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Distinct forms of childhood maltreatment and their associations with subjective and objective sleep during pregnancy

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ABSTRACT

Objectives: To examine the associations between distinct forms of childhood maltreatment and subjective/objective sleep during the second trimester of pregnancy.
Methods: Seventy-two pregnant women ($n = 42$ with an history of childhood maltreatment) were assessed between 18 and 20 weeks of gestation, a period considered relatively stable within pregnancy. Sleep was evaluated using both subjective and objective measures. Subjective sleep was measured using two validated self-report questionnaires, the Pittsburgh Sleep Quality Index and the Epworth Sleepiness Scale. Objective sleep was measured using actigraphy (Mini-Mitter/Respironics) worn on the non-dominant wrist for seven consecutive days, accompanied by daily sleep diaries. Linear regression models were used to test associations between five distinct forms of childhood maltreatment (physical neglect, emotional neglect, physical abuse, emotional abuse, and sexual abuse) and sleep parameters (subjective and objective measures). Analyses were conducted using both dichotomous exposure scores (yes/no based on validated cutoffs) and continuous severity scores. All models simultaneously controlled for other forms of childhood maltreatment types, maternal education and household income.
Results: Pregnant women with a history of childhood emotional abuse reported significantly poorer subjective sleep, reflected in a 2-point higher on the Pittsburgh Sleep Quality score ($2.0 \pm .9$, $p = .03$) compared to pregnant women without such histories. Objective actigraphy data indicated that pregnant women with a history of childhood sexual abuse obtained approximately 1 h less nighttime sleep (-62.1 ± 20.3 min, $p = .003$) compared to pregnant women who did not report childhood sexual abuse. Analyses using continuous severity scores for each childhood maltreatment type yielded consistent findings.
Conclusions: Distinct forms of childhood maltreatment appear to have different associations with subjective and objective sleep during pregnancy. These findings underscore the importance of replication in larger and more diverse samples, as well as the need for studies that monitor sleep across pregnancy to clarify mechanisms and inform trauma-informed approaches to perinatal sleep health.

1. Introduction

Women are generally more prone to experiencing sleep disturbances compared to men, with the odds of insomnia being 1.4 to 1.6 times higher [1]. In women, sleep problems can be especially acute during certain life stages, such as pregnancy. Sleep during pregnancy is influenced by a myriad of factors including normative hormonal changes that support fetal development, physical discomforts, and psychological

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stressors [2,3]. At the beginning of pregnancy, women frequently experience symptoms such as nausea and fatigue which typically subside during the second trimester and transform into more mechanical sleep disturbances during late pregnancy (Mindell, Cook & Nikolovski, 2015), Unfortunately, sleep disturbances, such as increased napping, nighttime awakenings, and overall poorer sleep quality, are common during this period [4]. Research indicates that sleep disturbances can contribute to adverse birth outcomes and negatively relate to maternal well-being throughout pregnancy [5]. For instance, poor maternal sleep is linked to an increased risk of preterm birth, gestational diabetes, low birth weight, and cesarean delivery [6–8]. Conversely, when quality sleep is preserved during pregnancy, it plays a crucial role in promoting overall health and is associated with optimal outcomes for both the mother and the developing fetus [5]. Identifying *who* is most at risk for sleep disturbances, and understanding the contributing factors, is a priority for research aimed at optimizing maternal and fetal health outcomes.

1.1. Maternal childhood maltreatment and sleep during pregnancy

To identify factors contributing to sleep disturbances, we need to better understand the complex association between childhood maltreatment and sleep during pregnancy [9–11]. Childhood maltreatment is common among pregnant women in the general population, with approximately one-third of women reporting having experienced at least one form of maltreatment, including physical neglect, emotional neglect, physical abuse, emotional abuse, or sexual abuse [12]. Consistently, childhood maltreatment is linked to psychological problems [13] and physical health issues ([14]; Moog et al., 2017; [15]) during pregnancy. Further, it is associated with an increased risk of adverse outcomes in offspring, including poorer development during infancy and toddlerhood [16,17] and a heightened risk of emotional and psychological problems later in development [18–20]. The long-term and intergenerational impacts of childhood maltreatment are thought to operate in part through disruptions in maternal regulatory systems during pregnancy [21,22]. As such, maternal prenatal sleep dysregulation may represent a key pathway linking childhood maltreatment to adverse outcomes.

