Antenatal depressive symptoms among Canadian-born and immigrant women in Quebec: differential exposure and vulnerability to contextual risk factors

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Abstract

Purpose To examine the distribution of contextual risk factors for antenatal depression according to immigrant status and the length of stay in Canada, to assess the association between these risk factors and antenatal depression (AD) for Canadian-born and immigrant women, and to compare the vulnerability of Canadian-born and immigrant women to risk factors in relation to antenatal depression.

Methods Women were recruited at routine ultrasound examinations (16–20 weeks), at antenatal blood sampling (8–12 weeks), or in antenatal care clinics. Cross-sectional analysis was performed on the baseline sample consisting of 5,162 pregnant women. CES-D scale was used to investigate depression. Levels of exposure to the selected risk factors according to immigrant status and length of stay were assessed using Chi-square-test or the t test. All measures of association were assessed using logistic regression. Multiplicative interaction terms were constructed between each of the risk factors and immigrant status to reveal differential vulnerability between Canadian-born and immigrant women.

Results Prevalence of AD (CES-D ≥16 points) was higher in immigrants (32% [29.6–34.4]) than in Canadian-born women (22.8% IC 95% [21.4–24.1]). Immigrant women were significantly more exposed than Canadian-born women to adverse contextual risk factors such as high marital strain, lack of social support, poverty, and crowding. At the same level of exposure to risk factors, Canadian-born women presented higher vulnerability to AD when lacking social support (OR = 4.14 IC 95% [2.69; 6.37]) while immigrant women presented higher vulnerability to AD when lacking money for basic needs (OR = 2.98 IC 95% [2.06; 4.32]).

Conclusions Important risk factor exposure inequalities exist between Canadian-born and immigrant pregnant women. Interventions should target poverty and social isolation. The observed high frequency of AD highlights the need to evaluate the effectiveness of preventive interventions of antenatal depression.

Keywords Pregnancy · Depression · Immigrant · Differential exposure and vulnerability

Introduction

Worldwide attention to antenatal depression (AD) has reached the point where recommendations for integrating screening for depression into routine antenatal care are proposed and justified [1–5]. Risk factors for AD that are recurrently studied include history of depression, lack of a partner, marital difficulties, lack of social support, poverty, family violence, increased life stress, substance abuse, history of previous abortions, unplanned pregnancy, ambivalence toward the pregnancy, and anxiety about the fetus [5, 6]. However, the relationship between race/ethnicity and antenatal depressive symptoms among minority women has yielded inconsistent findings, as these
associations may be explained by lower income and financial hardship among the minority women [6, 7]. In Canada, almost one in five women is an immigrant [7], but little is known about immigrant women’s prenatal mental health, their levels of exposure to the consistently reported risk factors for antenatal depression, or how they compare to Canadian-born pregnant women in terms of exposure and vulnerability to those risks.

In our previous work [8], we reported that immigrant status and place of birth were associated with higher levels of AD. Whether this is related to higher exposure or greater vulnerability to adverse life conditions remains unclear. According to the differential exposure and vulnerability hypothesis [9], one group of women may report higher levels of AD than another because it is exposed to greater levels of stressful factors and events, and/or because symptoms of AD would be increased in one group of women compared to another at any given level of stress exposure.

In this paper, we identify differences between Canadian-born and immigrant pregnant women in their exposure and vulnerability to the selected consistently reported risk factors for AD. These include marital strain, lack of social support, lack of money, distress related to life events, and crowding of housing conditions. They are conceptualized as contextual risk factors, reflecting the social and economic situation of these women during pregnancy. In fact, immigrant women are likely to experience major social, economic, and cultural transitions [10] during which their marital relationship, social support, and financial security, along with other social and living conditions, may be unstable or lacking. Thus, following the differential exposure and vulnerability hypothesis, we argue that immigrant women are both more exposed and more vulnerable to contextual risk factors for AD than their Canadian-born counterparts. Our objectives are: (1) to examine the distribution of contextual risk factors for AD according to immigrant status and the length of stay in Canada; (2) to assess the association between these risk factors and AD for Canadian-born and immigrant women; (3) to compare the vulnerability of Canadian-born and immigrant women to risk factors in relation to AD.

