Risk Factors and Birth Outcomes Associated with Teenage Pregnancy: A Canadian Sample

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ABSTRACT

Study Objective: To examine the extent to which socioeconomic status, mental health, and substance use are associated with teenage pregnancies in Southwestern Ontario (SWO), and whether these pregnancies are at an elevated risk for adverse birth outcomes, after controlling for medical, behavioral, and socioeconomic status factors.
Design: Retrospective cohort study using perinatal and neonatal databases.
Setting: Tertiary care hospital in SWO.
Participants: Women residing in SWO who gave birth to singleton infants without congenital anomalies between 2009 and 2014. Teenage pregnancies (19 years of age or younger) were compared with pregnancies of women 20-34 years and 35 years or older.
Interventions: None.
Main Outcome Measures: Low birth weight (LBW), very LBW, term LBW, preterm birth, very preterm birth, low and very low Apgar score, and fetal macrosomia.
Results: Of 25,263 pregnant women, 1080 (4.3%) were 19 years of age or younger. Approximately 18% of teenage mothers lived in socioeconomically disadvantaged neighborhoods, compared with 11% of mothers aged 20-34 and 9% of women 35 years of age or older ($P < .001$). Teenage mothers had higher rates of depression during pregnancy (9.8%) than mothers 20-34 years (5.8%) and those 35 years of age or older (6.8%; $P < .001$). Young mothers self-reported higher tobacco, marijuana, and alcohol use during pregnancy than adult mothers ($P < .001$). Teenage pregnancy increased the risk of a low Apgar score (adjusted odds ratio, 1.56; 95% confidence interval, 1.21-2.02), but was not associated with other birth outcomes after adjusting for covariates.
Conclusion: Teenage pregnancy is associated with a higher risk of socioeconomic disadvantage, mental health problems, and substance use during pregnancy, but is largely unrelated to adverse birth outcomes in SWO.
Key Words: Pregnancy in adolescence, Smoking, Cannabis, Alcohol drinking, Mental health, Premature birth, Infant, Low birth weight, Apgar score, Fetal macrosomia

Introduction

Global trends in adolescent pregnancy have been declining since the mid-1970s, yet current rates remain high in developed countries, such as Canada, the United States, New Zealand, and Western European countries.[1–4] In Canada, teenage pregnancy rates are calculated as the sum of recorded live births, induced abortions, and miscarriages per 1000 population of women aged 15-19 years.[5] Statistics Canada reported 7858 live births to women 19 years of age or younger in 2017, accounting for 2.1% of births in the country.[3] More than 70% of teenage pregnancies in Canada are unintended and 51% end in induced abortion.[6,7]

Teenage pregnant women have a higher risk for adverse birth outcomes, although most of this research has been conducted in the United States.[8] Infants born to teenage mothers are more likely to be preterm,[9–14] have low birth weight (LBW),[9,10] be small for gestational age,[10] and have a low Apgar score at 5 minutes.[9] Additionally, perinatal mortality,[13] neonatal mortality,[9,11,13] postneonatal mortality,[11] and stillbirth[15] are more strongly associated with infants born to young mothers. Similarly, adverse birth outcomes, such as stillbirth, neonatal death, preterm birth (PTB), and LBW are also more common among women of advanced maternal age (35 years of age or older).[16]

Teenage pregnancy is also a contributing factor to lifelong health disparities for the mother and the child.[17] Compared with women who become pregnant during

adulthood, teenage mothers are more likely to have low educational attainment and fewer employment opportunities,[9,17–25] poorer mental health,[22,26–34] less social support,[19,32] and higher rates of substance abuse.[18,32,35–38] A large body of research has shown an association between teenage motherhood and depression,[27,34,36,39,40] anxiety disorder,[31,36] eating disorders,[36] and perinatal suicide.[41] Furthermore, children of young mothers have a greater risk for poorer educational achievement[38,42] and lower level of life satisfaction.[22,42] The first objective of this study was to examine the extent to which socioeconomic status (SES), mental health, and substance use are associated with teenage pregnancies in Southwestern Ontario (SWO). The second objective was to determine whether teenage pregnancies were at an elevated risk for adverse birth outcomes compared with mothers aged 20-34 years and 35 years or older, after controlling for medical (ie, prepregnancy body mass index [BMI], previous PTB, depression, anxiety), behavioral (ie, tobacco, alcohol, marijuana), and SES factors (ie, income).

