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Childhood trauma and maternal perinatal depression during COVID-19: A stress sensitization hypothesis

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ABSTRACT

Background: Perinatal depressive symptoms (PDS) are a risk factor for maternal well-being during and following pregnancy as well as for infant development. COVID studies documented a definite increase in PDS during this period of heightened stress, but also highlighted that all women were not equally at risk of perinatal depression. This calls for the identification of factors that could contribute to sensitizing certain individuals to populational stressors such as the COVID-19 pandemic.

Objective: Based on the stress sensitization model, this study aimed to evaluate the associations between childhood trauma (CT) and depressive symptoms in pregnant women during the COVID-19 pandemic at four timepoints (two prenatal and two postnatal).

Methods: A sample of Canadian mothers (N = 117, Mage = 29.77 years, SD = 3.18, 63.2 % primiparous, 98.3 % White, 23.1 % with history of CT) completed self-reported measures of CT (CTQ) and depressive symptoms (EPDS) during the first or second (T1) and the third trimester of pregnancy (T2), as well as at 2 months (T3) and 6 months (T4) postpartum. Structural equation modeling (SEM) analyses were performed using MPlus.

Results: Maternal severity of CT was directly associated with pre- and postnatal depressive symptoms during the COVID-19 pandemic. CT was also indirectly associated with postnatal depressive symptoms via prenatal depressive symptoms.

Conclusions: CT had an enduring association with postnatal depressive symptomatology in part due to its role in prenatal depression during the first COVID-19 outbreak. The implications of the results for perinatal care will be discussed.

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1. Introduction

The perinatal period (defined as the period ranging between the beginning of pregnancy to 1-year postpartum; National Collaborating Centre for Mental Health, 2014) is one of increased vulnerability for psychological disorders (O'Hara & Wisner, 2014) given the multiple social, psychological and biological changes that pregnancy and the arrival of a child entail. The overall prevalence of perinatal depression at a clinical level is estimated at 11.9 % (Woody et al., 2017), which makes depressive symptoms among the most common difficulties encountered during pregnancy (Earls et al., 2019). A systematic review (Cox et al., 2016) observed that >50 % of perinatal clinical depressions are undetected and approximately 85 % are untreated. This is of concern given that women with perinatal depressive symptoms show greater risk of adverse obstetric and pregnancy outcomes (Jarde et al., 2016), and of having a child who will present early developmental delays (Rogers et al., 2020). It is then crucial to understand the individual and environmental risk factors that may predispose women to perinatal depressive symptoms in order to guide screening and preventive interventions.

Since March 2020, the COVID-19 pandemic has greatly challenged the psychological health in all populations. Pregnant women have been particularly vulnerable to its effects considering the threat of an infection during pregnancy both for the mother and the child (Wei et al., 2021) and the restrained social support resulting from the public health measures of lockdown and social distancing (Harrison et al., 2021), a much needed support when expecting a child and after childbirth. For pregnant women, those stressors add to the measures in place to prevent the propagation of the virus and their universal consequences on the economy (Deb et al., 2021), employment (Beland et al., 2020), family functioning (Feinberg et al., 2022) and socioeconomic disparities (Mishra et al., 2022). Congruently, an increase in psychological distress has rapidly been documented during the first weeks of the pandemic in the initial cohort of pregnant women from which we drew the sample for this study (Berthelot et al., 2020), a finding that was largely reproduced afterward in multiple nations. A meta-analysis including 47,677 pregnant women from North-America, Asia and Europe reported an overall prevalence rate of perinatal depressive symptomatology of 25.6 % during the first 6 months of the COVID-19 pandemic (Tomfohr-Madsen et al., 2021). However, an important limitation of most studies on perinatal psychological distress during the pandemic is that they are cross-sectional; therefore, it is impossible to evaluate whether this effect is an acute or chronic reaction, which would have much different implications in terms of later offspring development (Duguay et al., 2022). Furthermore, little is known about individual factors that might have influenced perinatal depressive symptomatology during the particularly stressful context of the COVID-19 pandemic.