Methods

Sample

Data were obtained from the original study investigating the role of socioeconomic disparities in prematurity in a prospective cohort of pregnant women in Montreal. The study was conducted in four large maternity hospitals and has been approved by their respective ethics committee. Details of study design are available elsewhere [11]. 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. Women who consented to participate in the study were asked to return to the hospital’s research clinic at 24–26 weeks of gestation. A total of 20,830 pregnant women were approached for participation in the study. Of these, 3,583 did not meet the eligibility criteria and 5,201 declined participation. Of the reminder, 3,636 were undecided and did not subsequently consent, and 3,073 who consented did not present for the interview at 24–26 weeks [12]. All demographic data, detailed socio-economic information, and health related measures were obtained from 5,329 women during a specially scheduled clinic visit. Cross-sectional analysis was performed on the final sample for whom 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) [13] 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 designed to measure depressive symptomatology in the general population. Each question uses a 0–3 response scale and is summed for an overall score that ranges from 0 to 60. For epidemiologic studies of depression, the scale is dichotomized: a score of ≥16 is equivalent to experiencing six symptoms of depression for most of the previous week or a majority of symptoms during one or two days, whereas a score of <16 is considered to signify no depression [13]. The scale has been validated in many languages and was found to produce equivalent measurements in samples with differential characteristics including race, socioeconomic status, health status, and region of origins [14–18].

Immigrant status

Immigrant status was defined as being born outside of Canada and the length of stay was based on the year of immigration to Canada; immigrant women were categorized as: recent immigrants (living in Canada up to 2 years) [19, 20], intermediate-term immigrants (living in Canada
for 3–8 years) and long-term immigrants (living in Canada for 9 years or more).

Contextual risk factors

A marital strain scale, used in multiple populations [21–23], including 10 questions with Likert-like scale possible answers, was used to assess conflict in the relationship with the current partner. The scale included questions on quality of relationship, acceptance, tolerance, equity, financial reliability and sexual partnership. This scale was first categorized based on its non-linear distribution as “no strain”, “low”, “high”, and “very high strain”. To avoid exclusion of women who were not in a relationship with a partner at the time of the study and those who did not provide a response, this scale was combined with marital status by adding two additional categories (“no partner”, and “missing information on marital strain”).

Social support scale adapted from Barrera (1981), previously used in highly heterogeneous woman/immigrant populations [24, 25] was based on two indicators: having someone to provide help (“Among family and friends, is there someone who would help you in a time of need?”) and having someone to talk to (“Among family and friends, is there someone you can confide in or talk to freely about your problems?”). It was dichotomized as the presence or absence of social support, reflecting whether or not women reported having someone to provide help and someone to talk to.

A valid scale for lack of money for basic needs [26] was based on the women’s perception 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”). The last two categories were collapsed for multiple regression modeling.

Assessment of prenatal stressful life events was based on a 16-item measurement [27]. Specific events experienced since the beginning of pregnancy included for example moving, being robbed, a death of someone close, discrimination, living far from partner and 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). Two variables were created from this scale; first, the number of life events, corresponding to the sum of declared events, and second, the distress index, corresponding to the averaged distress rating for each event. Women reporting no events were assigned a life event distress score of zero [28].

Crowding of housing conditions was assessed by calculating the ratio of the number of rooms to the number of people living in the place of residence. Other covariates included education (“primary school”, “secondary school”, and “some college or university degree”), working status (“working”, “not working”, or “studying/studying and working during pregnancy”), and parity based on the number of previous pregnancies that resulted in a live-born baby.

Statistical analysis

Statistical analysis was carried out separately by immigrant status and among immigrants, by length of stay.

First, levels of exposure to the selected risk factors were determined by examining the distribution of those factors according to immigrant status and length of stay using the Chi-square test for categorical variables or the t test for continuous variables. The nonparametric test for trend across ordered groups developed by Cuzick [29] was performed to compare risk factor frequencies in immigrant women according to the length of stay in Canada. Second, the prevalence of depression was calculated according to the contextual risk factors by immigrant status and length of stay. Third, the association between contextual risk factors and antenatal depressive symptoms was assessed using logistic regression. All models were adjusted for working status, education, and parity. Finally, interaction terms were constructed between each of the contextual risk factors and immigrant status. Five different models, each containing one of the interaction terms and all other remaining contextual risk factors were fitted using logistic regression, to reveal and quantify the differential vulnerability between Canadian-born and immigrant women. All analyses were conducted with STATA statistical software (version 9). All reported p values are 2-sided and p value <0.05 was considered statistically significant.