Several empirical studies have found that childhood maltreatment is associated with increased self-reported sleep problems in adulthood [23,24], including longer sleep latency and overall poorer sleep quality during pregnancy ([25]; Gelaye et al., 2025; [10,11]). These associations between childhood maltreatment and poorer sleep quality appear quite robust: they were observed in samples of both adult ([25]; Gelaye et al., 2025; [11]) and adolescent pregnant women [10], as well as using both cross-sectional [9,25] and longitudinal designs [10,11]. Moreover, these associations would persist throughout pregnancy [11]. Although these studies offer valuable insights into the link between childhood maltreatment and subjective sleep during pregnancy—reflecting perceived sleep quality, future research is needed to determine whether childhood maltreatment is associated with objectively measured sleep disruptions or solely with one's perception of sleep. Moreover, prior studies examining the associations between childhood maltreatment and sleep have typically used a total score of maltreatment, without distinguishing between forms of childhood abuse or neglect. Identifying how distinct forms of childhood abuse or neglect may differently influence sleep during pregnancy could enhance our precision in identifying those most at risk of sleep disturbances during pregnancy [26]. To address these gaps, the present study examined whether differences in subjective and objective sleep characteristics during pregnancy were associated with distinct forms of childhood maltreatment in a community sample of pregnant women. We assessed sleep around 20 weeks' gestation given that sleep patterns may normalize during the second trimester [27]. Given the limited existing evidence on the associations between distinct forms of childhood maltreatment and sleep, we did not formulate specific hypotheses about the differential associations between different types of abuse and neglect and sleep characteristics during pregnancy.

2. Method

2.1. Participants and procedure

The study received ethical approval from our Regional Health Center (blind for review) and the ethics review board of university (blind for review). During pregnancy monitoring appointments, nurses briefly presented the study, which is part of a larger project on the transition to parenthood in the context of childhood maltreatment. Interested participants provided their contact information and were later contacted by the research team. Inclusion criteria included being at least 18 years of age, having sufficient reading skills in French to complete self-reported assessments and being between 18 and less than 20 weeks pregnant during a relatively stable phase of gestation. Exclusion criteria included non-singleton pregnancies, suffering from a severe psychiatric disorder (e.g., psychosis), experiencing severe peripartum complications, or awaiting a child with a known congenital disorder. Prior to enrollment, research assistants explained the study to participants over the phone, answered any questions, and obtained their verbal consent to participate. Those who agreed to participate met with a research assistant during a home visit; research assistants provided detailed instructions on how to complete the self-report sleep questionnaires, wear the actigraphy device, and complete the sleep diary. All participants provided written informed consent and received a financial compensation of CAD $40 for their participation.

2.2. Measures

Participants completed a brief questionnaire covering demographic and participant characteristics, such as maternal age, maternal education level, having other children in charge, household income and number of nights with actigraphy device.

2.2.1. Maternal childhood maltreatment history

Childhood maltreatment was assessed using the French version [28] of the Childhood Trauma Questionnaire (CTQ-28; [29]). This self-report measure consists of 28 items that assess the severity of exposure to five types of maltreatment before the age of 18: physical neglect, emotional neglect, physical abuse, emotional abuse, and sexual abuse. Each item is rated on a 5-point Likert scale ranging from 1 (*never true*) to 5 (*always true*), with higher scores indicating more severe maltreatment. Established cut-off scores for each subscale are as follows: physical neglect: $\geq$8, emotional neglect: $\geq$15, physical abuse: $\geq$8, emotional abuse: $\geq$10 and sexual abuse: $\geq$8 [30]. Participants reaching or exceeding the cutoff on at least one subscale were categorized as having experienced childhood maltreatment. Internal consistency for the CTQ subscales is satisfactory with Cronbach's alphas ranging from .68 to .91 [29].