Materials and Methods

Data Collection and Sample

A retrospective cohort study was conducted using perinatal and neonatal databases from London Health Sciences Centre (LHSC), a tertiary care facility in SWO with a catchment area of 1.5 million patients per year. Data for all births at LHSC between February 2009 and February 2014 were collected prospectively from medical charts. Birth and neonatal records were also collected and recorded by a research assistant to constitute a large, hospital-based sample.[43] Medical, psychosocial, and behavioral factors were captured from the perinatal and neonatal databases. All women who resided in SWO who gave birth to singleton infants without congenital anomalies were included in the study. Women who lived in a postal code located outside of SWO were excluded. The final sample consisted of 25,263 pregnant women and their subsequent birth outcomes. Teenage mothers were defined as pregnant women aged 19 years or younger. The study received approval from the Health Science Research Ethics Board at Western University.

Outcome Variables

The following birth outcomes were assessed: LBW ($<$ 2500 g), very LBW ($<$1500 g), term LBW (TLBW; $<$2500 g at $\geq$37 weeks' gestation), PTB ($<$37 weeks' gestation), very PTB ($<$32 weeks' gestation), low Apgar score at 5 minutes ($<$7), very low Apgar score at 5 minutes ($<$4), and fetal macrosomia ($>$4000 g). A list and definition of all independent and dependent variables is shown in Table 1.

Predictor Variables

Neighborhood SES was developed on the basis of 6-digit postal codes where mothers reported living before giving birth. The postal codes identified each mother's approximate home location. Maternal postal codes were geocoded and mapped in a geographic information system (ArcGIS 10.4; ESRI, Redlands, CA) to determine the approximate location of mothers' homes using a population-weighted centroid, which provides the most representative location

Table 1
Definitions of the Independent and Dependent Variables

Variables	Variable Description
Independent	
1. Low-income measure after tax	Percentage of the dissemination in the population in 2011 who were of low income on the basis of after-tax income in 2010
2. Underweight	Body mass index less than 18.5
3. Healthy	Body mass index 18.5-24.9
4. Overweight	Body mass index 25-29.9
5. Obese	Body mass index greater than 30
6. Previous preterm birth	Yes/no
7. Previous abortion	Yes/no
8. Gestational diabetes	Yes/no
9. Breastfeeding intent	Yes/no at the time of admission
10. Asthma	Maternal self-report (yes/no)
11. Previous depression	Maternal self-report on history of a clinical diagnosis of depression (yes/no)
12. Depression during pregnancy	Maternal self-report if taking medications for depression (yes/no)
13. Previous anxiety	Maternal self-report on history of a clinical diagnosis of anxiety (yes/no)
14. Anxiety during pregnancy	Maternal self-report (yes/no)
15. Tobacco	Maternal self-report (yes/no)
16. Alcohol	Maternal self-report (yes/no)
17. Marijuana	Maternal self-report (yes/no)
18. Opioids	Maternal self-report (yes/no)
19. Cocaine	Maternal self-report (yes/no)
Dependent	
20. Low birth weight	Absolute birth weight of less than 2500 g
21. Very low birth weight	Absolute birth weight of less than 1500 g
22. Term low birth weight	Absolute birth weight of less than 2500 g at 37 weeks' gestation or more
23. Fetal macrosomia	Absolute birth weight of greater than 4000 g
24. Preterm birth	Birth at less than 37 weeks' gestation
25. Very preterm birth	Birth at less than 32 weeks' gestation
26. Low Apgar score	Apgar score less than 7 at 5 minutes
27. Very low Apgar score	Apgar score less than 4 at 5 minutes

Variable 1 is from the 2011 National Household Survey; variables 2-27 are from the perinatal and neonatal databases at London Health Sciences Centre.

