Original Research

Mental Disorders and Suicide Attempts in the Pregnancy and Postpartum Periods Compared with Non-Pregnancy: A Population-Based Study

Troubles mentaux et tentatives de suicide dans les périodes de grossesse et du postpartum comparés à la non-grossesse : une étude dans la population

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Abstract

Objective: To compare the rate of mental disorders (i.e., mood and anxiety, substance use, psychotic disorders) and suicide attempts within the same group of women across the pre-pregnancy, pregnancy, and postpartum periods, and between this perinatal cohort and a non-perinatal reference group.

Method: Data were from an administrative repository of residents in Manitoba, Canada. The perinatal cohort consisted of women aged 18 to 45 years who experienced >1 live birth pregnancy between 2011 and 2014 ($n = 45,362$). Pre-pregnancy, pregnancy, and postpartum periods were defined over consecutive 40-week intervals. The non-perinatal cohort consisted of age-matched women with no pregnancies during the same period ($n = 139,705$). A reference 40-week interval was defined from the individual's birthdate in the year they entered the cohort. Rate ratios of diagnosed mental disorders were adjusted (aRR) for demographic factors, parity, and mental health history.

Results: Within the perinatal cohort, pregnancy was associated with a lower rate of diagnosed mood or anxiety disorder, substance use disorder, and suicide attempt relative to pre-pregnancy (aRR range, 0.22-0.82). Pregnancy also had lower rates of all outcomes compared with the postpartum period (aRR, 0.44-0.87). Postpartum had a higher rate of psychotic disorder compared with pre-pregnancy (aRR, 1.61; 95% CI, 1.17-2.21), but a lower rate of mood or anxiety disorder and suicide attempt. Compared with non-perinatal women, pregnancy was associated with lower rates of all outcomes (aRR range, 0.25-0.87).

Conclusions: Compared with a non-perinatal period, the rate of a diagnosed mental disorder is lower during pregnancy but begins to rise in the postpartum period, highlighting an important period for early identification and rapid access to intervention.

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Abrégé

Objectif : Comparer le taux des troubles mentaux (c.-à-d., trouble anxieux et de l'humeur, trouble d'utilisation de substances, troubles psychotiques) et des tentatives de suicide au sein du même groupe de femmes durant les périodes de pré-grossesse, de grossesse et du postpartum, puis comparer cette cohorte périnatale avec un groupe de comparaison non périnatal.

Méthode : Les données proviennent d'un dépôt de données administratives pour les résidents du Manitoba, au Canada. La cohorte périnatale se composait de femmes de 18 à 45 ans qui ont vécu ≥ 1 grossesse avec naissance vivante entre 2011 et 2014 (n = 45 362). Les périodes de pré-grossesse, de grossesse et du postpartum ont été définies comme étant des intervalles de 40 semaines consécutives. La cohorte non périnatale comptait des femmes appariées selon l'âge n'ayant pas eu de grossesse durant la même période (n = 139 705). L'intervalle de référence de 40 semaines a été défini à compter de la date de naissance de la personne dans l'année où elle s'est inscrite dans la cohorte. Les rapports des taux des troubles mentaux diagnostiqués ont été ajustés (RTa) pour les facteurs démographiques, la parité, et les antécédents de santé mentale.

Résultats : Dans la cohorte périnatale, la grossesse était associée à un taux plus faible de diagnostics de trouble anxieux ou de l'humeur, de trouble d'utilisation de substances ou de tentatives de suicide relativement à la pré-grossesse, (RTa de 0,22 à 0,82). La grossesse avait aussi des taux plus faibles pour tous les résultats comparativement au postpartum (RTa de 0,44 à 0,87). Le postpartum avait un taux plus élevé de troubles psychotiques comparativement à la pré-grossesse (RTa 1,61; IC à 95% 1,17 à 2,21), mais un taux plus faible de troubles anxieux ou de l'humeur et de tentatives de suicide. Comparé aux femmes non périnatales, la grossesse était associée à des taux plus faibles pour tous les résultats (RTa 0,25 à 0,87).

Conclusions : Comparativement à une période non périnatale, le taux des troubles mentaux diagnostiqués est plus faible durant la grossesse mais connaît une hausse au postpartum, soulignant ainsi une importante période pour l'identification précoce et l'accès rapide à une intervention.

