Key concerns among pregnant individuals during the pandemic

Online cross-sectional survey

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Abstract

Objective To determine common sources of concern among pregnant individuals during the coronavirus disease 2019 (COVID-19) pandemic.

Design A cross-sectional, open, online electronic survey from May 9, 2020, to June 14, 2020.

Setting Electronic survey open internationally and advertised through Canadian-based social media platforms.

Participants Eligible participants understood English and had been pregnant during the COVID-19 pandemic (ie, were pregnant at the time of survey completion or had delivered an infant on or after March 11, 2020).

Main outcome measures   Potential sources of concern related to the pandemic, calculated as the proportion of participants who endorsed each concern among those for whom the concern was relevant. Differences in the proportion of individuals endorsing each concern were compared by parity using modified Poisson regression. Frequency of concerns was examined in terms of level of distress, as per the Kessler Psychological Distress Scale (K6), using multivariable linear regression.

Results Out of 1477 participants, 87.3% were Canadian. Top concerns included the following: hospital policies related to support persons during labour (80.9%), not being able to introduce the baby to family and friends (80.1%), and developing COVID-19 while pregnant (79.2%). Primiparous participants were more likely than multiparous participants to be concerned about accessing in-person prenatal classes (51.5% vs 13.3%; relative risk = 3.88; 95% CI 2.02 to 4.98) and cancellation of hospital tours (35.0% vs 5.6%, relative risk = 6.26; 95% CI 4.25 to 9.20), among other concerns. The mean (SD) K6 score was 6.7 (3.8) within the moderate to high distress range. Number of concerns reported was associated with K6 score in both primiparous (β = 0.24; 95% CI 0.20 to 0.29; *P* < .0001) and multiparous (β = 0.30; 95% CI 0.24 to 0.36; *P* < .0001) individuals.

Conclusion Pregnant individuals have unique concerns during the COVID-19 pandemic and the findings indicate the importance of targeted support strategies to meet the particular needs of both primiparous and multiparous pregnant individuals.

Editor's key points

▸ The coronavirus disease 2019 (COVID-19) pandemic has had a substantial impact on all pregnant individuals, both primiparous and multiparous. Distress levels in perinatal individuals are elevated relative to prepandemic estimates.

▸ Pregnant individuals were most concerned with hospital policies regarding support persons in labour, not being able to introduce their baby to loved ones, getting sick from COVID-19, not being able to rely on family or friends after labour because of physical distancing guidelines, and conflicting medical information on COVID-19 in pregnancy and newborns early in the pandemic.

▸ Family physicians are well placed to support pregnant individuals during this challenging time. Clinicians and hospital administrators can explore innovative ways to increase perinatal support. This could include the use of technology to have more frequent virtual check-ins; enhanced videoconferencing during health care visits and labour and delivery to include support people; virtual hospital tours; and the increased use of online resources to disseminate evidence-based information on COVID-19 that is relevant to expectant parents.

▸ Differences in concerns between primiparous and multiparous individuals were identified (eg, primiparous individuals were particularly concerned about the cancellation of in-person prenatal classes and hospital tours), which should be taken into account in the design and delivery of services.

Points de repère du rédacteur

▸ La maladie à coronavirus 2019 (COVID-19) a eu des répercussions considérables sur toutes les personnes enceintes, qu'elles soient primipares ou multipares. Les degrés de détresse en période périnatale chez elles sont élevés par rapport aux estimations avant la pandémie.

▸ Les principales inquiétudes des personnes enceintes concernaient les politiques hospitalières relatives aux personnes aidantes durant le travail, l'impossibilité de présenter leur bébé aux êtres chers, la possibilité de contracter la COVID-19, l'incapacité de s'appuyer sur la famille ou les amis après le travail en raison des directives liées à la distanciation physique, et les renseignements médicaux contradictoires sur la COVID-19 relatifs à la grossesse et aux nouveau-nés au début de la pandémie.

▸ Les médecins de famille sont bien placés pour soutenir les personnes enceintes durant ces temps difficiles. Les cliniciens et les administrateurs d'hôpitaux peuvent explorer des façons novatrices d'augmenter le soutien périnatal. Cela pourrait comprendre le recours à la technologie pour augmenter le nombre de visites de contrôle virtuelles; l'utilisation accrue de la vidéoconférence durant les visites médicales, le travail et l'accouchement pour inclure des personnes aidantes; des visites virtuelles de l'hôpital; et le recours accru à des ressources en ligne pour diffuser des renseignements fondés sur des données probantes sur la COVID-19, qui sont pertinents pour les futurs parents.