1.1. Childhood trauma, COVID-19 pandemic and perinatal mental health

Unquestionably, childhood trauma (CT) is a well-known risk factor for physical (Oh et al., 2018) and mental health problems later in life, including depression, anxiety, posttraumatic stress, or psychotic disorders (Atzl et al., 2019; Racine et al., 2021). In this study, CT is defined as having been exposed to at least one type of childhood maltreatment before the age of 18 among physical, sexual or psychological abuse and physical or emotional neglect by parents or caregivers (World Health Organization, 2022). Among expectant mothers, a recent study estimates the prevalence of CT at 35 % (Garon-Bissonnette et al., 2022), similar to the rate found in the Canadian general population (Afifi et al., 2014). In pregnant women, CT is linked to prenatal psychological distress, which would be associated in turn with less confidence in their parenting abilities as well as a lower emotional investment in the fetus (Berthelot et al., 2020). CT has also been linked to postnatal depressive symptomatology (Racine et al., 2021) and other pregnancy complications such as hypertensive disorders or preterm birth (Miller et al., 2021) and altered offspring development (Folger et al., 2018; Garon-Bissonnette et al., 2021; McDonnell & Valentino, 2016; Racine, Madigan, et al., 2018; Racine, Plamondon, et al., 2018; Larouche et al., 2025). The importance of considering CT is further supported by evidence showing that the co-occurrence of a history of CT and prenatal depression is likely to increase the risk of perpetration of child abuse (Yang et al., 2018).

1.2. Stress sensitization hypothesis

The stress sensitization hypothesis suggests that some people would be particularly vulnerable when exposed to new stressors considering that they have been previously exposed to multiple stressful experiences, such as CT (Hammen et al., 2000). This higher vulnerability to new psychosocial stressors in survivors of CT would have roots in persistent dysregulation of stress responses in the hypothalamus-pituitary-adrenal axis (HPA; Hammen et al., 2000). Indeed, multiple alterations have been found in terms of neuroendocrine and autonomic responses to stress in adults exposed to CT, namely in terms of central corticotropin-releasing factor (CRF) activity, which is linked to a decreased neuropeptide oxytocin activity and an altered HPA axis activity (Heim et al., 2008). Those changes in the stress regulation systems have been linked with an increased risk of depressive symptomatology later in life, supporting the hypothesis of a complex relationship between stress-mediating and stress-protective altered neural systems. Those particular patterns of responses to new stressors may in turn increase the vulnerability for the emergence or exacerbation of psychopathology (Heim et al., 2008). Accordingly, it has been shown that the accumulation of stressful life events during childhood predicted higher risk of major depression, post-traumatic stress and anxiety disorders in adults following exposure to a new stressor (McLaughlin et al., 2010). Moreover, it was found that childhood trauma would moderate the association between recent stressors and depression, even when controlling for childhood socioeconomic status, educational attainment, marital status, age, sex, previous depressive symptoms, and household stress (Rousson et al., 2020). Indeed, in Rousson et al.'s study (2020), a significant association between stressors during adulthood and depression was observed in adults with a history of childhood trauma, but not in non-exposed adults.

According to this model, we hypothesized that the emergence of depressive symptomatology, when confronted with the stressor of

being pregnant and giving birth to a child in times of threat and uncertainty, stems from previous exposure to significant stressors in the form of childhood trauma. Indeed, the very first year of the COVID-19 pandemic was a period during which knowledge about the virus was limited, vaccines were unavailable and public health measures were highly restrictive, which represented a massive populational stressor. Despite the extensive literature on the consequences of CT and of the COVID-19 pandemic on women's well-being during the perinatal period, both risk factors have rarely been considered simultaneously. Undeniably, the COVID-19 pandemic has been an unpredictable, uncontrollable and prolonged event likely to activate or amplify psychological distress associated with previous CT (Collin-Vézina et al., 2020). Thus, CT was found to be associated with higher levels of psychological distress at the beginning of the COVID-19 pandemic in a sample of pregnant women (Shreffler et al., 2021) and the direct effects of CT on prenatal depression was empirically supported in many pre-pandemic studies (Atzl et al., 2019; Berthelot et al., 2020; Racine et al., 2020; Racine et al., 2021). In terms of the direct effect of CT on postnatal depressive symptoms in pre-COVID studies, meta-analytic results suggest that maternal CT history is associated with higher reports of postpartum depressive symptoms (Racine et al., 2021). Furthermore, CT was shown to predict maternal depressive symptoms at 6 months postpartum even when controlling for initial levels of depressive symptoms during pregnancy (McDonnell & Valentino, 2016). However, to our knowledge, no studies of the association between CT and pre- and postnatal depression were conducted during the COVID-19 pandemic.