The presence of mental disorders during the perinatal period is common, with approximately 1 in 4 women who were pregnant or postpartum in the past year having a psychiatric illness.[1] Maternal mental disorders during and after pregnancy are associated with various negative outcomes, including a higher risk of obstetric complications, emotional problems, and cognitive deficits for the child.[2-5]

It is commonly believed that pregnancy and the postpartum period may be vulnerable stages for the development and exacerbation of mental disorders on account of both biological and psychosocial changes.[6-7] Although a large body of literature has compared the prevalence of mental disorders in pregnancy and postpartum with those in non-pregnancy, findings across studies originally painted an inconsistent picture of whether these periods were associated with a higher likelihood of mental health problems for women.[8-10] More recently, studies using large, population-based samples have further clarified the burden of mental illness during these times. In a Danish registry sample, the first 3 postpartum months were associated with an increased risk of first-time psychiatric hospitalisation and outpatient psychiatric contact among first-time mothers, relative to women who were 11 to 12 months' postpartum.[11] The risk of psychiatric contact during pregnancy and in the period between 3 and 12 months' postpartum was lower than that in non-pregnant women.[11] This pattern was slightly different across specific mental disorders; although, pregnancy was consistently a period of lower risk. Lower rates of mental disorders in pregnancy have also been noted in some other population-based studies.[12-13] A lower risk in pregnancy and a period of higher risk in the postpartum period has been linked to psychiatric readmission rates and recurrent mental disorder episodes.[14-16] In a nationally representative US sample, pregnant and postpartum women were also found to have either a lower or not significantly different prevalence of mood and substance use disorders relative to non-pregnant women,[1,17] with the one exception of a higher likelihood of major depressive disorder among postpartum women.[1] Investigators have generally recognised childbirth as a potential activator for the development of episodes of severe psychiatric illness, and physiological changes that occur during the perinatal period are often posited as the primary underlying mechanism driving this risk.[11,18]

Fewer studies have examined the occurrence of suicide attempts during pregnancy and postpartum compared with non-pregnancy; however, some research has investigated related outcomes, such as suicidal ideation and suicide. In general, while suicidal ideation may be higher during this time,[19] the perinatal period is likely one of lower suicide risk.[19-21] However, this protective effect may not be applicable to women who have existing contact with psychiatric services.[22] In a large, population-based study in Ontario, Canada, the perinatal suicide rate was found to be 2.58 per 100,000 live births; however, this study did not directly compare these rates with those in non-perinatal periods or in non-perinatal women.[23]

To date, most of the population-based studies investigating differences in the rate of mental disorders during the

perinatal period have focused on overall mental health service utilisation or psychiatric hospitalisation; postpartum depression; or serious mental illness. Only a handful of population-based studies have examined individual categories of physician-diagnosed mental disorders, and few studies have investigated the risk of suicidal behaviour during this period as directly compared with non-pregnancy, with particularly few North American studies. A comparison group of non-perinatal women is pivotal to identifying bona fide elevations in mental disorder rates during the perinatal timeframe. Comparing specific perinatal periods to one another can highlight particular points during which intervention is most needed. The current study aimed to 1) examine the rates of mental disorders (i.e., mood and anxiety, substance use, and psychotic disorders) and suicide attempts in women across the perinatal period, and 2) to compare rates of mental disorders and suicide attempts in the pregnancy and postpartum periods with those in a control group of non-perinatal women using a population-based, administrative database of health service use in the province of Manitoba, Canada.

Methods

Data Sources

Data came from the Manitoba Centre for Health Policy (MCHP), an administrative data repository containing information related to the health and social service use of residents of Manitoba, Canada. The following MCHP databases were used to derive relevant demographic, mental health, and social service variables between April 1, 2006 and January 5, 2015: Hospital discharge abstracts and outpatient physician billing claims (pregnancy and delivery status; mental disorders; suicide attempts), and data from Drug Program Information Network (DPIN: pharmacotherapy use), Census (area-level income quintiles), Education Enrollment, Marks, and Assessments (status of high school completion), Health Care Registry (age, geographic region), and Child and Family Services (previous child apprehensions). Given that all Manitoba residents have universal health care insurance, the databases have individual-level, de-identified information on almost all Manitobans. These population-based data were linked through a scrambled health number, thus ensuring the privacy of the women and providing a rich database. This study received approval from the Health Research Ethics Board at the University of Manitoba.