Table 2
Maternal Characteristics of Women Who Had Singleton Live Births at London Health Sciences Centre Between February 2009 and February 2014 (N = 25,263)

Characteristic	Maternal Age, years			P
	19 or Younger (n = 1080)	20-34 (n = 19,807)	Older than 35 (n = 4375)	
Maternal				
Body mass index				
Underweight	14.6	5.6	3.4	<.001
Healthy	60.7	52.8	49.3	<.001
Overweight	14.2	23.1	25.8	<.001
Obese	10.6	18.5	21.5	<.001
Previous preterm birth	1.8	6.1	9.9	<.001
Previous abortion	18.8	31.7	46.2	<.001
Gestational diabetes	1.2	4.5	9.5	<.001
Breastfeeding intent	81.2	91.2	91.7	<.001
Asthma	11.2	6.8	7.1	<.001
Mental health status				
Previous depression	11.5	6.5	6.2	<.001
Depression during pregnancy	9.8	5.8	6.8	<.001
Previous anxiety	4.9	3.1	2.8	.002
Anxiety during pregnancy	6.2	4.5	4.6	.04
Risk behaviors				
Tobacco use	41.0	16.5	8.7	<.001
Alcohol use	7.0	1.8	1.6	<.001
Marijuana use	13.1	2.0	0.5	<.001
Any 3 drugs	45.4	17.6	9.6	<.001
Opioids	3.4	.9	0.8	<.001
Cocaine	1.1	.3	0.1	<.001
Neighborhood				
Median LIM-AT 2011 (IQR)	18.4 (5.9-31.0)	1.8 (2.0-19.7)	8.5 (1.4-15.6)	<.001

IQR, interquartile range; LIM-AT, low-income measure after tax.
Data are presented as percentages except where otherwise noted. Pearson χ^2 test was used to compare differences in proportions between the 3 maternal age categories. The Kruskal-Wallis test was used to assess median differences in LIM-AT between groups.

for the postal code (DMTI Spatial Inc, 2016). Home neighborhoods were then delineated by corresponding census dissemination areas (DAs); the smallest geographical unit for which Statistics Canada releases the general population data required for this study.[44] Data on neighborhood SES for each DA in SWO, the catchment area of LHSC, were extracted from the 2011 National Household Survey and linked to each mother.[45] Neighborhood SES was defined by median low-income measure after tax (LIM-AT); the percentage of the DA population who lived below a fixed percentage (50%) of median adjusted after-tax household income, where "adjusted" reflects that a household's needs increase as the number of members increase. Mental health variables included previous maternal depression and anxiety disorder, and maternal depression and anxiety disorder during pregnancy. Behavioral factors included alcohol, marijuana, and tobacco use during pregnancy. All mental health variables and behavioral factors were measured on a binary (ie, yes/no) scale. Sociodemographic and medical factors included maternal age, prepregnancy body mass index (BMI), previous PTB, previous abortion, gestational diabetes, breastfeeding intent, and asthma.

Statistical Analyses

Data were analyzed using IBM Statistical Package for the Social Sciences Statistics, version 25 (IBM Corp, Armonk, NY). Descriptive statistics summarized mothers' demographic, SES, and clinical characteristics for the 3 maternal age groups: 19 years or younger, 20-34 years, and 35 years or older. Categorical variables were expressed as percentages, and continuous variables were described as median and interquartile range (IQR). χ^2 Tests were used to determine the association between categorical variables and maternal age groups. The Kruskal-Wallis test was used to assess the association between skewed continuous variables and maternal age categories.