2.2.2. Subjective sleep

We used two complementary instruments to measure subjective sleep. The first questionnaire—the Pittsburgh Sleep Quality Index (PSQI) [31] —measures sleep quality, while the second—the Epworth Sleepiness Scale (ESS; [32]) —assesses levels of sleepiness. The PSQI is a 19-item self-report questionnaire that includes seven subscales: sleep latency, sleep duration, sleep disturbances, sleep medication, subjective sleep quality, sleep efficiency, and daytime dysfunction. Each item is rated on a 4-point Likert-type scale (0 = not during the past month to 3 = three or more times a week), with a global score ranging from 0 to 21. We used the total score to assess subjective perceptions of sleep quality, with higher scores indicating poor sleep quality [31]. The internal consistency of the global score has been shown to be satisfactory in pregnant women, with Cronbach's alphas ranging from .70 to .76 [33].

The Epworth Sleepiness Scale (ESS), a standardized questionnaire measuring the likelihood of falling asleep in eight different everyday

situations, was used to assess daytime sleepiness. Each item is rated from 0 (extremely unlikely to fall asleep) to 3 (very likely to fall asleep), yielding a total score ranging from 0 to 24. Higher scores indicate a greater propensity for daytime sleepiness. The ESS has demonstrated a satisfactory internal consistency, with a Cronbach's alpha of .75 in pregnant women [34].

2.2.3. Objective sleep

Objective sleep parameters were measured through actigraphy using the Actiwatch-2 (Mini-Mitter/Respironics device) worn on the non-dominant wrist, concurrently with the collection of sleep diaries over a 7-day period (5 weekdays and one full weekend). Data from the sleep diaries were used to verify the accuracy of the actigraphy data, particularly for daytime naps, and were not used as dependent variables in the current study. The Actiwatch-2 contains a piezo-electric linear accelerometer; activity counts are accumulated at selected time intervals and data are downloaded to a computer. Acceleration signals from movements were collected in 30-s epochs. Participants were informed about the monitor's function and instructed to record bedtime and wake time by pressing the event button on the actigraph.

Actigraphy data were analyzed using the algorithm provided by the Actiwatch Sleep Analysis Software (Cambridge Neurotechnology Ltd). Using the default medium sensitivity setting, an integrated activity count of 40 within a 30-s epoch designates the epoch as being awake [35]. For automatic determination of sleep onset, the algorithm searches for a period of at least 10 min of consecutively recorded immobile data, with no more than one epoch of movement within this period, following the lights-off time. To determine sleep end, the algorithm searches for a 10-min consecutive period of activity around the lights-on time and then works backward to find the last epoch of immobility before the start of this sequence, classifying that as sleep end. The following objective sleep characteristics were calculated by the Actiwatch Sleep Analysis Software and used in the present study: (1) nighttime sleep duration, (2) daytime sleep duration, (3) number of nighttime awakenings, (4) nighttime awakening duration and (5) sleep efficacity (time asleep/time in bed × 100).

2.3. Statistical analyses

2.3.1. Selection of potential covariates

Covariates were considered based on their theoretical associations with adaptation following childhood maltreatment and sleep characteristics [36]. Potential covariates included the number of nights mothers wore the actigraphy device, maternal age, presence of other children in the household (yes/no), maternal education (post-secondary vs. not) [37], and household income (low vs. sufficient, with the cut-off set at CAD $55,000). The selection of covariates was based on empirical associations with distinct forms of childhood maltreatment and tested using t-tests (number of nights mothers wore the actigraphy device, maternal age) and chi-square tests (presence of other children in the household, maternal education and household income).