Cohort Formation

The study period was from April 1, 2006 to January 5, 2015. As shown in Figure 1, the perinatal cohort consisted of women aged 18 to 45 years who experienced at least one pregnancy that resulted in a live birth during the period between April 1, 2011 and March 31, 2014 ($n = 45,362$). Women who experienced a spontaneous or elective abortion at any point over the 3-year time frame were excluded from the study. For women who gave birth more than once during the study period, we examined the period surrounding the first birth only. The non-perinatal cohort consisted of women aged 18-45 years during the period between April 1, 2011 and March 31, 2014 who were never pregnant during this time, and who were also never pregnant in the one year before, and 40 weeks following, the study period ($n = 139,705$). Perinatal and non-perinatal women were age-matched at a ratio of 1:N (up to 5 non-perinatal women) using the matching method without replacement.

Among the perinatal cohort, a lookback period of 40 weeks before pregnancy and a follow-up period of 40 weeks after the live birth were created in accordance with previous work and to represent the mean gestational period.[12] This approach resulted in the creation of 3 periods of equal lengths of time: pre-pregnancy, pregnancy, and postpartum.[12] For comparability, a period of 40 weeks was also created in the non-perinatal cohort, starting on the index date defined as the woman's birthdate in the year when they were selected to be in the cohort. The woman's birthdate was selected as the index date as opposed to a single date for the entire non-perinatal cohort to minimise possible seasonal effects on mental disorder rates. A lookback period of 5 years from the index date in both cohorts was used to identify history of mental disorder diagnosis, psychotropic medication use, and child apprehensions in the past 5 years as covariates.

Primary Outcomes

Mental disorders. Physician-based diagnoses of any mood or anxiety disorder (one or more hospitalisations, where the patient was diagnosed according to the International Classification of Diseases, 10th revision Canada (ICD-10-CA) with codes F30, F31, F32, F33, F34, F38, F40, F41.0, F41.1, F41.2, F41.3, F41.8, F41.9, F42, F43, F53.0; 2 or more physician visits, diagnosed with the ICD 9th revision Clinical Modification (ICD-9-CM) codes 296, 300, 309, 311); substance use disorder (1 or more hospitalisations, diagnosed with the ICD-10-CA codes F10-F19 and F55; 1 or more physician visits, diagnosed with the ICD-9-CM codes 291, 292, 303, 304, 305), and psychotic disorder (1 or more hospitalisations, diagnosed with the ICD-10 codes F11.5, F12.5, F13.5, F14.5, F15.5, F16.5, F18.5, F19.5, F20, F22, F23, F24, F25, F28, F29; 1 or more physician visits, diagnosed with the ICD-9 codes 295, 297, 298) were extracted from the administrative database. These definitions are consistent with those used in previous studies using MCHP data.[24] A dichotomous "any mental disorder" variable, defined as having at least one code for any disorder examined, was also created.