1.3. Study objectives

The current study aims to provide first evidence of the association between CT and depressive symptomatology in women who were pregnant at the onset of the pandemic by assessing the direct and indirect effects of maternal severity of childhood trauma on depressive symptoms at four measurements (two prenatal and two postnatal) during the first year of the COVID-19 pandemic (April 2020 to February 2021). Based on previous findings, we hypothesized that (1) maternal severity of CT would be associated with prenatal depressive symptoms; (2) prenatal depressive symptoms would be associated with postnatal depressive symptoms; (3) maternal severity of CT would be associated with postnatal depressive symptoms, and (4) maternal severity of CT would be indirectly associated with postnatal depressive symptoms, via prenatal symptomatology.

2. Methods

2.1. Participants

Pregnant women (N = 117; see Table 1) were recruited through social media (Facebook and Instagram) during their first and second trimester (63.2 % second) and advertisements in prenatal clinics at their first pregnancy appointment. Participants in this study are a subsample of a longitudinal project on the adaptation (N = 977) to motherhood during the COVID-19 pandemic (see Duguay

Table 1
Sociodemographic characteristics of the sample (N = 117) during pregnancy (T1).

		N	%
Trimester of pregnancy			
1st trimester		43	36.8
2nd trimester		74	63.2
Maternal education			
Collegial or professional training		28	23.9
University degree		89	76.1
Maternal ethnicity[1]			
White		114	98.3
Black		1	0.9
Hispanic		1	0.9
Mothers in a couple relationship with the other parent		115	98.3
Primiparous mothers		74	63.2
Family income			
<$55.000 CAD		10	8.6
>$55.000- < $75.000 CAD		17	14.5
>$75.000- < $95.000 CAD		30	25.6
≥$95.000 CAD		60	51.3
Financial situation affected by COVID-19			
No change		55	47.0
Small reduction		42	35.9
Large reduction		20	17.1
Infant males[2]		58	50.9
	Range	M	SD
Maternal age	24–40	29.77	3.18
Weeks of pregnancy	6–25	15.90	4.67
Gestational age (weeks)	29–41.7	38.48	5.86

Note. The T1 data collection was conducted during first or second trimester of pregnancy; CAD = Canadian Dollar.
[1] For maternal ethnicity, N = 116; [2] For infant sex, N = 114.

et al., 2022 for more information on the sample) and were selected if they conferred complete data over four time points during the perinatal period: during the first or second trimester (T1) and the third trimester of pregnancy (T2), and at 2 months (T3) and 6 months (T4) postpartum. There was no statistically significant difference between the participants included in this article and those excluded in terms of depressive symptoms, severity of CT, parental status or impact of the pandemic on family income ($p > .05$). Inclusion criteria were being 18 years or older, having sufficient reading skills to complete self-report instruments, and being pregnant at the time of the initial assessment. Exclusion criteria were reporting a diagnosis of schizophrenia or bipolar disorder and having experienced major complications during pregnancy and/or childbirth such as prematurity or multifetal pregnancy. As shown in Table 1, participants had high education levels (76.1 % university degree), were mainly White (93.3 %), in a relationship with the other parent (98.3 %), primiparous (63.2 %), and from the middle class. Close to a quarter of participants (23.1 %) reported at least one type of childhood trauma (see Table 2).

