Depression in pregnant women with and without COVID-19

Alissa Papadopoulos, Emily S. Nichols, Yalda Mohsenzadeh, Isabelle Giroux, Michelle F. Mottola, Ryan J. Van Lieshout and Emma G. Duerden

Evidence suggests that pregnant women who test positive for COVID-19 may develop more severe illness than non-pregnant women and may be at greater risk for psychological distress. The relationship between COVID-19 status (positive, negative, never tested) and symptoms of depression was examined in a survey study (May to September 2020) of pregnant women (n = 869). Pregnant women who reported testing positive for COVID-19 were significantly more likely to report depressive symptoms compared with women who tested negative (P = 0.027) and women who were never tested (P = 0.005). Findings indicate that pregnant women who test positive for COVID-19 should be screened and monitored for depressive symptoms.

Keywords
Perinatal psychiatry; depressive disorders; low- and middle-income countries; primary care; rating scales.

Method
A prospective online survey study of English-speaking pregnant women was conducted during May to September 2020. Women were recruited online using advertisements on social media from Canada, USA, UK and other countries. Women were asked whether they had been tested for COVID-19 and whether the test was positive or negative. Pregnant women were enrolled (N = 1185). Complete data were available for 869 women (73%); 18 women reported they had tested positive, 133 reported they had tested negative and 718 reported that they had not been tested for COVID-19 (Table 1).

The prevalence of depression was significantly higher in women who tested positive for COVID-19 compared with women who tested negative (adjusted odds ratio [aOR] = 4.34, 95% confidence interval [95% CI]: 1.53–12.09, P = 0.005). Findings indicate that pregnant women who test positive for COVID-19 should be screened and monitored for depressive symptoms.

Results
The prevalence of depression was significantly higher in women who tested positive for COVID-19 compared with women who tested negative (adjusted odds ratio [aOR] = 4.34,
95% CI = 1.18–15.90, \( P = 0.027 \), as well as compared with untested women (aOR = 5.31, 95% CI = 1.66–16.94, \( P = 0.005 \)), adjusting for age, education level, gestational age, country and survey completion month.

COVID-19-positive women had higher total scores on the EPDS compared with women who tested negative (\( B = 0.62, 95\% \) CI = 0.14–1.13, \( P = 0.01 \)) and compared with the group of women who were not tested for COVID-19 (\( B = 0.74, 95\% \) CI = 0.26–1.21, \( P = 0.002 \)), both after adjustment for covariates. Results were maintained after a pairwise Bonferroni correction for multiple comparisons. The associations of COVID-19 test status with EPDS scores are shown in Fig. 1.

### Discussion

Mental health is a key predictor of maternal health during pregnancy, neonatal outcomes and offspring development.\(^1^0\) Pregnant women who reported testing positive for COVID-19 had significantly higher rates of depression compared with untested women and those who reported testing negative. Although analyses were adjusted for gestational age, women who reported testing positive for COVID-19, were assessed early in their pregnancies, and they indicated they experienced greater depressive symptoms, given the potential unknown outcomes associated with maternal illness and fetal outcomes.

Limitations of the current study included that COVID-19 diagnosis status was based on self-report, women were not recruited based on COVID-19 test outcome status, the study only assessed depression and no other mental health indicators, the data were collected at one time point during pregnancy, and the sample size of women who reported testing positive for COVID-19 was small. Data were obtained from a large heterogenous population of pregnant women, and although we adjusted for demographic and perinatal factors, the groups based on COVID-19 test outcome status, the study only assessed women who reported testing positive with women who tested negative, or were not tested who were from the same environment and faced comparable restrictions, as well as comparable access to antenatal care, given that these practices have differed internationally.\(^1^1\)

Pregnant women who test positive for COVID-19 are in need of screening and monitoring for depression, as well as timely treatment in order to optimise outcomes for them and their families.

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### Table 1 Characteristics of pregnant women who tested positive or negative, or who were not tested for COVID-19

| Country, % (n)  | Total (n = 869) | COVID positive (n = 18) | COVID negative (n = 133) | Untested (n = 718) | P-value |
|----------------|----------------|------------------------|--------------------------|--------------------|---------|
| Canada         | 19.6 (170)     | 0 (0)                  | 14.3 (19)                | 21.0 (151)         | <0.001* |
| USA            | 31.9 (277)     | 16.7 (20)              | 51.9 (69)                | 28.6 (205)         |         |
| UK             | 20.7 (180)     | 5.6 (1)                | 14.3 (19)                | 22.3 (160)         |         |
| India          | 12.3 (107)     | 66.7 (12)              | 7.5 (10)                 | 11.8 (85)          |         |
| Other*         | 15.5 (135)     | 11.1 (2)               | 12.0 (16)                | 16.3 (117)         |         |

**Fig. 1** COVID-19 status and EPDS scores in pregnant women. EPDS scores for pregnant women who reported testing positive or negative, or who were not tested for COVID-19. Women who reported testing positive for COVID-19 had higher EPDS scores than women who reported testing negative (\( P = 0.038, 95\% \) CI = 0.02–1.24) or untested women (\( P = 0.007, 95\% \) CI = 0.16–1.32). No statistically significant differences between pregnant women who reported testing negative for COVID-19 and untested women (\( P = 0.81, 95\% \) CI = 0.34–0.13) were evident. Values represent the estimated marginal means of EPDS scores, adjusted for age, country of residence, education, survey completion month and gestational age at survey completion. \( P \)-values are Bonferroni corrected (pairwise) for multiple comparisons. Error bars reflect s.e.m. \( * P < 0.05, ** P < 0.01, \) n.s. (not significant).
research examining other mental health indicators in pregnant women with COVID-19 are needed to inform treatment options for this vulnerable group.

Alissa Papadopoulos, BSc, MA, Applied Psychology, Faculty of Education, Western University, London, Ontario, Canada; Emily S. Nichols, PhD, Applied Psychology, Faculty of Education, and The Brain and Mind Institute, Western University, London, Ontario, Canada; Yalda Mohsenzadeh, PhD, The Brain and Mind Institute and Department of Computer Science, Western University, London, Ontario, Canada; Emma G. Duerden, PhD, School of Nutrition Sciences, Faculty of Health Sciences, University of Ottawa, and Institut du Savoir Monfort, Ottawa, Ontario, Canada; Isabelle Giroux, PhD, School of Nutrition Sciences, Faculty of Health Sciences, University of Ottawa, and Institut du Savoir Monfort, Ottawa, Ontario, Canada; Michelle F. Mottola, PhD, R. Samuel McLaughlin Foundation – Exercise and Pregnancy Laboratory, School of Kinesiology, Faculty of Health Sciences, Department of Anatomy and Cell Biology, Schulich School of Medicine and Dentistry, Children’s Health Research Institute, Western University, London, Ontario, Canada; Ryan J. Van Lieshout, MD, PhD, Departments of Psychiatry and Behavioural Neurosciences, McMaster University, Hamilton, Ontario, Canada; Emma G. Duerden, PhD, Applied Psychology, Faculty of Education, The Brain and Mind Institute, and Psychiatry, Schulich School of Medicine and Dentistry, Western University, London, Ontario, Canada

Correspondence: Emma G. Duerden. Email: eduerden@uwo.ca

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Declaration of interest
None.

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