Suicide attempts. Suicide attempts were determined from hospital discharge abstracts using the following ICD-10 codes: X60-X84 (self-inflicted injury or poisoning), or Y10-Y34, T39, T40, T423, T427, T43, T509, T58, X44, X46, X47
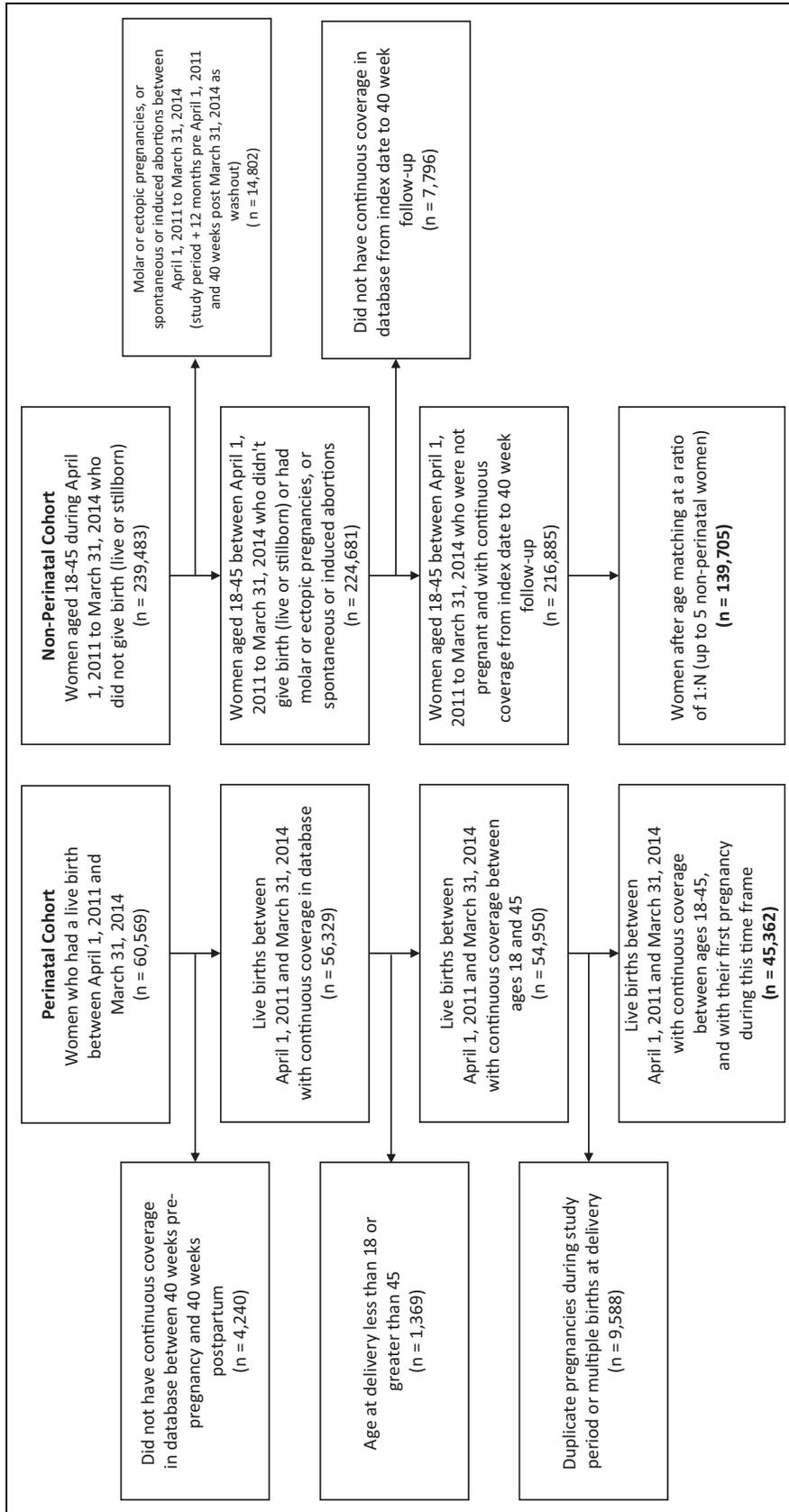
Non-Perinatal Cohort
Women aged 18-45 during April 1, 2011 to March 31, 2014 who did not give birth (live or stillborn)
(n = 239,483)

Molar or ectopic pregnancies, or spontaneous or induced abortions between April 1, 2011 to March 31, 2014 (study period + 12 months pre April 1, 2011 and 40 weeks post March 31, 2014 as washout)
(n = 14,802)

Women aged 18-45 between April 1, 2011 to March 31, 2014 who didn't give birth (live or stillborn) or had molar or ectopic pregnancies, or spontaneous or induced abortions
(n = 224,681)

Women aged 18-45 between April 1, 2011 to March 31, 2014 who were not pregnant and with continuous coverage from index date to 40 week follow-up
(n = 216,885)

Did not have continuous coverage in database from index date to 40 week follow-up
(n = 7,796)

Women after age matching at a ratio of 1:N (up to 5 non-perinatal women)
(n = 139,705)

Perinatal Cohort
Women who had a live birth between April 1, 2011 and March 31, 2014
(n = 60,569)

Did not have continuous coverage in database between 40 weeks pre-pregnancy and 40 weeks postpartum
(n = 4,240)

Live births between April 1, 2011 and March 31, 2014 with continuous coverage in database
(n = 56,329)

Age at delivery less than 18 or greater than 45
(n = 1,369)

Live births between April 1, 2011 and March 31, 2014 with continuous coverage between ages 18 and 45
(n = 54,950)

Duplicate pregnancies during study period or multiple births at delivery
(n = 9,588)

Live births between April 1, 2011 and March 31, 2014 with continuous coverage between ages 18-45, and with their first pregnancy during this time frame
(n = 45,362)

Figure 1. Flow chart of perinatal and non-pregnant (control) cohorts.