2.3.2. Main analyses

To test multicollinearity between distinct forms of maltreatment (yes/no based on validated cut-offs) and continuous severity scores for abuse and neglect during childhood, correlation matrices were computed. Multiple linear regression analyses were then conducted to examine the associations between exposure to distinct forms of maternal childhood maltreatment and sleep characteristics. These analyses were conducted in two stages. In stage 1, the model simultaneously included the five distinct forms of childhood maltreatment as predictors. In stage 2, the selected covariates were added to the model.

3. Results

A total of 72 pregnant women participated in the study, including 42 (59.2%) women with a history of childhood maltreatment. More precisely, 38.9% (n = 28) reported physical neglect, 22.5% (n = 16) emotional neglect, 15.3% (n = 11) physical abuse, 39.4% (n = 28) emotional abuse, and 25.4 % (n = 18) sexual abuse. On average, participants were 28.1 years old (SD = 4.6), had completed middle school or university (64.8 %), reported a household income of at least CAD $55,000 (66.7 %) and had no other children in their household during the study period (56.7%). In all, 83.3 % of participants wore the actigraph for the full 7-day period with a minimum of 3 days. One participant's actigraphy data were excluded from the objective sleep analyses (n = 71) because the device was worn for only one day; this participant's data were included in the analyses of subjective sleep characteristics (n = 72). According to sleep diaries, none of the participants in the present study reported using sedating medications or worked the night shift during data collection.

Table 1a summarizes the demographic and participant characteristics of the study sample. As shown in Tables 1b and 1c, pregnant women without post-secondary education and those with low household income reported higher rates of all forms of childhood maltreatment (neglect and abuse). Other potentially confounding variables were homogeneously distributed between women exposed and not exposed to the five distinct forms of childhood maltreatment. Analyses using continuous scores for the severity of abuse and neglect yielded consistent results (see Table S1, available online). Correlations were found between distinct forms of childhood maltreatment (r = .33 to .55) (Table 2 for categorical data and (r = .46 to r = .69) (Table S2, available online, for continuous data) that justifies the importance to enter simultaneously the five distinct forms of childhood maltreatment in the model.

3.1. Childhood maltreatment and subjective sleep

The associations between childhood maltreatment and the subjective experience of sleep are presented in Table 3 and Table S3 (available online). The first multiple linear regression model, testing the specific associations between the distinct forms of childhood maltreatment (exposed vs non-exposed) and the PSQI total score (measuring subjective sleep quality) was statistically significant [$F(5, 61) = 3.13, p = .01$]. Taken together, the five forms of childhood maltreatment explained 20% of the variance in subjective sleep quality. The second model, which controlled for maternal education and household income, was also statistically significant [$F(7, 56) = 2.97, p = .01$] and yielded similar results: women who reported childhood emotional abuse reported a two-point increase on the PSQI scale compared to those who had not. Consistent findings were observed when using continuous severity scores of childhood maltreatment (see Table S3, available online).

Table 1a
Demographic and participant characteristics of the study sample.

Demographic characteristics	Mean (SD) or n (%)
Maternal age§, years	28.1 ± 4.6
Maternal education level	
Primary	8 (11.3)
Secondary or vocational training	17 (23.9)
College	21 (29.6)
University	25 (35.2)
Having other children in care	
Yes	29 (43.3)
No	38 (56.7)
Household income level	
Less than $54 999	23 (33.3)
From $55 000 to $74 999	15 (21.7)
$75 000 or more	31 (44.9)
Number of nights with actigraphy§, days	6.7 ± .7

§ T-tests were used for continuous variables.

Table 1b
Potentially covariates associated with pregnant women who reported distinct forms of childhood neglect compared to those who did not.