2.2. Procedures

Data collection was initiated during the very first weeks of the COVID-19 pandemic in Quebec, Canada from April 2nd to April 13th, 2020. All non-essential businesses were closed, and confinement measures were in place from March 24th until May 4th. The second measurement period (T2) took place between July and September 2020 during which public health measures were rigorous and stable in the province of Quebec (i.e. wearing of masks was mandatory everywhere, color-coded alerts and curfews were initiated). The third measurement period (T3) was between September 2020 and February 2021 during which most gatherings were partially or totally banned. The last timepoint (T4) was between January 2021 and May 2021. During this period, a quarter of the population got vaccinated. The sociosanitary context changed toward the end of this period with the accessibility of the vaccine. Measures were completed online on a secure portal. Informed consent was obtained from all participants at each assessment. This study was approved by the Institutional Review Board of our University (#CER-20-266-10.10).

2.3. Instruments

Sociodemographic questionnaires were administered at T1 (assessing age, gender, marital status, family income and pregnancy complications) and at T3 and T4 (assessing maternal marital status and delivery complications, and infant age, sex, and health status).

Childhood trauma was assessed at T1 using the French version of the Childhood Trauma Questionnaire (CTQ-28; Bernstein et al., 2003; Paquette et al., 2004). The 28-item self-reported measure examines 5 types of childhood trauma: physical, psychological, and sexual abuse as well as physical and psychological neglect. Responses to each item are rated on a 5-point Likert scale, ranging from 1 (never true) to 5 (always true). Higher scores reflect more severe exposure to childhood trauma. The CTQ-28 shows a good validity across diverse clinical and general populations (Bernstein et al., 2003). Participants with at least one subscale above the cut-offs (physical [$\geq$ 8], psychological [$\geq$ 10] and sexual abuse [$\geq$ 8] as well as physical [$\geq$ 8] and psychological neglect [$\geq$ 15] (Walker et al., 1999)) were classified as having been exposed to childhood trauma. In the current sample, internal consistency was good (Cronbach's $\alpha = 0.73$ for the total score) and the scores ranged between 25 and 83, with a mean of 31.7 and a median of 29, which is similar to what has been reported in a large sample of pregnant women from the community in the province of Quebec (Garon-

Table 2
Participant's history of childhood trauma and depressive symptoms across the four timepoints (N = 117).

	N	%
History of childhood trauma (CTQ; T1)	27	23.1
Emotional abuse	13	11.1
Physical abuse	6	5.1
Sexual abuse	5	4.3
Emotional neglect	8	6.8
Physical neglect	11	9.4
Denial/minimization of trauma (high or intermediate level)	21	25.6
Clinical depressive symptomatology (EPDS ≥11)		
T1 – prenatal	42	35.9
T2 – prenatal	20	17.1
T3–2-months postnatal	23	20
T4–6-months postnatal	29	24.8
	Range	M (SD)
CTQ total score (T1)	25–83	31.91 (10.19)
CTQ denial/minimization subscale score (T1)	0–3	0.83 (1.14)
EPDS total score (T1)	0–21	8.83 (4.82)
EPDS total score (T2)	0–22	6.28 (4.30)
EPDS total score (T3)	0–24	6.91 (4.80)
EPDS total score (T4)	0–23	7.35 (4.89)

Note. The N and % represent the number of participants who are above the clinical threshold. CTQ = Childhood Trauma Questionnaire; EPDS = Edinburgh Postnatal Depression Scale; T1 = first data collection during first or second trimester of pregnancy; T2 = second data collection during third trimester of pregnancy; T3 = third data collection at 2 months postpartum; T4 = fourth data collection at 6 months postpartum.

Bissonnette et al., 2022).

Maternal perinatal depressive symptomatology was evaluated at each timepoint using the Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987), a 10-item self-report measure using a 4-point variable Likert scale ranging from 0 to 3. Higher total scores reflect greater severity of depressive symptoms. The French (Guedeney & Fermanian, 1998) and English (Cox et al., 1987) versions of the EPDS have shown good reliability and validity when used to measure prenatal and postnatal depressive symptoms (Adouard et al., 2005; Cox & Holden, 2003). Furthermore, a cutoff of 11 was used in order to generate dichotomic variables of suspected clinical depressive symptomatology, a cutoff which maximizes sensitivity and specificity (Levis et al., 2020). In this sample, internal consistency of the instrument was good (Cronbach's α between 0.83 and 0.86 over the four time points) and the scores ranged between 0 and 24. Means for each timepoint is available in Table 1.