Table 1. Demographic characteristics at index date in perinatal cohort and among non-perinatal controls.

		Non-Perinatal Cohort (N = 139,705)		Perinatal Cohort (Postpartum Period) (N = 45,362)	
		N, mean, or median	% or SD	N, mean, or median	% or SD
Demographics					
Age		28.52	6.69	28.64	5.64
Region	Urban	10,0612	72.02	27,987	61.70
	Rural	38,932	27.87	17,328	38.20
Income Quintiles	1 (lowest income)	29,223	20.92	11,354	25.03
	2	28,246	20.22	9357	20.63
	3	27,350	19.58	8668	19.89
	4	27,374	19.59	9021	19.14
	5 (highest income)	26,929	19.28	6805	15.00
Number of Children		0	–	2	–
Mental Disorder in Past 5 Years		51,439	36.82	20,365	44.89
Psychotropic Medication Use in Past 5 Years		38,616	27.64	13,707	30.22
History of Child Apprehension		2257	1.62	1464	3.23

(poisoning or injury of undetermined intent) if there was also a mental disorder code during the same hospital stay. The decision to include poisonings and injuries of unknown intent in our definition of suicide attempt (if a mental disorder code was also present) was made because deaths determined to be injuries of unknown intent are likely to be suicides.[24-25] Our definition is consistent with that of previous studies using MCHP data.[24,26] Suicide deaths were not included because there were too few deaths for statistical analyses.

Time-varying Covariates

The following demographic information was extracted for all women: age (continuous), geographical region (urban; rural), income (quintiles), number of children (count variable), any mental disorder diagnosis 5 years before the index date (yes/no), any psychotropic medication prescriptions 5 years before the index date (yes/no; based on Anatomical Therapeutic Chemical (ATC) codes in pharmaceutical claims), and child apprehensions 5 years before the index date (yes/no). The above covariates were entered in the models as defined.

Data Analysis

We estimated mental disorder and suicide attempt rates using Poisson distribution with a log link function and the logarithm of the 40-weekly time periods as offset in the models. The perinatal cohort had 3 observations (pre-pregnancy, pregnancy, and postpartum) per individual and hence, they were assumed to be correlated. The non-perinatal cohort had one observation per individual. To compare the perinatal and non-perinatal groups, a separate model was run for the combined cohorts, and observations relating to the same matching group were assumed to be correlated. A generalised estimating equation (GEE) with an

unstructured working correlation was employed to account for correlations due to multiple observations relating to the same individual or matching group. Models were adjusted for region, income quintile, a diagnosed mental disorder in the past 5 years, use of psychotropic medications in the past 5 years, having a history of child apprehension in the past 5 years, and number of children. The results from these models are expressed as adjusted rate ratios (aRRs). Statistical analyses were conducted using SAS V9.4 (SAS Institute Inc., Cary, NC).

Results

Table 1 describes the demographic and clinical profiles of our perinatal cohort at postpartum (index date) and our cohort of non-perinatal women. The mean age of women in both cohorts was approximately 28 years, with most residing in urban regions. Women in the non-perinatal cohort were relatively equally distributed across income quintiles, while approximately one-quarter of women in the perinatal cohort were in the lowest income quintile and only 15% in the highest income quintile. The non-perinatal cohort had zero children, on average, whereas women in the perinatal cohort had an average of 2 previous children. Approximately 37% of women in the non-perinatal cohort were diagnosed with a mental disorder in the past 5 years compared with 45% of women in the perinatal cohort. Any psychotropic prescription in the past 5 years was comparable across both cohorts, from 28% to 30%. Finally, 1.6% of non-perinatal women and 3.2% of women in the perinatal cohort had a child apprehended by Child and Family Services in the past 5 years.

Table 2 displays the aRRs that compare the rates of mental disorder and suicide attempts across the pre-pregnancy, pregnancy, and postpartum periods in the perinatal cohort. After adjusting for covariates, pregnancy was associated with a lower rate of a physician-diagnosed mood and anxiety

Table 2. Adjusted rate ratios (aRR) of mental disorders and suicide attempts across perinatal periods.