Logistic regression models were used to assess the influence of teenage pregnancy on adverse birth outcomes, after adjusting for medical, behavioral, demographic, and

Table 3
Rates of Adverse Birth Outcomes According to Maternal Age Category (N = 25,263)

Outcome	Maternal Age, years			P
	19 or Younger (n = 1080)	20-34 (n = 19,807)	Older than 35 (n = 4375)	
Low birth weight	7.4	5.5	6.0	.02
Very low birth weight	1.4	1.1	1.0	.59
Term low birth weight	2.4	1.6	1.6	.13
Preterm birth	8.1	7.3	8.3	.04
Very preterm birth	2.1	1.6	1.6	.42
Low Apgar score	13.1	9.5	10.5	<.001
Very low Apgar score	6.4	4.4	5.5	<.001
Fetal macrosomia	10.0	11.5	12.6	.03

Data are presented as percentages. Pearson χ^2 test was used to compare differences in proportions between the 3 age categories.

Table 4
Multivariable Logistic Regression Analyses for Predictors of LBW, VLBW, TLBW, and Fetal Macrosomia (N = 25,263)

Characteristics	LBW	VLBW	TLBW	Fetal Macrosomia
Maternal				
Age*				
≤ 19 Years	0.99 (0.68-1.45)	1.89 (0.85-4.21)	0.89 (0.49-1.62)	1.30 (0.99-1.71)
≥ 35 Years	1.19 (0.98-1.44)	1.09 (0.69-1.71)	1.28 (0.91-1.79)	1.09 (0.98-1.20)
BMI†				
Underweight	1.99 (1.54-2.57)	0.46 (0.14-1.49)	2.63 (1.80-3.85)	0.46 (0.33-0.65)
Overweight	0.85 (0.70-1.04)	1.16 (0.74-1.81)	0.89 (0.64-1.25)	1.68 (1.49-1.89)
Obese	0.94 (0.77-1.16)	1.75 (1.15-2.67)	0.92 (0.64-1.32)	2.16 (1.91-2.44)
Previous preterm birth	3.68 (3.02-4.49)	3.52 (2.25-5.51)	1.86 (1.25-2.75)	1.04 (0.92-1.18)
Mental health status				
Depression during pregnancy	1.27 (0.97-1.66)	0.74 (0.34-1.65)	0.86 (0.52-1.43)	0.81 (0.66-1.00)
Anxiety during pregnancy	1.06 (0.78-1.46)	0.71 (0.28-1.79)	0.91 (0.51-1.62)	1.11 (0.88-1.39)
Risk behaviors				
Tobacco use	1.55 (1.27-1.88)	1.10 (0.67-1.82)	2.88 (2.15-3.87)	0.65 (0.55-0.77)
Alcohol use	0.56 (0.31-1.01)	0.00 (0.00)	0.28 (0.09-0.92)	1.14 (0.78-1.66)
Marijuana use	2.54 (1.75-3.68)	2.44 (0.93-6.45)	2.88 (1.72-4.82)	0.82 (0.52-1.28)
Neighborhood				
Median LIM-AT 2011	1.00 (1.00-1.01)	1.00 (0.99-1.02)	1.00 (0.99-1.01)	1.00 (1.00-1.00)

BMI, body mass index; LBW, low birth weight; LIM-AT, low-income measure after tax; TLBW, term low birth weight; VLBW, very low birth weight.
Data are presented as adjusted odds ratio (95% confidence interval).
  * Reference category: maternal age 20-34 years.
  † Reference category: healthy prepregnancy BMI, 18.5-24.9.

neighborhood SES factors. χ^2 Tests were used to determine the association between categorical predictor variables and birth outcomes. Univariate logistic regression analyses were used to assess the relationship between continuous predictor variables and birth outcomes. All predictor variables that had a bivariate relationship with birth outcomes at the P less than .10 level were subsequently included in the models. Furthermore, because logistic regression is sensitive to high correlations among predictor variables, the same variables that were used in the logistic regression models were entered into linear regression models to obtain collinearity diagnostics (ie, tolerance statistic, variance inflation factor, condition index) to detect signs of collinearity. There were no high intercorrelations among the predictor variables. The strength of the association between predictor variables and birth outcomes was determined according to adjusted odds ratios (aORs) and 95% confidence intervals (CIs), after controlling for potential confounding variables. A P value less than .05 was considered statistically significant.