Sociodemographic variables	Physical neglect		p	Emotional neglect		p
	Yes (n = 28)	No (n = 44)		Yes (n = 16)	No (n = 55)	
	mean (SD) or n (%)	mean (SD) or n (%)		mean (SD) or n (%)	mean (SD) or n (%)	
Continuous variables§						
Number of nights with actigraphy	6.6 (.9)	6.8 (.6)	.16	6.4 (1.1)	6.8 (.6)	.20
Maternal age	27.9 (5.2)	28.3 (4.2)	.73	27.8 (5.6)	28.4 (4.1)	.60
Categorical variables #						
Having other children in care, no	15 (60.0)	23 (54.8)	.68	8 (61.5)	29 (54.7)	.66
Maternal education level, low[a]	**15 (53.6)**	**10 (23.2)**	**.009**	**9 (56.3)**	**15 (27.8)**	**.04**
Household income level, low[b]	**14 (50.0)**	**9 (22.0)**	**.02**	**12 (75.0)**	**10 (19.2)**	**<.001**

§ T-tests were used for continuous variables.
#Chi-squared tests were used for categorical variables.
[a]Maternal education level means Low = Professional cursus, high school or less; No (reference) = College education or University.
[b]Household income level means Low = less than $55 000; No (reference) = $55 000 or higher.

3.2. Childhood maltreatment and objective sleep

The associations between childhood maltreatment and objective sleep characteristics are presented in Table 4 and Table S4 (available online). Regarding nighttime sleep duration, the model without covariates was statistically significant [$F(5, 63) = 3.81$, $p = .004$] and explained 23% of the variance in nighttime sleep duration. In this model, childhood sexual abuse emerged as the only statistically significant factor associated with nighttime sleep duration ($\beta = -45.6$, SD = 17.3, $p = .003$). The second model, which controlled for maternal education and household, also reached statistical significance [$F(7, 58) = 3.05$, $p = .008$] and confirmed the association between sexual abuse and nighttime sleep duration ($\beta = -63.9$, SD = 20.3, $p = .003$). In this model, women who reported a history of sexual abuse obtained approximately 1 h less of objective nighttime sleep duration compared to those without such a history. No significant associations were found between other forms of childhood abuse and neglect and the remaining objective sleep characteristics (Table 4). Analyses using continuous severity scores of abuse and neglect yielded similar results, with statistically significant associations between childhood sexual abuse and objective nighttime sleep duration (Table S4, available online). As analyses using continuous severity scores offer additional statistical power and sensitivity to detect associations, however, they revealed two additional significant associations. First, the models testing associations between childhood maltreatment and daytime sleep duration were statistically significant (Table S4, available online) and the severity of maternal childhood physical abuse was negatively associated with daytime sleep duration, even after controlling for relevant covariates ($\beta = -1.3$, SD = .5, $p = .02$). Second, a positive association was found between maternal education and nighttime awakening duration ($\beta = 22.3$, SD = 8.7, $p = .01$):

Table 2
Correlation matrix between distinct forms of childhood maltreatment.

Variables	1	2	3	4	5
1. Physical neglect	1	.55**	.45**	.47**	.33**
2. Emotional neglect		1	.42**	.46**	.41**
3. Physical abuse			1	.45**	.47**
4. Emotional abuse				1	.19
5. Sexual abuse					1

* Significant at P < .05.
** Significant at P < .01.

Table 3
Models on sleep questionnaires in function of distinct forms of childhood maltreatment (model 1) and model 2 adjusted also on significant covariates.

Models	Pittsburgh Sleep Quality Index		Epworth Sleepiness Scale	
	B (SE)	p	B (SD)	p
Model 1		*		
Physical neglect	−1.0 (.9)	.28	.5 (1.2)	.65
Emotional neglect	.6 (1.0)	.57	−1.4 (1.4)	.31
Physical abuse	.8 (1.2)	.50	2.5 (1.6)	.13
Emotional abuse	**2.1 (.8)**	**.02**	−.3 (1.1)	.77
Sexual abuse	1.2 (.9)	.22	.8 (1.3)	.51
R^2 model	.20		.08	
Model 2		*		
Physical neglect	−.8 (.9)	.40	.3 (1.3)	.84
Emotional neglect	.3 (1.1)	.80	−1.3 (1.5)	.38
Physical abuse	.6 (1.4)	.67	3.1 (1.9)	.11
Emotional abuse	**2.0 (.9)**	**.03**	−.6 (1.2)	.96
Sexual abuse	.5 (1.0)	.63	1.1 (1.5)	.48
Maternal education[a]	.5 (.9)	.59	−.5 (1.4)	.75
Household income[b]	1.0 (1.0)	.32	−.6 (1.4)	.68
R^2 model	.26		.10	

SE means standard error. [a]Maternal education means Low = Professional cursus, high school or less; No (reference) = College education or University. [b]Household income means Low = less than $55 000; No (reference) = $55 000 or higher.