▸ On a pu établir des différences entre les inquiétudes des personnes primipares et multipares (p. ex. les personnes primipares craignaient particulièrement l'annulation des cours prénataux en personne et des visites de l'hôpital), dont il faudrait tenir compte au moment de concevoir et de fournir les services.

Principales inquiétudes chez les personnes enceintes durant la pandémie

Sondage transversal en ligne

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Résumé

Objectif Déterminer les sources les plus fréquentes d'inquiétude chez les personnes enceintes durant la pandémie de la maladie à coronavirus 2019 (COVID-19).

Type d'étude Un sondage électronique en ligne, transversal et ouvert, réalisé du 9 mai 2020 au 14 juin 2020.

Contexte Un sondage électronique ouvert à l'échelle internationale et annoncé au moyen de plateformes de médias sociaux basées au Canada.

Participantes Pour être admissibles, les participantes devaient comprendre l'anglais et avoir été enceintes durant la pandémie de la COVID-19 (c.-à-d. être enceintes au moment de répondre au sondage ou avoir accouché le 11 mars 2020 ou après).

Principaux paramètres à l'étude Les sources d'inquiétude possibles liées à la pandémie, calculées comme étant la proportion de participantes qui se sont dites d'accord avec chaque préoccupation parmi celles pour qui la préoccupation était pertinente. Les différences dans les proportions de personnes qui étaient d'accord avec chaque préoccupation ont été comparées selon le nombre de grossesses à l'aide d'une régression de Poisson modifiée. La fréquence des inquiétudes a été examinée en fonction du degré de détresse, conformément à l'échelle de détresse psychologique de Kessler (K6) et à l'aide d'une régression linéaire multiple.

Résultats Parmi 1477 participantes, 87,3 % étaient canadiennes. Les principales sources d'inquiétude incluaient les suivantes : les politiques de l'hôpital concernant les personnes aidantes durant le travail (80,9 %), l'incapacité de présenter leur bébé à la famille et aux amis (80,1 %) et la crainte de contracter la COVID-19 durant la grossesse (79,2 %). Entre autres, les participantes primipares étaient plus enclines que les multipares à se préoccuper de l'accès aux cours prénataux en personne (51,5 c. 13,3 %; risque relatif = 3,88; IC à 95 % de 2,02 à 4,98) et de l'annulation des visites de l'hôpital (35,0 c. 5,6 %, risque relatif = 6,26; IC à 95 % de 4,25 à 9,20). Le score K6 moyen (ET) était de 6,7 (3,8), soit dans une fourchette de détresse allant de modérée à élevée. Le nombre de préoccupations signalées était associé avec le score K6, tant chez les personnes primipares (β = 0,24; IC à 95 % de 0,20 à 0,29; *p* < ,0001) que multipares (β = 0,30; IC à 95 % de 0,24 à 0,36; *p* < ,0001).

Conclusion Les personnes enceintes ont des inquiétudes particulières durant la pandémie de la COVID-19, et les constatations indiquent qu'il est important de mettre sur pied des stratégies de soutien ciblées pour répondre aux besoins spécifiques des personnes enceintes primipares et multipares.

The impact of the coronavirus disease 2019 (COVID-19) pandemic on pregnant individuals has been substantial. Knowledge about COVID-19 effects on pregnancy and infant outcomes has evolved,[1-3] but public health messaging for this population was contradictory at times.[4] The pandemic has also disrupted standard perinatal services (eg, decreased frequency of in-person antenatal visits,[5,6] cancellation of in-person prenatal classes) and support networks (eg, limited support people to help during labour, restrictions on visitors postpartum). While approximately 1 in 5 perinatal women experience depressive or anxiety symptoms in nonpandemic situations,[7] throughout this pandemic, up to two-thirds of pregnant women have experienced considerable symptoms of mental illness or distress.[8-11] This is especially concerning given the impact of antenatal maternal mental health on child cognitive, behavioural, and social outcomes.[12-15] Because of the relatively low uptake of vaccination in the pregnant population compared with other highest-risk conditions, and the evolving highly transmissible and virulent variants of concerns, public health restrictions—and their psychological and social sequelae—may be prolonged in this population.[16,17]

Understanding sources of concern in pregnancy is essential to guide evidence-based responses for delivering care to pregnant individuals and their families during this and future pandemics. There is limited research on the concerns of pregnant individuals regarding the risk of infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2),[10,18] and no previous data exist on COVID-19–related disruptions in psychosocial supports and perinatal care delivery. Only 1 previous study has examined differences between primiparous and multiparous women on COVID-19–related concerns.[18] While no differences were found, that study focused solely on SARS-CoV-2 transmission, and did not explore the impact of disruptions to perinatal care and psychosocial supports,[18] which may be used differently by primiparous versus multiparous individuals.