	Pre-Pregnancy	Pregnancy	Postpartum	Pregnancy vs Pre-Pregnancy			Postpartum vs. Pre-pregnancy			Pregnancy vs. Postpartum		
	N (%)	N (%)	N (%)	aRR	95% CI	p	aRR	95% CI	p	aRR	95% CI	p
Mood and Anxiety Disorder	7,053 (15.55)	6,136 (13.53)	6,983 (15.39)	0.82	(0.80-0.84)	<0.0001	0.96	(0.92-0.97)	<0.0001	0.87	(0.85-0.90)	<0.0001
Substance Use Disorder	801 (1.77)	582 (1.28)	881 (1.94)	0.67	(0.61-0.74)	<0.0001	0.92	(0.87-1.05)	0.33	0.70	(0.64-0.77)	<0.0001
Psychotic Disorder	61 (0.13)	58 (0.13)	91 (0.20)	0.86	(0.65-1.14)	0.28	1.61	(1.17-2.21)	0.003	0.53	(0.39-0.72)	<0.0001
Suicide Attempt	54 (0.12)	12 (0.03)	25 (0.06)	0.22	(0.12-0.40)	<0.0001	0.50	(0.30-0.82)	0.01	0.44	(0.21-0.90)	0.02

Note. Adjusted rate ratio, adjusted for region, income quintile, mental disorder in past 5 years, use of psychotropic medications in past 5 years, history of child apprehension in the past 5 years, and number of children.

disorder (aRR, 0.82; 95% CI, 0.80-0.84), substance use disorder (aRR, 0.67; 95% CI, 0.61-0.74), or being hospitalised for a suicide attempt relative to the pre-pregnancy period (aRR, 0.22; 95% CI, 0.12-0.40). No difference in rate of psychotic disorder was found between these periods. Relative to the pre-pregnancy period, the postpartum period was associated with a lower rate of mood and anxiety disorder (aRR, 0.96; 95% CI, 0.92-0.97) and suicide attempt (aRR, 0.50; 95% CI, 0.30-0.82), but with a higher rate of psychotic disorder diagnosis (aRR, 1.61; 95% CI, 1.17-2.21). The pre-pregnancy and postpartum periods did not differ with respect to rates of substance use disorder. The pregnancy period was associated with lower rates of all mental disorders and having a suicide attempt relative to the postpartum period.

Figure 2 displays differences in the rates of mental disorder diagnoses and suicide attempts between non-perinatal women and the pre-pregnancy, pregnancy, and postpartum periods in our perinatal cohort. After adjusting for covariates, women in the pregnancy period had a lower rate of being diagnosed with all mental disorders examined and being hospitalised for a suicide attempt compared with non-perinatal women, whereas the postpartum period was associated with lower rates of diagnosed mood and anxiety disorder (aRR, 0.93; 95% CI, 0.91-0.95), psychotic disorder (aRR, 0.58; 95% CI, 0.46-0.75), or suicide attempt (aRR, 0.59; 95% CI, 0.38-0.93) than in non-perinatal women, but not substance use disorder. When comparing rates of disorder and suicide attempt in the pre-pregnancy period relative to non-perinatal women, there was a lower rate of being diagnosed with a psychotic disorder in the pre-pregnancy period (aRR, 0.33; 95% CI, 0.25-0.43). No other significant differences were found.

Discussion

The current study compared mental disorder and suicide attempt rates across the pre-pregnancy, pregnancy and postpartum periods within the same cohort of perinatal women, and also compared rates during these periods to a non-perinatal control group using an administrative database of health service utilisation. This study provides additional understanding of mental disorder rates during the pregnancy and postpartum periods by being among the first to compare the pregnancy and postpartum periods with 2 periods of non-pregnancy using the same population of women.