Table 1c
Potentially covariates associated with pregnant women who reported distinct forms of childhood abuse compared to those did not.

	Physical abuse		p	Emotional abuse		p	Sexual abuse		p
	Yes (n = 11)	No (n = 61)		Yes (n = 28)	No (n = 43)		Yes (n = 18)	No (n = 53)	
Sociodemographic variables	mean (SD) or n (%)	mean (SD) or n (%)		mean (SD) or n (%)	mean (SD) or n (%)		mean (SD) or n (%)	mean (SD) or n (%)	
Continuous variables§									
Number of nights with actigraphy	6.8 (.4)	6.7 (.8)	.68	6.5 (.9)	6.9 (.6)	.11	6.7 (.8)	6.7 (.7)	.89
Maternal age	27.9 (5.2)	28.2 (4.5)	.87	27.9 (4.8)	28.4 (4.6)	.68	26.6 (5.0)	28.7 (4.4)	.10
Categorical variables #									
Having other children in care, no	2 (25.0)	36 (61.0)	.05	15 (60.0)	22 (53.7)	.62	7 (46.7)	30 (58.8)	.40
Maternal education level, low[a]	**9 (81.8)**	**16 (26.7)**	**<.001**	**16 (57.1)**	**9 (21.4)**	**.002**	**13 (76.5)**	**12 (22.6)**	**<.001**
Household income level, low[b]	**9 (90.0)**	**14 (23.7)**	**<.001**	**14 (51.9)**	**9 (22.0)**	**.01**	**13 (76.5)**	**10 (19.6)**	**<.001**

§T-tests were used for continuous variables.
#Chi-squared tests were used for categorical variables.
[a]Maternal education level means Low = Professional cursus, high school or less; No (reference) = College education or University.
[b]Household income level means Low = less than $55 000; No (reference) = $55 000 or higher.

Table 4
Models of actigraphic sleep characteristics associated with distinct forms of childhood maltreatment (model 1) and model 2 adjusted also on significant covariates (maternal education and household income).

Models	Nighttime sleep duration (min)		Daytime sleep duration (min)		Number of nighttime awakening		Nighttime awakening duration (min)		Sleep efficiency	
	B (SE)	*p*	B (SE)	*p*	B (SE)	*p*	B (SE)	*p*	B (SE)	*p*
Model 1		*								
Physical neglect	27.7 (16.5)	.10	−2.3 (3.2)	.47	−6.8 (4.0)	.10	−11.2 (8.5)	.19	2.3 (1.9)	.13
Emotional neglect	15.2 (18.7)	.81	−.6 (3.6)	.88	8.0 (4.5)	.08	8.0 (9.7)	.41	−1.0 (1.7)	.56
Physical abuse	−34.7 (21.4)	.11	−.3 (4.2)	.94	.2 (5.2)	.96	8.9 (11.1)	.42	−2.4 (1.9)	.22
Emotional abuse	17.5 (15.0)	.25	3.1 (2.9)	.29	5.4 (3.7)	.14	14.5 (7.8)	.07	−2.0 (1.4)	.15
Sexual abuse	**−45.6 (17.3)**	**.01**	5.4 (3.4)	.11	1.0 (4.2)	.81	13.7 (8.9)	.13	−3.0 (1.6)	.06
R^2 model	.23		.07		.12		.20		.21	
Model 2		*								
Physical neglect	19.1 (17.4)	.28	−1.6 (3.1)	.59	−7.0 (4.2)	.10	−12.9 (9.0)	.16	2.4 (1.6)	.15
Emotional neglect	23.2 (20.2)	.26	−3.5 (3.5)	.34	7.2 (4.9)	.15	5.5 (10.4)	.60	−.4 (1.9)	.85
Physical abuse	−29.4 (24.2)	.23	−.7 (4.2)	.87	−1.1 (5.9)	.85	6.6 (12.5)	.60	−2.0 (2.2)	.37
Emotional abuse	10.8 (15.5)	.49	4.6 (2.7)	.10	5.0 (3.8)	.19	11.7 (8.0)	.15	−1.7 (1.4)	.23
Sexual abuse	**−62.1 (20.3)**	**.003**	7.4 (3.6)	.04	.6 (4.9)	.90	5.0 (10.5)	.64	−2.2 (1.9)	.24
Maternal education[a]	**35.2 (17.1)**	**.04**	−4.3 (3.0)	.16	3.2 (4.2)	.44	12.6 (8.8)	.16	−.8 (1.6)	.61
Household income[b]	−9.6 (18.5)	.60	4.3 (3.2)	.20	1.9 (4.5)	.67	10.2 (9.5)	.29	−1.7 (1.7)	.31
R^2 model	.27		.17		.15		.27		.25	