To address this gap, this study examined the most common sources of concern among pregnant individuals during the COVID-19 pandemic. The specific objectives were to determine the most frequently reported perinatal care and psychosocial concerns; to compare concerns by parity (primiparous vs multiparous); and to explore the relationship between number of reported concerns and overall level of maternal distress.

—— Methods ——

Study design and setting
A cross-sectional survey was conducted where an online, open electronic survey (e-survey) was available between May 9, 2020, and June 14, 2020. Reporting follows CHERRIES (Checklist for Reporting Results of Internet e-Surveys).[19] The survey was advertised on PandemicPregnancyGuide (PPG), a social media science communication platform (via Instagram and Twitter) created by 3 of the co-authors (T.B., E.M.S., S.W.) in Toronto, Ont, to provide reliable and up-to-date medical information for pregnant individuals during the COVID-19 pandemic (approximately 7000 followers at time of survey).

Recruitment and data collection
Links to the survey were posted on PPG's social media accounts and could be shared publicly to facilitate snowball sampling. Informed consent (where participants were informed of the purpose, risks and benefits, and participation requirements of the study) was obtained digitally from eligible participants before accessing the e-survey. Participants could enter their name into a draw to win 1 of 5 $25 gift cards, and could provide their e-mail address to be contacted for future research, but otherwise no personal information was collected. These personal data were stored separately from study data. Ethics approval was obtained from the St Michael's Hospital Research Ethics Board in Toronto, Ont, before the start of recruitment and data collection.

The e-survey was administered through REDCap (Research Electronic Data Capture),[20] a secure Web application for building and managing online surveys and databases, with data housed on secure servers located at St Michael's Hospital. Data were only accessible to authorized individuals on the study team. The e-survey, which took 15 to 20 minutes to complete, incorporated adaptive questioning (ie, certain questions were conditionally displayed based on responses to other items) to reduce the number and complexity of questions. The questionnaire was distributed over 6 webpages, with 1 additional page to provide contact information for the gift card draw and to optionally agree to be contacted for future research. All questions were optional. A back button allowed participants to review and change their answers. Usability and technical functionality were piloted with 10 perinatal individuals known to the study investigators before fielding the questionnaire.

Participants
Individuals were eligible to participate if they were 18 years or older, understood English, and had been pregnant during the COVID-19 pandemic (ie, were pregnant at the time of survey completion or had delivered an infant on or after March 11, 2020, when the World Health Organization declared a global pandemic). As the survey closed on June 14, 2020, participants could be up to 3 months postpartum. The wording of the survey was designed to be inclusive of childbearing individuals of all gender identities.

Study measurements and outcomes
Perinatal concerns. The primary outcomes of interest were sources of perinatal concern related to the COVID-19

pandemic. A list of perinatal concerns was generated by consulting with primary and obstetric care providers and perinatal psychiatrists, conducting a high-level synthesis of comments posted on PPG, and pretesting with 10 perinatal individuals. The final list of concerns was related to health and exposure to SARS-CoV-2 (7 items), provision of prenatal care (4 items), labour and delivery experience (3 items), postpartum support (7 items), and other perinatal concerns (6 items). Additional questions identified through prior COVID-19–related research included nonperinatal pandemic-related difficulties (11 items; eg, reduced household income) and mental well-being (9 items; eg, feeling isolated, anxious, or depressed).[21] For each item, participants were asked to indicate their level of concern on a 5-point Likert scale (with 1 indicating not concerned at all and 5 indicating extremely concerned), or to select not applicable.[22] A free-text box was available for participants to report additional concerns.