2.4. Analysis strategy

Using SPSS version 29.0, normality of the distribution was first assessed with the means and standard deviation of variables (see Tables 1 and 2). Pearson correlations were conducted to identify potential confounding variables in terms of sociodemographic characteristics. Structural equation modeling (SEM) analyses were next performed with MPlus 8.0 (Muthén & Muthén, 2017) using full maximum likelihood parameter estimation to examine the association between severity of maternal childhood trauma and perinatal depressive symptomatology. In this model, exogenous variables were childhood trauma severity (CTQ total score) and depressive symptomatology at T1, T2, T3 and T4 (EPDS scores at each timepoint). The model included two endogenous variables to get a robust construct of depression during pregnancy and postnatally: a latent variable of prenatal depressive symptoms (estimated using EPDS scores at T1 and T2) and a latent variable of postnatal depressive symptoms (estimated using EPDS scores at T3 and T4). The indirect pathway from severity of maternal childhood trauma to postnatal depressive symptoms was assessed using Bootstrapping with 10,000 bootstrap samples. The adequacy of the model fit was assessed using four indices: a non-significant $\chi 2$, a root mean square error of approximation (RMSEA) ≤ 0.06, a comparative fit index (CFI) ≥ 0.95, and a standardized root square residual (SRMR) ≤ 0.08 (Hu & Bentler, 1999; Tabachnick et al., 2019). The model includes 15 estimated parameters, giving a sufficient ratio of 7.8 participants per parameter (Kline, 2023). We further evaluated the odds ratios of reaching the clinical cut-offs of a probable depressive disorder at the EPDS at any of the two prenatal measures and any of the two postnatal measures in women who experienced childhood trauma in comparison to non-exposed women.

3. Results

3.1. Preliminary analyses

As shown in Table 3, no significant associations were observed between potentially confounding variables and depression scores, except for a negative association between annual family income and depression scores at T1. As our sample is economically advantaged and shows little variability on this variable, and as income was not associated with depression at further timepoints, it was not included in the model. We also explored the potential association between the month of completion of questionnaires and depressive symptoms scores to exclude the possibility that the exact timing of the COVID-19 pandemic explained a significant part of the variance in EPDS scores at each timepoint. A significant correlation was observed between the month of questionnaire completion and depressive symptoms at T3 ($r = -0.22$, $p < .05$) and at T4 ($r = -0.26$, $p < .01$), the earlier the questionnaire was completed, the higher the depression scores. The SEM was therefore repeated, controlling for the timing of data collection at T3 and T4, which yield similar results (see Figure S1, available online). Furthermore, trauma-exposed women and non-exposed women were not statistically different in terms of maternal education ($\chi^2 = 2.290$, $p = .683$), family income ($\chi^2 = 15.997$, $p = .067$), relationship with other parent ($\chi^2 = 0.831$, $p = .362$), parental status ($\chi^2 = 1.770$, $p = .183$), trimester of pregnancy at T1 ($\chi^2 = 0.240$, $p = .624$), maternal age ($t = 0.291$, $p = .772$), weeks of pregnancy ($t = 1.100$, $p = .274$) or gestational age in weeks ($t = 0.655$, $p = .514$). Accordingly, no covariate was included in the regression analyses.

3.2. Structural equation modeling (SEM)

We then tested the direct and indirect effect of maternal severity of CT on postnatal depressive symptoms, via prenatal symptomatology (see Fig. 1). Indices revealed an excellent fit for the model, χ^2 (3, N = 117) = 2.957, $p = .398$, CFI = 1.000, RMSEA = 0.000 with 90 % CI [0.000, 0.155]. First, maternal severity of CT was significantly associated with prenatal depressive symptoms ($\beta = 0.247$, $p = .018$) and prenatal depressive symptoms were significantly associated with depressive symptoms after childbirth ($\beta = 0.756$, $p < .001$). Second, the indirect effect of maternal severity of CT on postnatal depressive symptoms via prenatal depressive symptoms was significant ($\beta = 0.186$, $p = .024$). The direct effect of maternal severity of CT on postnatal depressive symptoms was also significant ($\beta = 0.197$, $p = .033$). The model explained 68.3 % of the variance of maternal postnatal depressive symptoms.