SE means standard error. [a]Maternal education means Low = Professional cursus, high school or less; No (reference) = College education or University. [b]Household income means Low = less than $55 000; No (reference) = $55 000 or higher.

women with lower education levels were more likely to experience frequent awakenings during the night.

4. Discussion

This study aimed to investigate whether three forms of abuse and two forms of neglect were associated with subjective and objective sleep characteristics during pregnancy. Using both categorical and continuous approaches to assess childhood maltreatment exposure, we found different patterns of associations between distinct forms of childhood maltreatment and both subjective and objective sleep characteristics. Notably, associations emerged between higher severity of childhood emotional abuse and poorer perceived sleep quality, as well as between higher severity of childhood sexual abuse and poorer objective sleep (i.e. nighttime sleep duration measured via actigraphy). The absence of associations for other childhood maltreatment subtypes may be due to limited statistical power, as some categories were endorsed by few participants. Larger studies will be needed to clarify whether these forms of maltreatment are also linked to sleep characteristics. These findings are among the first to examine both subjective and objective sleep characteristics in pregnant women with histories of distinct forms of childhood maltreatment.

First, our results indicate that pregnant women who experienced childhood emotional abuse reported a two-point increase on the Pittsburgh Sleep Quality Index compared to those who did not report such experiences. This finding is consistent with prior research linking childhood emotional abuse and poor sleep quality in non-pregnant women [38,39]. For instance, using daily sleep diaries, Hamilton et al. [40] found that young adults with a history of emotional abuse reported more severe insomnia symptoms. Though this association may be direct, it may occur through indirect pathways, whether they are biological or psychological. For instance, depressive symptoms are prevalent among pregnant women who report histories of childhood emotional abuse [41]. Since depressive symptoms are associated with disturbances in sleep architecture [42], the observed association between emotional abuse and poorer perceived sleep quality may partly reflect greater severity of depressive symptoms among women who experienced emotional abuse—especially because this association emerged for perceived, but not objective, sleep measures. Although depression may confound the association between childhood emotional abuse and poor sleep quality [41,42], we were unable to account for its potential mechanistic role in the present study. Future studies should further investigate this possibility.