Mental health scales. The frequency of maternal distress in the past month was measured by the 6-item Kessler Psychological Distress Scale (K6).[23] The K6 has good psychometric properties to detect mood and anxiety disorders[24] and is validated for use in perinatal populations.[25] Each question is scored from 0 to 4, with total scores ranging from 0 (no distress) to 24 (severe distress), and higher cumulative scores indicating greater distress. In general population samples, scores of 5 or greater and 13 or greater reflect moderate (sensitivity 0.76, specificity 0.75) and severe (sensitivity 0.36, specificity 0.96) distress, respectively.[26,27] We assessed depressive symptoms using the Edinburgh Postnatal Depression Scale, an internationally recommended tool for screening for depressive symptoms in perinatal women (10 questions, each scored from 0 to 3, with a maximum total of 30; scores ≥13 indicate probable depression).[28,29] A score of 1 or more on question 10 indicates self-harm risk.[30] We assessed social support using the 10-item Social Provisions Scale (SPS-10), which measures 5 domains of support (emotional attachment, social integration, reassurance of worth, tangible help, and orientation), and has good psychometric properties (Cronbach $\alpha = .88$), construct validity, and strong concurrent validity with its original 24-item measure.[31,32] Cronbach α for the SPS-10 for the current study was .95. Each SPS-10 item was scored on a Likert scale from 0 to 4 (indicating strongly disagree to strongly agree), with a cutoff of 29 or less, indicating low perceived support.[33]

Parity. Primiparous participants were currently pregnant and reported no previous live births or were not currently pregnant and had delivered their first child during the pandemic. Multiparous participants were currently pregnant and had 1 prior live birth, or reported 2 or more prior live births.

Other variables. The survey included questions relating to sociodemographic profile and reproductive, medical, and psychiatric history.

Data analysis
Summary statistics were used to describe study participants, overall and by parity. Counts smaller than 6 were suppressed to reduce risk of participant re-identification. Concerns mentioned in the free-text box were reviewed, initial patterns were identified, identified patterns were then grouped into potential themes, and those potential themes were then refined into finalized themes. To determine top pregnancy concerns, the proportion of participants who ranked a potential concern as at least moderately concerning was calculated (denominator: total number of participants who answered the question, excluding those who indicated it was not relevant to them). The potential sources of concern were then ranked according to the proportion of participants rating it as at least moderately concerning. This was done for the entire sample, and separately for the subsets of primiparous and multiparous participants. To compare concerns between primiparous and multiparous participants, a separate univariate modified Poisson regression model was generated for each potential source of concern to compute the relative risk (RR) of reporting that it was a source of moderate or extreme concern (referent: multiparous participants). To investigate the relationship between an individual's total number of perinatal concerns, parity, and K6 scores, we used multivariable linear regression. The model included the total number of responses that were of moderate or extreme concern, parity, and the interaction between these 2 variables.

Although all participants were pregnant during the pandemic, some had already delivered their infant at the time of survey completion. To assess whether pregnancy status at the time of survey completion (pregnant vs postpartum) impacted our results, we conducted 2 additional analyses: we calculated the sources of concern stratified by pregnancy status at the time of survey completion, and in the regression models comparing concerns between primiparous and multiparous individuals, we adjusted each modified Poisson regression model for pregnancy status, generating adjusted RRs.

All statistical tests were 2-tailed, and *P* less than .05 was set as the level of statistical significance. We used SPSS, version 24.033, for the analyses.

—— Results ——

Sample characteristics
Overall, 1781 individuals clicked on the survey link (unique users could not be determined as IP addresses were not collected for privacy reasons). Of these, 50 did not meet eligibility criteria, 152 declined participation, and 1579 consented to participate (recruitment rate[19] of

88.7%). There were 102 participants who consented but did not complete any survey questions, therefore resulting in a final sample of 1477 participants who completed at least part of the survey. The completion rate[19] (participants who consented and reached the final page of the survey) for the study was 82.9% (n=1310).

The mean (SD) age of the sample was 33.3 (3.5) years (range from 21 to 45) (**Table 1**).[34] Most participants (87.3%) resided in Canada. Most (74.1%) had an annual household income greater than $95 000, were university educated (85.1%), were married or in a relationship (98.8%), and identified as heterosexual (96.5%); almost all (>99%) identified as cisgender women. Overall, 19.1% reported having a formal mental health diagnosis, 16.7% had a current chronic medical condition, and 1.7% reported a disability (defined per the Ontario Disability Support Program Act[34]). Of the 85 participants who had undergone testing for SARS-CoV-2, fewer than 10 had positive test results. Among 1410 participants who answered questions on parity, 820 (58.2%) were primiparous. Similar sociodemographic, reproductive, and medical profiles were observed between groups, except primiparous participants were slightly younger and were more likely to identify as part of an ethnic or racial minority group. The overall mean (SD) K6 score was 6.7 (3.8), with 68.5% (n=913) of participants reporting moderate to high levels of distress (K6 score≥5). About 20.3% had depressive symptoms (Edinburgh Postnatal Depression Scale score≥13), and 8.4% had low perceived support (SPS score≤29) (**Table 2**).[25-30]