Results

The overall prevalence rate of AD was higher in immigrants (32% [29.6–34.4]) than in Canadian-born women (22.8% IC 95% [21.4–24.1]). Prevalence rate estimates of AD specific to the length of stay in Canada and the region of birth were previously reported [8].

Levels of exposure to the selected risk factors

Immigrant women were exposed to high marital strain, lack of social support and money, and crowded living conditions more frequently than Canadian-born women (Table 1). In particular, those living in Canada for 3–8 years were most frequently exposed to high marital strain and the absence of social support, while newly arrived immigrant women were most exposed to adverse life events and crowded housing conditions. Long-term immigrant women were among the most exposed to lack of money for basic needs. Moreover,
availability of social support significantly increased while
crowding decreased in immigrant women in accordance
with the length of stay in Canada. A gradient for depressive
symptomatology was observed according to the levels of
marital strain and lack of money.

Prevalence of depression according to the contextual
risk factors by immigrant status and length of stay

A particularly high prevalence of depression was reported
among intermediate and long-term immigrant women
declaring high marital strain, not having a partner, or not
providing a response to the marital strain scale, as well as
in newly arrived immigrant women without a partner at the
time of pregnancy. Depression was also highly prevalent
among Canadian-born women and newly arrived immi-
grant women without social support. The highest levels of
depression were found in intermediate-term immigrant
women lacking money for more than two basic needs
(Table 2).

Association between contextual risk factors
and antenatal depressive symptoms

Multivariate analyses (Table 3) revealed that for all women,
Canadian-born or immigrant, marital strain, lack of social
support, lack of money for two or more basic needs, and life
event distress were all strongly and independently associated
with AD. A greater likelihood of presenting AD while
lacking money for basic needs was observed among newly
arrived women. The likelihood of presenting AD while
lacking social support was highest among Canadian-born
women. High marital strain was remarkably associated with
depression in Canadian-born and intermediate-term immi-
grant women. Adverse life event distress was more strongly
associated with AD in newly arrived immigrant women than
in any other group.

At the same level of exposure to these contextual risk
factors, Canadian-born women presented higher vulnera-
bility to AD when lacking social support while immigrant
women presented higher vulnerability to AD when lacking
money for basic needs (Table 4).

Discussion

Our study reveals important health inequalities between
Canadian-born and immigrant pregnant women. These
could be addressed by reducing the existing differential
exposure and vulnerabilities to contextual risk factors that
increase the likelihood of depression in these women.

A complex interplay of interpersonal, social, and cul-
tural factors influences the likelihood of depression in
childbearing women. More importantly, immigrant women
face multiple challenges related to the experience of
migration, highlighted by ethnic and cultural differences

| Table 1 | Differential exposure to contextual risk factors in Canadian and immigrant women during pregnancy |
|-------------------------------|---------------------------------|-------------|-----------------|-----------------|-----------------|-----------------|-------------|-----------------|-------------------------------|
| Marital strain % (n)          | Canadian-born | Immigrant | p value     | Immigrants (0–2 years) | Immigrants (3–8 years) | Immigrants (≥9 years) | p value |
| No strain                     | 23.4 (895)    | 17.2 (258) | 0.000      | 16.4 (64)           | 17.2 (75)            | 17.7 (117)       | 0.192     |
| Low strain                    | 50.0 (1,915)  | 40.9 (614) |           | 41.9 (163)          | 37.9 (165)           | 42.2 (279)       |           |
| High strain                   | 14.2 (542)    | 15.8 (237) |           | 16.4 (64)           | 14.9 (65)            | 16.2 (107)       |           |
| Very high strain              | 6.2 (236)     | 12.3 (185) |           | 10.0 (39)           | 14.5 (63)            | 12.1 (80)        |           |
| No partner                    | 4.5 (171)     | 4.6 (69)   |           | 4.4 (17)            | 3.9 (17)             | 5.0 (33)         |           |
| Missing information on strain | 1.8 (69)      | 9.2 (138)  |           | 10.8 (42)           | 11.5 (50)            | 6.8 (45)         |           |
| Social support % (n)          |                |            | 0.000      |                   |                   |                 | 0.001     |
| No social support             | 3.3 (128)     | 9.3 (139)  |           | 9.8 (38)            | 12.6 (55)            | 6.7 (44)         |           |
| Someone to talk and help      | 96.7 (3,700)  | 90.7 (1,362) |         | 90.2 (351)          | 87.4 (380)           | 93.3 (617)       |           |
| Lack of money % (n)           |                |            | 0.000      |                   |                   |                 | 0.480     |
| Do not lack money             | 82.8 (3,169)  | 76.4 (1,147) |         | 76.1 (296)          | 78.8 (343)           | 74.9 (495)       |           |
| Lack money for 1 item         | 9.5 (363)     | 10.9 (164) |           | 12.1 (47)           | 9.0 (39)             | 11.6 (77)        |           |
| Lack money for 2 item         | 5.0 (192)     | 6.8 (102)  |           | 5.9 (23)            | 6.4 (28)             | 7.6 (50)         |           |
| Lack money for 3 or 4         | 2.7 (104)     | 5.9 (88)   |           | 5.9 (23)            | 5.7 (25)             | 5.9 (39)         |           |
| Life events distress [mean (SE)] | 1.3 [1.2; 1.3] | 1.3 [1.2; 1.4] | 0.795 | 1.4 [1.2; 1.6] | 1.3 [1.3; 1.4] | 1.2 [1.2; 1.3] | 0.143 |
| Crowding [mean (SE)]         | 0.5 [0.5; 0.5] | 0.67 [0.7; 0.7] | 0.000 | 0.73 [0.7; 0.8] | 0.69 [0.6; 0.7] | 0.63 [0.6; 0.6] | 0.000 |