Second, to our knowledge, the current study is the first to demonstrate that pregnant women reporting a history of childhood sexual abuse slept, on average, 1 h less per night than their counterparts, based on actigraphy measurements. This association remained statistically significant and of similar magnitude even after controlling for other forms of maternal childhood maltreatment as well as maternal education and household income. Two hypotheses may help explain this association. First, in the aftermath of traumatic experiences such as childhood sexual abuse, individuals may develop trauma-related symptoms like hypervigilance and heightened fear which can interfere with sleep quality [43]. This hypothesis is consistent with findings from Bublitz and Stroud [44], who reported that women with a history of sexual abuse exhibit greater hypothalamic-pituitary-adrenal (HPA) axis dysregulation in response to stress, along with irregular diurnal cortisol patterns, compared to non-exposed women to childhood sexual abuse. These trauma-related symptoms may thus impair the physiological stress regulation systems necessary for initiating and maintaining sleep. Second, beyond contextual and physiological reactions, sleep itself requires letting go and entering a certain state of vulnerability. This process is grounded in an internalized sense of safety and trust, which may be especially fragile among individuals with histories of sexual abuse. The ability to "let go" into sleep may be particularly challenging, even in the absence of immediate external threats or dysregulated physiological stress responses.

4.1. Strengths and limitations

The current study builds on research examining sleep in pregnant women by examining distinct forms and severity of maternal childhood maltreatment, offering additional insights into how they may relate to specific sleep characteristics during pregnancy. A key strength lies in the combination of both subjective and objective sleep measures. Subjective measures capture individuals' perceptions of their sleep quality whereas objective measures, assessed by actigraphy, provide a more accurate assessment of sleep quantity. As such, the use of objective sleep data is essential for investigating the complex association between distinct forms of childhood maltreatment and sleep during pregnancy. Moreover, the complementary use of both categorical (yes or no) and continuous (severity of exposure) scores to assess distinct forms of childhood maltreatment strengthens the robustness of the current findings and facilitates their translation to clinical practice.

While the current study had strengths, the findings should be interpreted in consideration of some limitations. First, the sample size was relatively small, and participants lacked diversity in terms of maternal education level and household income. In addition, we did not assess whether maternal obesity, which is often related to both childhood maltreatment [45] and sleep quality [46], acted as a potential confounder in our associations. Due to limited statistical power, we were unable to include and test all variables simultaneously in the model. Future studies with larger and more diverse samples, and with the capacity to adjust for additional confounders, are warranted to better highlight the association between childhood maltreatment and sleep during pregnancy. Second, the present study did not assess sleep-disordered breathing or other objective measures of sleep quality (e.g., percentage of sleep stages). Third, sleep data were taken during the second trimester of pregnancy. Given that sleep quality fluctuates across pregnancy, it remains unclear whether similar associations would be observed in the first and third trimesters. Longitudinal studies tracking sleep quality and quantity across all stages of pregnancy are needed to address this gap. Finally, the correlational design of the current study does not allow for the establishment of a causal link.

4.2. *Futures directions and clinical implications*

Future longitudinal studies should replicate the current findings in larger and more diverse samples, using objective sleep technologies that also assessed sleep stages. Future investigations should better understand the mechanisms linking different forms of childhood maltreatment to different indicators of disturbed sleep throughout pregnancy, such as depressive symptoms or physical health metrics (e.g., obesity). By demonstrating that women who have experienced emotional or sexual abuse are at greater risk of sleep problems during pregnancy than their counterparts, this study underscores the need to address sleep as part of trauma-informed or trauma-focused interventions for pregnant women with a history of maltreatment. Given pregnant women who have experienced childhood maltreatment are at elevated risk for psychological problems [13], physical health problems (Moog et al., 2017; [15]), and obstetrical complications [7,8], these findings highlight the need for targeted and integrated interventions that address sleep health to improve outcomes for both mother and child.

CRediT authorship contribution statement

Evelyne Touchette: Writing – review & editing, Writing – original draft, Validation, Resources, Methodology, Investigation, Funding acquisition, Conceptualization. **Y-Lane Noémie Zaine:** Writing – review & editing, Writing – original draft. **Julia Garon-Bissonnette:** Writing – review & editing, Supervision, Resources, Project administration, Methodology. **Roxanne Lemieux:** Writing – review & editing, Supervision. **Nicolas Berthelot:** Writing – review & editing, Supervision, Resources, Project administration, Funding acquisition.

Declaration of competing interest

No conflict of interest has been declared by the authors.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.sleep.2026.108951.

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