Sources of concern

The top 5 sources of concern among participants were hospital policies around support persons during labour (n=1083; 80.9% of participants who indicated it was relevant to them), not being able to introduce the baby to family members and friends (n=1100; 80.1%), getting infected with SARS-CoV-2 and its impact on health while pregnant (n=1065; 79.2%), not having postpartum support because of physical distancing (n=1039; 76.4%), and conflicting health care information on the impact of COVID-19 on pregnancy and newborns (n=986; 71.4%) (**Table 3**). The top concern among primiparous participants was not being able to introduce their baby to family and friends (n=672; 85.6%), and the top concern among multiparous participants was contracting COVID-19 and it impacting their health while pregnant (n=420; 78.4%).

While many concerns were similar between primiparous and multiparous participants, there were some key differences between groups in terms of ranking an item as moderately or extremely concerning, among those for whom it was relevant (**Figure 1**). Compared with multiparous individuals, primiparous participants were more likely to be concerned about their provision of prenatal care, including the cancellation of in-person prenatal classes (n=387 [51.5%] vs n=58 [13.3%]; RR=3.88;

95% CI 3.02 to 4.98) and hospital tours (n=259 [35.0%] vs n=26 [5.6%]; RR=6.26; 95% CI 4.25 to 9.20). They were also more likely to be worried about their labour and delivery experience (eg, changes in recommendations for labour pain management; n=372 [48.9%] vs n=197 [38.2%]; RR=1.28; 95% CI 1.12 to 1.46), access to postpartum support (eg, difficulty accessing breastfeeding support; n=509 [65.1%] vs n=214 [39.6%]; RR=1.64; 95% CI 1.46 to 1.85), and other general concerns such as not being able to prepare and acquire baby items in advance of delivery (n=345 [43.9%] vs n=135 [24.3%]; RR=1.81; 95% CI 1.53 to 2.13). They were less likely to be concerned about COVID-19 exposure from older children living in their homes (n=51 [17.7%] vs n=234 [45.0%]; RR=0.39; 95% CI 0.30 to 0.51) and not getting along with their partner (n=43 [5.9%] vs n=61 [11.3%]; RR=0.53; 95% CI 0.36 to 0.77). Both groups were similarly concerned about SARS-CoV-2 exposure and not having additional help and support from family members postnatally.

Participants' nonperinatal difficulties and concerns are presented in **Table 4**.

Association between total number of concerns and level of distress

Overall, participants had a mean (SD) of 13.2 (5.7) items that they rated as moderate or extreme sources of concern. A 1-point increase in the K6 score was associated with an increase of 0.24 (95% CI 0.20 to 0.29; $P<.0001$) in the total number of responses that were of moderate or extreme source of concern among primiparous participants, and a 0.30 (95% CI 0.24 to 0.36; $P<.0001$) increase among multiparous individuals. The associations did not differ significantly by parity (β=.05, 95% CI 0.02 to 0.12; $P=.152$).

Additional analyses

In the additional analyses, there were only slight differences between pregnant and postpartum individuals in their concerns, and most of the top concerns were the same. When pregnancy status at the time of survey completion was added to the modified Poisson regression models comparing concerns between primiparous and multiparous individuals, results were similar to the unadjusted analyses. These supplementary analyses, as well as a table of the most frequent free-text responses and a sample generation algorithm, are available from **CFPlus.***

—— Discussion ——

This online survey of 1477 participants who were pregnant during the COVID-19 pandemic asked about the diverse aspects of pregnancy during the pandemic, ranging from

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*Supplementary Tables 1 to *3* and *Supplementary Figure 1* are available from **www.cfp.ca**. Go to the full text of the article online and click on the **CFPlus** tab.