Analyses using categorical scores showed that women who experienced childhood trauma were not more at risk of reaching the clinical cut-off of the EPDS at any of the prenatal assessments (OR = 1.62, $p = .28$) but had a 4.48-fold increased risk ($p = .001$) of postpartum depression in comparison to women without a history of trauma.

Table 3
Correlations between study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. CTQ total score	–														
2. EPDS total score at T1	0.244**	–													
3. EPDS total score at T2	0.167	0.574***	–												
4. EPDS total score at T3	0.295**	0.421***	0.543***	–											
5. EPDS total score at T4	0.296**	0.447***	0.492***	0.609***	–										
6. Maternal age	−0.012	−0.089	0.045	−0.147	−0.056	–									
7. Family income	−0.205*	−0.275**	−0.106	−0.130	−0.085	0.259**	–								
8. Maternal education	−0.104	−0.073	−0.152	−0.024	−0.100	0.289**	0.257**	–							
9. Couple w/ other parent (yes/no)	−0.216*	0.091	0.147	0.012	0.104	−0.010	0.233*	0.125	–						
10. Parental status (primiparous/ multiparous)	−0.166	−0.121	−0.034	−0.110	−0.011	0.022	0.097	0.014	−0.036	–					
11. Weeks of pregnancy at T1	−0.098	0.055	0.124	0.042	0.062	−0.026	−0.204*	0.070	−0.074	−0.099	–				
12. Ethnicity	−0.016	0.025	0.130	0.013	0.152	0.136	0.181	−0.025	0.018	−0.102	0.015	–			
13. Financial situation affected by COVID-19	−0.006	0.052	0.012	0.011	−0.099	−0.197*	−0.005	−0.013	−0.140	0.035	−0.024	0.073	–		
14. Gestational age	0.076	0.158	0.142	0.162	0.181	−0.210*	−0.099	−0.118	−0.035	−0.070	0.036	−0.031	−0.032	–	
15. Infant sex	0.044	0.040	−0.097	−0.059	0.133	−0.043	−0.109	−0.117	−0.066	0.167	0.007	0.062	0.027	−0.101	–
16. CTQ denial/minimization subscale (continuous)	0.097	0.013	−0.034	−0.028	−0.045	0.046	−0.183*	0.140	−0.020	−0.088	0.048	−0.092	−0.051	0.059	−0.098

Note. Pearson's correlations were used to assess associations between continuous variables; Point-Biserial correlations were used to assess associations between dichotomous and continuous variables; Spearman's correlations were used to assess associations between ordinal and continuous variables. CTQ = Childhood Trauma Questionnaire; EPDS = Edinburgh Postnatal Depression Scale; T1 = first data collection during first or second trimester of pregnancy; T2 = second data collection during third trimester of pregnancy; T3 = third data collection at 2 months postpartum; T4 = fourth data collection at 6 months postpartum.

