in relationships with more educated partners, the latter being another protective factor for IPV. More qualitative and quantitative studies, with more appropriate design focusing on immigrants, are needed to address violence and health issues. Such studies will have to include innovative sampling methods in order to fully represent the demography of Canada's immigrants. This will be challenging as the ethnocultural diversity of Canada is reflected in over 200 ethnic groups, and within the last 25 years, the population of visible minorities increased from 4.7 to 16.2 %, in 2006, with South Asian and Chinese being, respectively, the largest groups (Immigration: The Changing Face of Canada. The Canadian Chamber of Commerce 2009). The refugee group, which comprises 11 % of migrants to Canada at the time of this study, also constitutes a challenge when studying violence and health issues, mainly due to the particularly vulnerable, socially isolated nature of this group.

Other sources of violence should also be considered, since the lack of studies of violence committed by perpetrators other than intimate partners and its effect on mental health or depression is striking. Although the association between other sources of violence and depression was lower than that for IPV, it remains an important risk factor that is ignored in recent research.

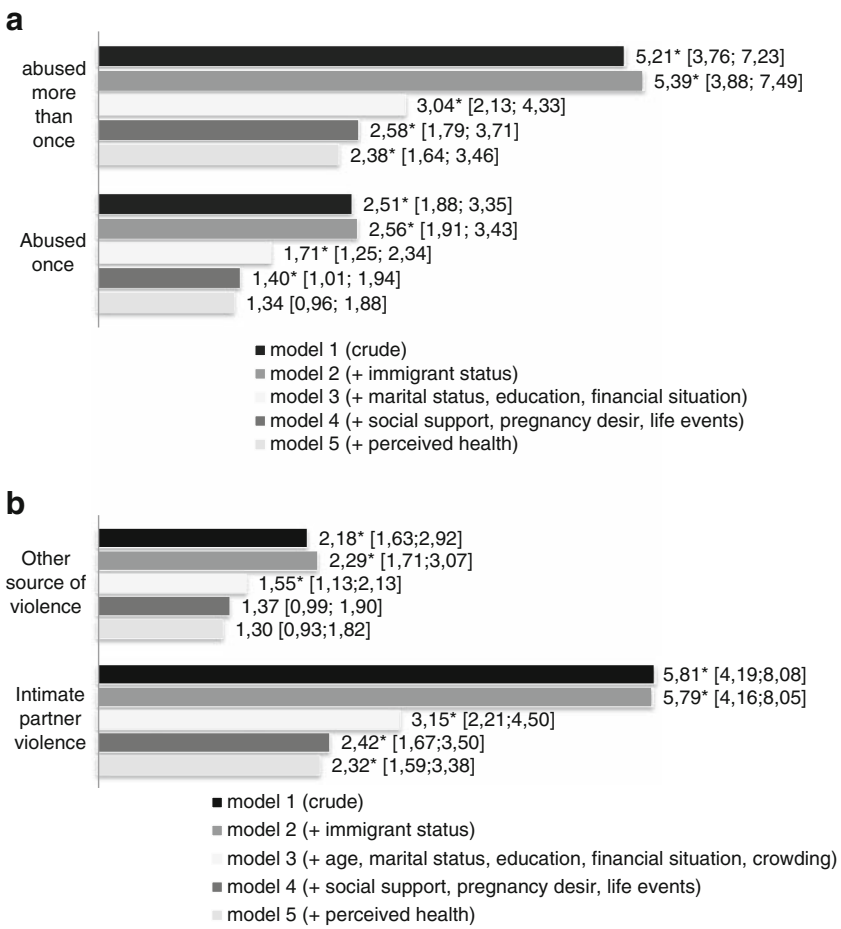

Fig. 2 Prevalence odds ratio (POR) and 95 % CI of antenatal depressive symptoms for **a** frequency of abuse and **b** source of violence: results of multivariate logistic regressions. * corresponds to p-value <0.05

Despite the new portrait of violence and depression in pregnant women that is provided, some limitations of this study need to be addressed. First, the nature of its cross-sectional design does not allow us to predict the direction of the effects in the violence–depression relationship since, as it has been reported previously, physical or mental conditions may also increase the likelihood of partner violence. Second, selection criteria favoring immigrants who are fluent in English or French could possibly result in exclusion of the most socially isolated and/or economically deprived immigrants, leading to an underestimation of the force of the association between violence and depression if violence and depression were more prevalent in the excluded group. Third, although the AAS scale includes question on threats, the emotional and psychological abuse that is used by some men to control their female partners is not fully addressed by this scale. Studies showed that psychological abuse during pregnancy is the most common form of abuse by the partner and is positively associated with the onset of depression. Some have concluded that it is the psychological rather than physical violence during pregnancy that has a negative impact on women's mental health (Ludermir et al. 2010; Tiwari et al. 2008). Thus, studying different forms of abuse and depression during the perinatal period may not only increase the reporting of abuse but also help to direct and target future preventive efforts. Moreover, even if the AAS is among the most studied tools, with very good sensitivity (93–94 %) and specificity (55–99 %), other psychometric properties, such as internal reliability, are yet to be established. In fact, the same criticisms are addressed to other common tools such as the Hurt, Insult, Threaten, and Scream (HITS); Partner Violence Screens (PVS); or Woman Abuse Screening (WAST). While these three tools were developed for family physicians or hospital emergency departments, only the AAS was created to detect violence against pregnant women and was evaluated in other countries, namely, Brazil and Sri Lanka (Rabin et al. 2009).

Finally, previous abuse and partners' characteristics were two potential confounders that were not assessed in our study but which could explain the association between violence and depression. In fact, a history of past abuse increases a woman's risk of depression during pregnancy, and approximately 20 % of women had a lifetime experience (Rachana et al. 2002). Additionally, the partner's education level and problems with drinking and drug use increase the risk for lethal and violent victimization of women in intimate partner relationships (Sharps et al. 2008). Thus, the lack of inclusion of these two confounders

could explain the remaining strong association between frequent abuses and ADS.

Conclusion

Violence during pregnancy is not a rare phenomenon, and it has important consequences for the mental health of Canadian and immigrant women living in Montreal. In particular, during the prenatal period, the presence of depression is strongly related to the frequency and severity of the violence experienced since the beginning of pregnancy. Recognizing violence as a clinically relevant and identifiable risk factor for antenatal major and minor depression, both in Canadian-born and in immigrant women, could be a first step in preventing mental health problems. Health care providers, particularly those who care for pregnant women, are in a unique position to identify and direct women and their families to the help they need, to end the violence in their lives (Chambliss 2008). Although the evidence for the effectiveness of IPV screening in health care settings is still insufficient (MacMillan et al. 2009), our study supports the need for the establishment of routine screening for abuse in the maternity services settings, as well as tested, proper, culturally sensitive referral systems (Hyman et al. 2006a; Latta and Goodman 2005) in order to decrease the effect of abuse on women and their children.

Competing interest None to declare.

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