Table 1. Baseline characteristics by parity

CHARACTERISTIC	ALL PARTICIPANTS (N = 1477)	PRIMIPAROUS* (N = 820)	MULTIPAROUS* (N = 590)
Sociodemographic†			
Mean (SD) age, y	33.3 (3.5)	32.6 (3.5)	34.5 (3.1)
Income, n (%)			
• <$95 000	302 (20.5)	181 (22.1)	106 (18.0)
• $95 000 to $199 999	746 (50.6)	427 (52.1)	285 (48.5)
• ≥$200 000	346 (23.5)	168 (20.5)	164 (27.9)
• Prefer not to answer	80 (5.4)	43 (5.3)	33 (5.6)
Education, n (%)			
• High school, college diploma, trade school, or lower	220 (14.9)	127 (15.6)	83 (14.1)
• Undergraduate degree	547 (37.2)	301 (36.9)	217 (36.8)
• Graduate or professional degree	705 (47.9)	388 (47.5)	289 (49.1)
Marital status, partnered, n (%)	1459 (98.8)	NR	NR
Front-line worker, n (%)‡	180 (12.2)	109 (13.3)	69 (11.7)
Ethnic or racial minority, n (%)	275 (18.7)	167 (20.4)	90 (15.3)
Sexual orientation, heterosexual, n (%)	1424 (96.5)	NR	NR
Residence, in Canada, n (%)	1288 (87.3)	728 (88.9)	508 (86.1)
• Atlantic Canada§	16 (1.2)	NR‖	NR‖
• Quebec	15 (1.2)	NR‖	NR‖
• Ontario	1145 (89.0)	NR‖	NR‖
• Prairie Provinces¶	51 (4.0)	NR‖	NR‖
• British Columbia	59 (4.6)	NR‖	NR‖
Residence, outside of Canada, n (%)	188 (12.7)	91 (11.1)	82 (13.9)
Current chronic medical condition, n (%)	247 (16.7)	141 (17.2)	98 (16.6)
Formal mental health diagnosis, n (%)	282 (19.1)	152 (18.5)	121 (20.5)
Physical or mental disability, n (%)#	25 (1.7)	NR	NR
Previous miscarriage, ≥1, n (%)	374 (26.6)	160 (19.6)	212 (36.7)
Current pregnancy			
Planned or expected pregnancy, n (%)	1282 (88.8)	737 (89.9)	515 (87.4)
Type of pregnancy care provider, n (%)			
• Obstetrician	732 (51.0)	409 (50.2)	302 (51.4)
• Family physician obstetric care	193 (13.4)	118 (14.5)	68 (11.6)
• Midwife	332 (23.1)	176 (21.6)	151 (25.7)
• Shared care (family physician and obstetrician)	130 (9.1)	85 (10.4)	44 (7.5)
• Shared care (midwife and obstetrician)	49 (3.4)	26 (3.2)	22 (3.7)
Planned birth location, n (%)			
• Hospital	1316 (91.1)	763 (93.0)	524 (89.0)
• Other (eg, home, birthing centre)	128 (8.9)	57 (7.0)	65 (11.0)
High-risk pregnancy, n (%)	218 (15.1)	104 (12.7)	110 (18.6)
Pregnancy complications (eg, gestational diabetes), n (%)	292 (20.2)	146 (17.9)	143 (24.2)

CHARACTERISTIC	ALL PARTICIPANTS (N = 1477)	PRIMIPAROUS* (N = 820)	MULTIPAROUS* (N = 590)
Gestational age at time of survey, n (%)			
• First trimester	103 (7.2)	55 (6.8)	47 (8.1)
• Second trimester	445 (31.3)	279 (34.4)	158 (27.3)
• Third trimester	619 (43.5)	354 (43.7)	243 (42.0)
• Postpartum (< 3 mo)	257 (18.0)	122 (15.1)	130 (22.5)

NR—not reportable.

*Not all participants in the sample completed questions related to parity.

†Not all participants in the sample completed all questions related to sociodemographic characteristics.

‡*Front-line worker* was defined as health care clinical or support staff, grocery store clerk, delivery service person, etc.

§Atlantic Canada includes New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador.

‖Data are not reportable and not shown because of small sample size (n < 6) or potential for calculation.

¶Prairie Provinces include Manitoba, Saskatchewan, and Alberta.