Within the perinatal cohort and relative to pre-pregnancy, we found lower rates in pregancy of a healthcare visit for mood and anxiety disorder, substance use disorder, and suicide attempt requiring hospitalisation. We also found lower rates of all outcomes in pregnancy relative to the postpartum period and to an age-matched control group of non-perinatal women. These results are consistent with previous population-based studies highlighting that pregnant women tend to have a lower likelihood of most mental disorders and substance use than non-perinatal women.[11,13,17] Although we saw no differences between the pre-pregnancy period
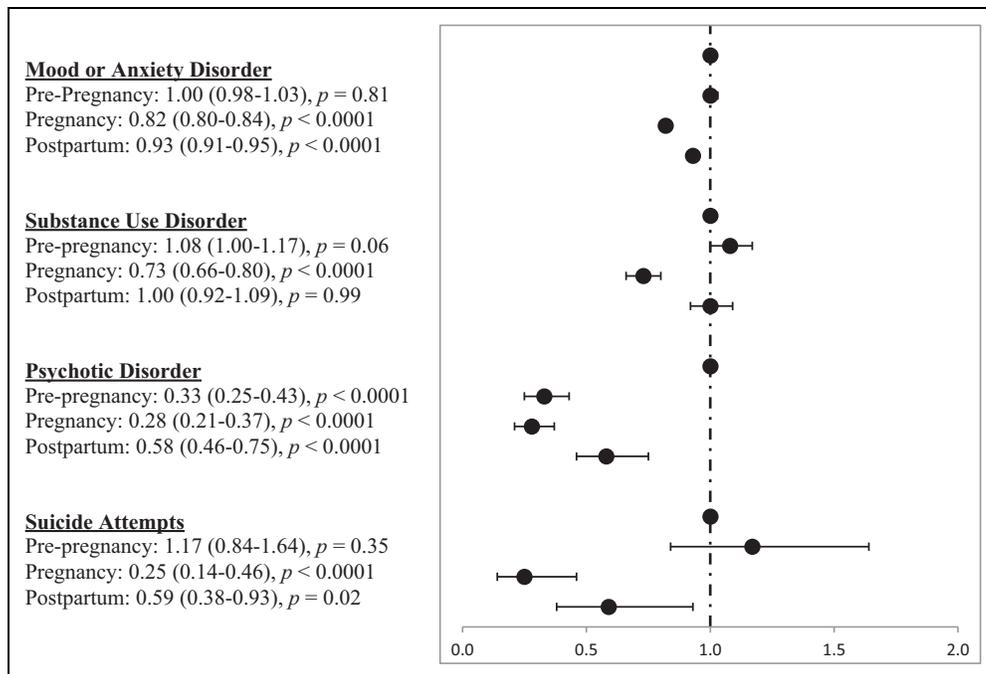
Mood or Anxiety Disorder
Pre-Pregnancy: 1.00 (0.98-1.03), *p* = 0.81
Pregnancy: 0.82 (0.80-0.84), *p* < 0.0001
Postpartum: 0.93 (0.91-0.95), *p* < 0.0001

Substance Use Disorder
Pre-pregnancy: 1.08 (1.00-1.17), *p* = 0.06
Pregnancy: 0.73 (0.66-0.80), *p* < 0.0001
Postpartum: 1.00 (0.92-1.09), *p* = 0.99

Psychotic Disorder
Pre-pregnancy: 0.33 (0.25-0.43), *p* < 0.0001
Pregnancy: 0.28 (0.21-0.37), *p* < 0.0001
Postpartum: 0.58 (0.46-0.75), *p* < 0.0001

Suicide Attempts
Pre-pregnancy: 1.17 (0.84-1.64), *p* = 0.35
Pregnancy: 0.25 (0.14-0.46), *p* < 0.0001
Postpartum: 0.59 (0.38-0.93), *p* = 0.02

Figure 2. Adjusted rate ratios of mental disorders and suicide attempts between women during perinatal periods and non-perinatal women.

and the non-perinatal cohort with regard to all outcomes except psychosis, it is possible that some women make the decision to get pregnant during periods of better mental health. It should be noted, however, that the rate of having any diagnosed mental disorder in the past 5 years was higher in the perinatal cohort than in the non-perinatal cohort. Pregnancy can be a positive event for many women, which may lower symptoms during this time, and may also be associated with an increase in protective psychosocial factors for mental disorders, such as social support, optimism, and perceived purpose in life.[27] Alternatively, the current findings may be reflective of differing patterns of mental health service utilisation across the perinatal period, whereby expectant and new mothers may be less likely to seek help for common mental disorders. Fear of mental health-related stigma and child apprehension, for example, may deter women from help-seeking during this time. Although this explanation is unlikely—particularly given previous studies, where non-treatment seeking samples showed lower rates of mental disorders in pregnancy—it should be noted that not all studies have demonstrated these findings,[28-29] and that service use can be limited for new mothers with mental disorders.[30-31] Several factors are associated with a higher risk of psychiatric disorders and suicidal behaviour among pregnant and postpartum women, including older age, lower income, residence in an urban area, being unpartnered, poorer health status, low social support, unintended pregnancy, the presence of stressors, and a history of trauma exposure.[1,19,29,32-34] Future work should continue to elucidate the specific circumstances and disorders that may impact risk level during this time.