1 This p value corresponds to the results of nonparametric test for trend across ordered groups.
This population is potentially exposed to a series of barriers and stressors related to resettlement and may be more likely to experience poor health. Using the differential exposure and vulnerability approach, our study reveals that immigrant women are significantly more exposed than Canadian-born women to adverse contextual risk factors such as high marital strain, lack of social support, poverty, and crowding, and this exposure is independent of the time since immigration. Particularly, women who have been living in Canada since 3–8 years were the most exposed to marital strain and lack of emotional and instrumental help, whereas newly arrived immigrants were most exposed to crowded living conditions and adverse life events. Independently of time since immigration, immigrants must deal with multiple individual and structural challenges that include identity crises, roles changes, conflicts with cultural expectations and social isolation/exclusion. Facing adverse life events at the beginning of the settlement and crowded living conditions in our study just highlighted these known challenges. At the individual level, marital strain may reflect not only the decline in marital satisfaction or stress related to parenthood, but also the disruption in family dynamics after a first period of acculturation in Canada. The absence of the relatives and other women in family networks may have consequences on shifting in gender roles, issues of dependency and child care, as women may seek more support from their husbands [30, 34, 35].

These results highlight the growing concern over how poverty and social isolation concentrates among immigrant mothers and is strongly associated with their poor mental health [25, 36, 37]. Concerning differential vulnerability to depression, Canadian-born women were more vulnerable to lack of social support. Lack of social support is a risk factor for perinatal depression [35] and the importance of social support in antenatal and postnatal depressive symptoms was reported in many cultures and in minority women [35, 38, 39]. Not having anyone to talk to or provide help could be considered a rare or unusual situation, especially for women who normally have larger and more varied networks than men and are more likely to have a close confidant other than their spouse [40, 41]. For Canadian-born women, insufficient social support can hide some