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

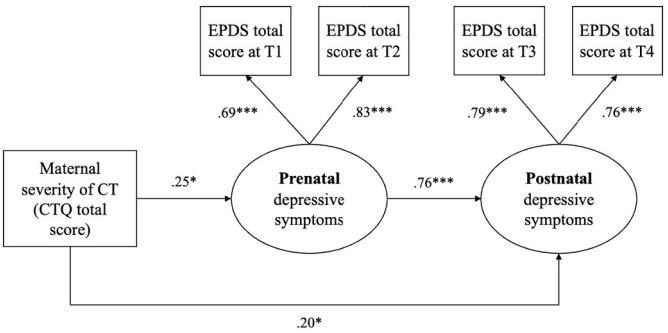

Fig. 1. Direct and indirect effects of prenatal depressive symptoms on the association between maternal severity of CT and postnatal depressive symptoms. *p < .05, ***p < .001. Note. Structural equation modeling (SEM) analyses of direct and indirect effects of maternal severity of CT on latent variables of prenatal and postnatal depressive symptoms. CT = childhood trauma; CTQ = Childhood Trauma Questionnaire; EPDS = Edinburgh Postnatal Depression Scale; T1 = first data collection during first or second trimester of pregnancy; T2 = second data collection during third trimester of pregnancy; T3 = third data collection at 2 months postpartum; T4 = fourth data collection at 6 months postpartum.

4. Discussion

The aim of this study was to evaluate the associations between childhood trauma and depressive symptoms over time in women that were pregnant at the beginning of the pandemic by assessing the direct and indirect effects of maternal severity of childhood trauma on depressive symptoms at four timepoints (two prenatally and two postnatally). Consistent with our hypotheses, our findings showed (a) a direct effect of maternal severity of CT on pre- and postnatal depressive symptoms and (b) an indirect effect of maternal severity of CT on postnatal depressive symptoms via prenatal depressive symptoms.

Our findings are consistent with the stress sensitization hypothesis, which proposes that exposure to CT could lead to a form of latent vulnerability, making individuals more at risk of emotion dysregulation and psychological distress when faced with new stressors (Hammen et al., 2000; Heim & Binder, 2012). Accordingly, we observed that women exposed to CT were 4.48 more at risk of postpartum depression than women without a history of CT during the COVID-19 pandemic. Of note, this latent vulnerability to new stressors may have been particularly salient during the pandemic, as some features of this period may have triggered past traumas. Indeed, home isolation and physical distancing, the uncertainty about health risks for pregnant women and their fetus, as well as domestic and socioeconomic stressors may have represented a significant psychological burden and have recreated the sense of insecurity and unpredictability that characterizes CT, increasing the risk of emotional disturbance under the form of depressive symptoms (Jernslett et al., 2022). In addition to the factors listed above, social support was belittling and transformed in the particular sociosanitary context of the first year of the pandemic, a protective factor which has been shown to limit the negative effect of childhood trauma in pregnant women (Filippetti et al., 2022; Li et al., 2022; Thomson et al., 2022). In other words, women who had experienced trauma were not only more likely to find themselves in a position of emotional imbalance during the pandemic but were also likely to be deprived of the protective factors that could have helped limit the effects of their latent vulnerability.

Given the factors mentioned above, we might have expected a particularly strong association between severity of CT and perinatal depressive symptoms during the pandemic. Interestingly, however, the strengths of the associations observed in the current study did not seem to be much different from those of pre-pandemic studies (Garon-Bissonnette et al., 2022; Osofsky et al., 2021; Racine et al., 2021; Shreffler et al., 2021). Indeed, meta-analytic findings reported small to medium pooled effect sizes for the association between maternal history of CT and prenatal ($k = 12$; $r = 0.19$; 95 % CI [0.13, 0.24]) and postpartum ($k = 7$; $r = 0.23$; 95 % CI [0.06 to 0.39]) depressive symptoms (Racine et al., 2021). On the one hand, this similarity may suggest that the arrival of a child, whether or not it is during a pandemic, can be a sufficient trigger for psychological distress for some women that have been previously fragilized by difficult life experiences, such as by CT. Considering that expecting a child may reactivate threatening attachment representations with maltreating caregivers (Racine et al., 2021; Slade et al., 2009), this could lead to emotion dysregulation and increase the odds of prenatal and postnatal depressive symptoms. On the other hand, many pregnant women, and not only women exposed to trauma, were confronted with significant levels of stress around the onset of the pandemic and may have experienced higher levels of mood dysregulation than usual (Delanerolle et al., 2023), narrowing the gap between the two cohorts. The effect of stress sensitization may therefore become more apparent when looking at the longitudinal trajectories of depressive symptoms over a longer period of time, with trauma-exposed women being possibly more likely to remain depressed over the long-term (Negele et al., 2015). Consistent with this assumption, we found that trauma-exposed women were no more likely to have a probable major depressive disorder during pregnancy than non-exposed women, but were 4.48 times more likely to be clinically depressed in the postnatal period. To further address these questions, cohort studies contrasting the longitudinal trajectories of symptoms in pandemic samples to the one of pre- or post-pandemic samples will be required.