Compared with pre-pregnancy, there were lower rates of diagnosed mood and anxiety disorders and of hospitalisations for suicide attempts in the postpartum period. Relative to the control group of non-perinatal women, the postpartum period was also associated with a lower rate of a healthcare visits for mood and anxiety disorder, psychotic disorder, or suicide attempt. Previous work has generally shown either no significant difference between postpartum and non-pregnancy, or an increased likelihood of mental disorders during the postpartum period.[1] Mental disorders, including depression and psychosis, are relatively common presentations in the postpartum period and, in the current study, the lower rates of multiple outcomes in pregnancy relative to the postpartum period suggest that mental disorder rates begin to rise again following birth. Further, there was a higher rate of psychotic disorder diagnosis in the postpartum period compared with pre-pregnancy, and no difference between the pre-pregnancy and postpartum periods regarding rates of substance use disorders. It is likely that the postpartum period may be a vulnerable time for the development of some mental disorders (e.g., psychosis) and/or in certain subgroups of women, such as those with a history of mental health difficulties or certain genetic propensities, while not for others.[1,35] Alternatively, help-seeking rates may begin to increase again following pregnancy. Finally, it is possible that the lower rate of psychotic disorders in pre-pregnancy relative to non-perinatal women represents a lower likelihood of pregnancy among women experiencing chronic psychosis.[36]

Although lower overall than a non-pregnancy period, the results of this study nonetheless demonstrate reasonably high

rates of mental disorders in pregnancy and postpartum. This is particularly noteworthy given that specialised mental health care is likely to be needed during a period in which attending regular psychotherapy appointments may be challenging due to the competing demands of a new baby. Further, there are potential risks of pharmacotherapy on several pregnancy outcomes (e.g., preterm birth) that require additional investigation.[37-38] Health professionals interacting with perinatal women should be trained to appropriately screen for the presence of mental disorders given the negative and, in some cases, even life-threatening, sequelae associated with these conditions for both mother and child.[39-40] Aggressive outreach efforts and novel models of treatment delivery may also be needed to address mental health issues during a time when barriers to seeking care are likely to be elevated.[41-43] The lack of difference in the rates of substance use disorders between the pre-pregnancy and postpartum periods may reflect a woman's efforts to abstain from substance use during pregnancy, but then resume use in the postpartum period. Combined with the trend towards a higher rate of healthcare visits for substance use disorders that we observed in the pre-pregnancy period relative to the non-perinatal cohort, treatments and programming focused on overcoming addiction and maintaining sobriety for expectant and new mothers may be especially pertinent.[44]

The current findings should be interpreted in the context of the following limitations. First, the administrative database utilised in the study only captures physician visits and hospitalisations for mental health concerns. Although the definitions used for mental disorders and suicide attempts have been previously validated,[24] other definitions may have resulted in different rates. Further, the calculated rates are likely an under-representation of the burden of mental disorders in Manitoba, because they do not include women with mental illness who did not seek care or who sought services from non-physicians, such as from psychologists or social workers; the latter may be particularly common during the perinatal period when pharmacological treatments are often undesired. Similarly, only suicide attempts resulting in hospitalisation were captured in this administrative database. We were also unable to distinguish suicide attempt from self-harm with our data; so, it is likely that some episodes of self-harm have been captured within the category of suicide attempt. Second, due to the availability in our data of only the first 3 ICD digits of a diagnosis, we were not able to examine rates of all individual mental disorders. Future research should examine rates of individual mood and anxiety disorders using population-based data and physician-based diagnoses. Finally, the current study examined rates of mental disorders across the broad pregnancy and postpartum periods. Some previous work has shown that different points during the postpartum period may be associated with different levels of risk for mental disorders,[11,45] and future studies should examine the nuanced course of different disorders to identify the periods of highest risk.

Despite these limitations, the current study found lower rates of outpatient visits and hospitalisations for mental disorders during pregnancy relative to a non-pregnancy period for the same group of women using a population-based, administrative database and physician-based diagnoses. The lower rate of diagnosed mental disorders during the postpartum period was present but more modest, with a potentially higher rate of psychosis, relative to pre-pregnancy. Access to care during this time should be maximally facilitated, which will ensure early detection and intervention.

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