<table>
<thead>
<tr>
<th>Contextual risk factors</th>
<th>Canadian-born Immigrant (0–2 years)</th>
<th>Immigrant (3–8 years)</th>
<th>Immigrant (≥9 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressed</td>
<td>Total</td>
<td>Depressed</td>
<td>Total</td>
</tr>
<tr>
<td>Marital strain* % (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No strain</td>
<td>9.46 (88)</td>
<td>888</td>
<td>12.85 (32)</td>
</tr>
<tr>
<td>Low strain</td>
<td>17.83 (335)</td>
<td>1,879</td>
<td>22.89 (133)</td>
</tr>
<tr>
<td>High strain</td>
<td>35.89 (192)</td>
<td>535</td>
<td>37.07 (86)</td>
</tr>
<tr>
<td>Very high strain</td>
<td>63.9 (149)</td>
<td>233</td>
<td>64.37 (112)</td>
</tr>
<tr>
<td>No partner</td>
<td>46.63 (76)</td>
<td>163</td>
<td>58.06 (36)</td>
</tr>
<tr>
<td>Missing strain</td>
<td>32.81 (21)</td>
<td>64</td>
<td>48.04 (49)</td>
</tr>
<tr>
<td>Social support* % (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No social support</td>
<td>65.0 (80)</td>
<td>123</td>
<td>61.94 (83)</td>
</tr>
<tr>
<td>Someone to talk and help</td>
<td>21.4 (780)</td>
<td>3,645</td>
<td>28.81 (365)</td>
</tr>
<tr>
<td>Lack of money* % (n)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do not lack money</td>
<td>18.6 (569)</td>
<td>3,117</td>
<td>25.35 (272)</td>
</tr>
<tr>
<td>Lack money for 1 item</td>
<td>38.6 (136)</td>
<td>352</td>
<td>42.21 (65)</td>
</tr>
<tr>
<td>Lack money for 2 item</td>
<td>48.2 (92)</td>
<td>191</td>
<td>55.91 (52)</td>
</tr>
<tr>
<td>Lack money for 3 or 4</td>
<td>58.8 (60)</td>
<td>102</td>
<td>73.75 (59)</td>
</tr>
<tr>
<td>Life events distress* (mean [IC 95%])</td>
<td>1.72 [1.65; 1.79]</td>
<td>857</td>
<td>1.74 [1.59; 1.89]</td>
</tr>
<tr>
<td>Crowding* (mean [IC 95%])</td>
<td>0.57 [0.56; 0.59]</td>
<td>2,890</td>
<td>0.72 [0.69; 0.75]</td>
</tr>
</tbody>
</table>

* Corresponds to Chi² test p value <0.05

[30–33].
aggravated social conflict that may also have profound effects on women’s mental and physical health during pregnancy [42]. Moreover, while immigrant women, especially those newly arrived, may perceive their lack of social support as a temporary situation, in the case of Canadian-born women this may reflect long term absence of social ties increasing the risk of poor health and health behaviors [43].

Among those lacking money for basic needs, immigrant women were more vulnerable to depression than Canadian women. In our previous work, descriptive analysis revealed that immigrant women had more formal education than Canadian-born women, with newly arrived immigrants having the highest educational level [8]. However, sustained poverty prevails among recent migrant families, who tend to belong to visible minorities residing in Quebec, Canada [44, 45]. This increased vulnerability to depression associated with poverty may be due to the barriers to adequate employment following immigration to Canada. These barriers are particularly damaging to highly educated women and men from visible minority countries of origin. In fact, studies show that immigrants of non-European origin struggle with low-paying jobs and that the majority of immigrant women and their spouses experience a drastic decline in social mobility in the years following migration to Canada [46, 47]. In this population, social support had no effect on mental health nor even a buffer effect on the relationship between life events and difficulties and mental health [46]. Finally, the strong association between marital strain and depressive symptoms in all women revealed its universality and showed the fundamental role of good marital relationships in preserving mental health. Although the strength of association between marital strain and depression varied between all groups of pregnant women, this risk factor remained the strongest predictor of AD while taking all other contextual risk factors into account.

Due to the cross-sectional nature of this study, the possibility cannot be excluded that for some women, recurrent and untreated depression could be at the origin...
of marital strain, poverty, lack of social support, or other adverse life events. Moreover, our study includes a large number of women with very diverse cultural backgrounds; grouping them under a simplistic immigrant status dichotomy hides heterogeneity in exposure and vulnerability [8]. Thus, introducing their origins/ethnicity could reveal a different pattern of associations and identify highly vulnerable profiles. This was already observed in our previous study that revealed a considerable variation of the AD prevalence across ethnic origins [8]. Higher estimated AD symptomatology was reported for women from Caribbean (45%), South-Asian (43%), Maghreb (42%) and Sub-Saharan (38%) regions than in women with European origins (20%), suggesting some subjacent differential exposures that was not captured in the current study. Further, due to eligibility criteria in the primary study, our sample includes only women who have a good knowledge of one of the country’s official languages (French or English). In fact over 33% of non-eligible participants were excluded because of language barriers, thus indicating a potential selection bias [12]. Women who cannot communicate easily on a daily basis are more likely to report poor health [52, 53] thus excluding them from our study may likely attenuate the observed associations in immigrant women. In addition, questions regarding marital relationship or financial situation could introduce social desirability bias with higher non-response or biased responses. And, while scales of marital strain and social support, two strongly associated factors to depression, have been previously used in other ethnic/cultural populations and circumstances [22–24], possible variability in terms of its measurement may be expected within these highly heterogeneous immigrant populations. Social support is one of the key factors protecting women from depression, especially when provided in the form of companionship, emotional support