4.1. *Strengths and limitations*

This study is not without limitations. First, whereas our findings are in line with the stress sensitization model, our design did not

permit assessing whether the COVID-19 pandemic moderated the association between trauma and perinatal depressive symptoms, calling for further cohort studies that include women that were pregnant during and outside the COVID-19 pandemic. Second, our study may lack diversity (98.3 % White, 76.1 % having a university degree, 51.3 % with a familial annual revenue >$95,000 CAD), thus undermining the generalization of our findings. Third, the lack of pre-pregnancy measures limits possible inferences about whether our findings are specific to pregnant women. Fourth, the use of a self-reported measurement of CT may induce retrospective recall biases and over- or under-evaluate the severity or the frequency of abuse and neglect in childhood, as well as not considering other forms or occurrences of trauma later in life. Nevertheless, retrospective measures of trauma were found to be more predictive of psychopathology than prospective measures, which do not take into account first-person subjective appraisals of childhood experiences (Baldwin et al., 2024). Furthermore, the lack of a measure of the severity of the stress experienced during the pandemic prevents us from characterizing the subjective stress experienced by our sample because of the pandemic. However, one strength of this study is the use of a longitudinal design, unlike the vast majority of existing studies (Iyengar et al., 2021), allowing us to evaluate the evolution of depressive symptoms in childbearing women during the COVID-19 pandemic. The use of four time points helped balancing out noise associated with other factors not considered in the study. Considering that our first data collection took place rapidly at the beginning of the pandemic (April 2020), at a time when there was no cure or effective protection against a virus the effects of which were unknown, it is reasonable to assume that stress was uniformly higher than usual, which was later confirmed by scientific literature (Tomfohr-Madsen et al., 2021). Finally, future research should evaluate whether the associations observed between CT and maternal depression during the COVID-19 pandemic persisted beyond 6 months after childbirth and the extent to which those traumas and the pandemic interfered with mother-child interactions and child development. Future studies with larger samples will also be needed to provide a clearer assessment of the heterogeneous longitudinal profiles of depressive symptoms following population-based stressors in pregnant women with and without histories of childhood trauma.

4.2. Clinical and scientific implications

This study has multiple clinical and scientific implications. First and foremost, our finding that 68.3 % of the variance in maternal postnatal depressive symptoms was explained by maternal severity of CT and prenatal depressive symptoms calls for careful and trauma-informed screening of CT in pregnant women and close monitoring of current psychiatric symptoms. Trauma-informed interventions aiming to support maternal mental health during the perinatal period should also be implemented. In times like the COVID-19 pandemic, brief and online interventions should be prioritized (Berthelot et al., 2023) in order to mitigate the impacts of perinatal depression and the intergenerational transmission of trauma. Furthermore, this study highlights the importance of increased surveillance of at-risk populations during global crises, such as pregnant women and survivors of childhood trauma. However, this also applies in a post-pandemic world: exposure to significant stress during pregnancy, whether due to a virus or not, can have considerable impacts on mothers and possibly families, as shown in this study. Additionally, monitoring should be increased in survivors of CT following childbirth, even in the absence of prenatal symptoms of depression, given our finding of a direct association between maternal severity of CT and postnatal depressive symptomatology.

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CRediT authorship contribution statement

Gabrielle Duguay: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Julia Garon-Bissonnette:** Writing – review & editing, Validation, Supervision, Data curation. **Roxanne Lemieux:** Writing – review & editing, Project administration, Funding acquisition, Data curation. **Karine Dubois-Comtois:** Writing – review & editing, Supervision, Conceptualization. **Nicolas Berthelot:** Writing – review & editing, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization.

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Data availability

Data will be made available on request.

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