Results

Descriptive Results

Of 25,263 mothers who gave birth between February 2009 and February 2014 at LHSC, 1080 (4.3%) were 19 years of age or younger. Characteristics of the sample are shown in Table 2. Almost one-fifth of teenage pregnant women lived in socioeconomically disadvantaged neighborhoods (median LIM-AT, 18.4%; IQR, 5.9-31.0), which was significantly higher than mothers aged 20-34 years (median LIM-AT, 10.8%; IQR, 2.0-19.7), and 35 years or older (median LIM-AT, 8.5%; IQR, 1.4-15.6; P < .001). Teenage mothers had significantly higher rates of depression during pregnancy (103/1053; 9.8%) than mothers aged 20-34 years (1119/19,364; 5.8%) and 35 years of age or older (291/4298, 6.8%; P < .001). Younger mothers were also more likely to have

anxiety during pregnancy (65/1053; 6.2%) than mothers aged 20-34 years (867/19,364; 4.5%) and 35 years or older (199/4298; 4.6%; P = .04). Tobacco, marijuana, and alcohol use was more common during pregnancy among teenage pregnant women than adult mothers (P < .001).

Table 3 shows a comparison of rates of adverse birth outcomes according to maternal age category. Teenage mothers gave birth to significantly more LBW infants (80/1080; 7.4%) than mothers aged 20-34 years (1088/19,807; 5.5%) and 35 years of age or older (263/4375, 6.0%; P = .02). Mothers aged 35 years or older had the highest rate of PTB (363/4375; 8.3%), but this was only significantly higher than mothers aged 20-34 years (1438/19,807, 7.3%; P = .04). In addition, 13.1% (140/1070) of infants born to teenage mothers had a low Apgar score, which was significantly higher than infants born to mothers aged 20-34 years (1863/19,638; 9.5%) and 35 years or older (457/4334; 10.5%; P < .001). Older mothers had the highest rate of fetal macrosomia (549/4358; 12.6%) compared with the other maternal age categories (P = .03).

Regression Analyses

Results from the logistic regression models are shown in Tables 4 and 5. In Table 4, significant variables associated with LBW included: underweight maternal BMI, previous PTB, tobacco use, and marijuana use, after adjusting for covariates. Mothers who used marijuana during pregnancy were 2.5 times more likely to have an LBW baby (aOR, 2.54; 95% CI, 1.75-3.68), and smoking tobacco increased the likelihood of an LBW pregnancy by 55% (aOR, 1.55; 95% CI, 1.27-1.88). Mothers with previous PTB had the largest relative influence on LBW (aOR, 3.68; 95% CI, 3.02-4.49) and very LBW (aOR, 3.52; 95% CI, 2.25-5.51). For TLBW, significant predictor variables were: underweight maternal BMI, previous PTB, and tobacco, alcohol, and marijuana use. Infants born to mothers who used tobacco and marijuana were almost 3 times more likely to be TLBW. In contrast,

Table 5
Multivariable Logistic Regressions for Predictors of PTB, VPTB, Low Apgar Score, and Very Low Apgar Score (N = 25,263)