Table 4 Differential vulnerability to contextual risk factors in Canadian-born and immigrant women in association to antenatal depressive symptomatology

<table>
<thead>
<tr>
<th>Por</th>
<th>CI 95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>POR prevalence odds ratio</td>
<td>Statistically significant interaction terms with p value &lt;0.05</td>
</tr>
</tbody>
</table>

All interaction models are adjusted for education, working status and parity and, respectively, for all contextual factors (social support, lack of money, crowding, marital strain, distress index)

- **Differential vulnerability to marital strain**
  - Canadian no marital strain 1
  - Immigrant no marital strain 1.40 [0.89; 2.20]
  - Canadian low strain 1.89 [1.46; 2.46]
  - Immigrant-low marital strain 2.51 [1.83; 3.43]
  - Canadian-high marital strain 4.00 [2.97; 5.40]
  - Immigrant-high marital strain 4.39 [3.02; 6.38]
  - Canadian very high marital strain 10.46 [7.24; 15.11]
  - Immigrant-very high marital strain 10.22 [6.78; 15.42]
  - Canadian no partner 3.92 [2.60; 5.89]
  - Immigrant no partner 5.74 [3.14; 10.49]
  - Canadian missing information on marital strain 3.47 [1.89; 6.37]
  - Immigrant missing information on marital strain 4.98 [3.06; 8.11]

- **Differential vulnerability to lack of social support**
  - Canadian & social support 1
  - Immigrant & social support 1.31 [1.11; 1.55]
  - Canadian & lack of social support 4.14 [2.69; 6.37]
  - Immigrant & lack of social support 2.69 [1.79; 4.04]

- **Differential vulnerability to lack of money**
  - Canadian who do not lack money 1
  - Immigrant who do not lack money 1.26 [1.05; 1.53]
  - Canadian who lack money for 1 item 1.43 [1.10; 1.87]
  - Immigrant who lack money for 1 item 1.47 [1.01; 2.15]
  - Canadian who lack money for ≥2 items 2.13 [1.61; 2.81]
  - Immigrant who lack money for ≥2 items 2.98 [2.06; 4.32]

- **Differential vulnerability to house crowding**
  - Immigrant status × crowding 0.86 [0.50; 1.49]

- **Differential vulnerability to distress**
  - Immigrant status × distress index 1.07 [0.93; 1.24]
and instrumental support like the assistance with household tasks. The types, sources and appraisal of social support differ across cultures and the complexity of mechanisms by which support works may also be different across cultures. In our study only two single questions were used to investigate the presence of someone who can help or talk to reflecting dimensions of social support related to the possibility of having assistance and people to confide in.

The importance of social support for mental health may vary with the length of stay in the host country. Emotional and informational support from peers, friends or relatives is sought after a longer stay in new country. As newcomers are more concerned with immediate needs for survival like food, housing, employment, the two addressed questions did not capture this dimension of instrumental support in our study, translated into practical help for better integration [54]. Nevertheless, strong association was observed between social support and AD even when using two questions. This suggest that closer attention should be given to different dimensions of social support including its actual accessibility and woman’s expectations toward relationships, and including challenges in establishing or maintaining relationships, especially for immigrant women. Finally, due to the small number of women in some subgroups, prevalence odds ratios had large confidence intervals or were statistically non-significant and inconclusive.

In spite of these limitations, our study adds evidence to a growing basis for possible interventions: (1) to reduce inequalities in exposure between Canadian-born and immigrant women who had the highest exposure levels for most contextual risk factors; (2) to test the efficacy of possible interventions against two important vulnerability factors, poverty and social isolation, by providing economic assistance and health-promoting support such as group physical exercise programs independently of women’s origins; (3) to test interventions for the vast majority of pregnant women who live with a partner, aiming at reducing marital strain and preventing deteriorations in mental health, targeting both members of the couple [55]; (4) to test interventions targeting perinatal depression that could be integrated in routine clinical practice, assuming the increased contact of pregnant women with the health services in this period [56, 57]. Since AD is the strongest predictor of postnatal depression and, that in turn, is the strongest predictor for parenting stress [58–60] and since both have significant negative effects on child development [61, 62], the need for targeted intervention cannot be ignored.

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