Characteristic	PTB	VPTB	Low Apgar Score	Very Low Apgar Score
Maternal				
Age[*]				
19 Years or younger	0.99 (0.68-1.44)	1.71 (0.85-3.47)	1.56 (1.21-2.02)	1.56 (1.08-2.26)
35 Years or older	1.18 (1.01-1.39)	1.32 (0.93-1.88)	1.11 (0.97-1.28)	1.28 (1.06-1.55)
BMI[†]				
Underweight	1.40 (1.08-1.84)	0.52 (0.21-1.30)	0.78 (0.60-1.02)	0.80 (0.54-1.20)
Overweight	1.04 (0.88-1.22)	1.19 (0.83-1.71)	1.26 (1.10-1.43)	1.29 (1.07-1.56)
Obese	1.13 (0.95-1.34)	1.44 (1.00-2.07)	1.48 (1.29-1.69)	1.69 (1.40-2.04)
Previous preterm birth	4.55 (3.84-5.38)	3.91 (2.73-5.61)	1.12 (0.91-1.37)	1.30 (0.99-1.71)
Mental health status				
Depression during pregnancy	1.37 (1.08-1.73)	1.12 (0.64-1.97)	1.51 (1.26-1.82)	1.28 (0.97-1.68)
Anxiety during pregnancy	1.40 (1.09-1.82)	0.78 (0.38-1.58)	1.24 (1.00-1.55)	1.39 (1.02-1.88)
Risk behaviors				
Tobacco use	0.91 (0.75-1.11)	1.20 (0.80-1.81)	0.89 (0.76-1.04)	0.95 (0.75-1.19)
Alcohol use	0.79 (0.46-1.33)	0.47 (0.11-1.96)	1.37 (0.96-1.94)	1.37 (0.84-2.24)
Marijuana use	1.47 (0.95-2.27)	1.71 (0.70-4.15)	1.21 (0.84-1.74)	1.28 (0.77-2.14)
Neighborhood				
Median LIM-AT 2011	1.00 (1.00-1.01)	1.00 (0.99-1.01)	1.00 (1.00-1.01)	1.00 (1.00-1.01)

BMI, body mass index; LIM-AT, low-income measure after tax; PTB, preterm birth; VPTB, very preterm birth.
Data are presented as adjusted odd ratio (95% confidence interval).
  [*] Reference category: maternal age 20-34 years.
  [†] Reference category: healthy prepregnancy BMI, 18.5-24.9.

alcohol use decreased the odds of TLBW by 72% (aOR, 0.28; 95% CI, 0.09-0.92). Underweight maternal BMI increased the odds of TLBW by 163% (aOR, 2.63; 95% CI, 1.80-3.85), and previous PTB increased the odds by 86% (aOR, 1.86; 95% CI, 1.25-2.75).

Significant predictors of fetal macrosomia were prepregnancy BMI and tobacco use. Although an underweight maternal BMI decreased the odds of fetal macrosomia by 54% (aOR, 0.46; 95% CI, 0.33-0.65), mothers who were overweight and obese were 1.68 (95% CI, 1.49-1.89) and 2.16 (95% CI, 1.91-2.44) times more likely to have the outcome. Infants of mothers who smoked tobacco during pregnancy were 35% less likely to have fetal macrosomia (aOR, 0.65; 95% CI, 0.55-0.77).

As shown in Table 5, significant predictors of PTB were maternal age 35 years or older, underweight prepregnancy BMI, previous PTB, depression during pregnancy, and anxiety during pregnancy. Women who had a previous PTB were more than 4 times more likely to have another PTB (aOR, 4.55; 95% CI, 3.84-5.38), and almost 4 times more likely to have a very PTB (aOR, 3.91; 95% CI, 2.73-5.61). Depression (aOR, 1.37; 95% CI, 1.08-1.73) and anxiety (aOR, 1.06; 95% CI, 0.78-1.46) were also associated with PTB.

Significant predictors of low Apgar score were maternal age 19 years or younger, overweight and obese prepregnancy BMI, and prenatal depression. Teenage pregnancy had the largest relative influence on low Apgar score, increasing the odds by 56% (aOR, 1.56; 95% CI, 1.21-2.02) compared with mothers aged 20-34 years. Results for very low Apgar score largely resemble those of low Apgar score, except that women aged 35 years or older were at a higher risk than women ages 20-34 years, and depression was no longer associated with the outcome.

Discussion

The rate of teenage motherhood was 4.3% in the current study from SWO, which is higher than rates in Ontario

(1.6%) and Canada (2.1%),[3] as well as the United States (1.8%).[46] However, our sample might not be representative of all SWO, because LHSC is a large tertiary care facility for high-risk pregnancies from nearby geographic regions and does not deliver all births in SWO. Nonetheless, there have been few studies conducted in Canada on the association between teenage pregnancy and adverse birth outcomes.[13,14,47–50] In the current study we found that, with the exception of low Apgar scores, teenage pregnancy did not increase the risk for poor birth outcomes when covariates were adjusted for in the regression models. These results are largely consistent with other Canadian studies, showing no association between teenage pregnancy and LBW or PTB.[14,49] We also found that teenage pregnant women had self-reported high levels of substance use (tobacco, marijuana, and alcohol use, respectively: 41.0%, 13.1%, and 7.0%). This is approximately triple the rate of Canadian pregnant women who smoke during pregnancy (13%),[51–53] and far exceeds the smoking rate of nonpregnant female teenagers at 5.9%.[54]

With most studies that have investigated the association between teenage pregnancy and adverse birth outcomes conducted in the United States,[8] it appears that geographical context, differences in social inequality, and type of health care system are important considerations when comparing findings between Canada and the United States. Indeed, nationally representative American studies have shown that infants born to teenage mothers are at an increased risk for LBW,[9,10,15,55] PTB,[9,15,55] and low Apgar score.[9] Additionally, a recent systematic review showed a strong association between maternal race and adverse birth outcomes in teenage pregnancies; however, findings must be interpreted with caution, because most studies did not adjust for other covariates.[8] This is problematic because race/ethnicity could be confounding the relationship between teenage pregnancy and adverse birth outcomes in the United States.

It is also possible that Canada's universal health care system provides a stronger safety net for teenage mothers

and helps attenuate the effect of social disadvantage on adverse birth outcomes when contrasted to the United States.[56,57] The Canadian health care system provides higher levels of income support for the poor and promotes women's health more than the United States.[57] Furthermore, Canadians who are living in poverty utilize health care resources at a much higher rate than economically disadvantaged Americans who do not have health insurance.[58] Taken together, we believe that differences in social policies between Canada and the United States might help explain differences in birth outcomes of teenage mothers.

Future research should investigate early childhood factors associated with the intergenerational transmission of teenage pregnancy, including family history of teenage childbearing, history of mental illness, and history of risk behaviors. These factors can influence disparities in teenage birth outcomes and might lead to health consequences for the mother and the child after birth. Other options and choices for young mothers should also be explored when they become pregnant, specifically targeting teenagers' engagement in high substance use, to minimize the effect of these risk behaviors on adverse birth outcomes.

Our study is not without limitations. First, our sample size for mothers aged 19 years or younger was not large enough to test for differences in birth outcomes between younger (eg, 13-16 years old, which accounted for 12.4% of our teenage sample) and older teenagers (eg, 17-19 years old, which accounted for 87.6% of our teenage sample). Previous studies indicate that younger teenage mothers have worse obstetric and perinatal outcomes than older teenage mothers.[10,15,55,59–61] Second, substance use variables (ie, alcohol, tobacco, marijuana use) relied on maternal self-report and should be interpreted with caution because self-reported measures are commonly underreported. Consequently, actual rates of substance use were likely greater than those reported. Third, the neonatal and perinatal databases did not have information pertaining to race/ethnicity. This is important because the Indigenous population, for example, have a higher risk for substance use[62] and their risk of teenage pregnancy is more than double that of the general population.[63]

Despite these limitations, our study adds to the limited research on the association between teenage pregnancy and adverse birth outcomes in Canada. Using a large sample from SWO, our findings provide further evidence that early motherhood is not correlated with poorer neonatal outcomes when adjusted for other factors also known to be associated with adverse birth outcomes.

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