#A *physical or mental disability* (confirmed or diagnosed by a medical professional) was defined by the Ontario Disability Support Program Act[34] as "substantial mental or physical impairment that is continuous or recurrent, and is expected to last a year or more," and the impairment "directly result[s] in a substantial restriction in the person's ability to: work, take care of him or herself, or take part in community life."[34]

Table 2. Results from mental health scales by parity

MENTAL HEALTH SCALE	ALL PARTICIPANTS	PRIMIPAROUS*	MULTIPAROUS*	ABSOLUTE MEAN DIFFERENCE (95% CI)
No. of 6-item Kessler Psychological Distress Scale† respondents	1332	762	536	
• Mean (SD) score	6.7 (3.8)	6.4 (3.7)	6.9 (3.9)	0.5 (0.1-0.9)
• Low distress score (< 5), n (%)	419 (31.5)	250 (32.8)	160 (29.9)	
• Moderate distress score (5-12), n (%)	807 (60.5)	458 (60.1)	328 (61.2)	
• Severe distress score (≥ 13), n (%)	106 (8.0)	54 (7.1)	48 (9.0)	
No. of Edinburgh Postnatal Depression Scale‡ respondents	1333	760	539	
• Mean (SD) score	8.9 (4.7)	8.6 (4.7)	9.2 (4.7)	0.7 (0.1-1.2)
• Score ≥ 13, n (%)	271 (20.3)	141 (18.6)	124 (23.0)	
• Question 10 score ≥ 1, n (%)§	83 (6.2)	48 (6.3)	34 (6.3)	
No. of 10-item Social Provisions Scale respondents	1258	725	501	
• Mean (SD) score	38.8 (4.8)	36.2 (4.9)	35.2 (4.7)	1.0 (0.4-1.5)
• Low score (≤ 29), n (%)	106 (8.4)	49 (6.8)	55 (11.0)	
No. of PROMIS Sleep Disturbance Scale respondents	1319	755	530	
• Raw mean (SD) score	24.0 (7.0)	23.4 (7.1)	24.9 (6.7)	1.4 (0.6-2.2)
• Mean (SD) T-score	54.1 (8.1)	53.4 (8.4)	55.1 (7.6)	

PROMIS—Patient-Reported Outcomes Information System.

*Not all participants in the sample completed questions related to parity.

†Scores less than 5 indicate low levels of distress; scores from 5 to 12 indicate moderate levels of distress; and scores greater than or equal to 13 indicate severe levels of distress and that serious mental illness is highly possible.[26,27]

‡Scores greater than or equal to 13 indicate probable depression.[28,29]

§A positive screen result (≥ 1) on question 10 indicates self-harm or suicidality risk.[30]

being infected with SARS-CoV-2 to the provision of perinatal care and the impact on postpartum support. We found that, among participants for whom it was relevant, more than 80% were concerned about hospital policies, availability of support persons during labour, and not being able to introduce their baby to family and friends. Compared to multiparous participants, primiparous participants were more likely to be concerned about accessing elements of prenatal care, such as prenatal classes and hospital tours. Having more concerns was related to overall distress, underscoring the need to address the totality of an individual's concerns when providing perinatal services. Our findings have important implications for the delivery of primary care to pregnant individuals and their families

Table 3. Top 5 perinatal concerns by parity, presented as a fraction (%) of those who indicated it was a moderate to extreme concern (numerator) over those who indicated it was relevant to them (denominator)

GROUP	RANKED CONCERNS
Overall	1. Hospital policies around support persons in labour, 1083/1338 (80.9) 2. Not being able to introduce my baby to loved ones, 1100/1373 (80.1) 3. Getting sick from COVID-19 and its impact on my health while pregnant, 1065/1345 (79.2) 4. Not being able to rely on additional family members (outside of the home) as support people after having a baby because of physical distancing, 1039/1360 (76.4) 5. Confusing or conflicting medical information on the impact of COVID-19 on pregnancy and newborns, 986/1381 (71.4)
Primiparous	1. Not being able to introduce my baby to loved ones, 672/785 (85.6) 2. Hospital policies around support persons during labour, 642/773 (83.1) 3. Getting sick from COVID-19 and its impact on my health while pregnant, 614/775 (79.2) 4. Not being able to rely on additional family members (outside of the home) as support people after having a baby because of physical distancing, 594/775 (76.6) 5. Less frequent in-person well-baby checkups with health care provider, 596/786 (75.8)
Multiparous	1. Getting sick from COVID-19 and its impact on my health while pregnant, 420/536 (78.4) 2. Hospital policies around support persons during labour, 414/532 (77.8) 3. Not being able to rely on additional family members (outside of the home) as support people after having a baby because of physical distancing, 419/551 (76.0) 4. Not being able to introduce my baby to loved ones, 396/554 (71.5) 5. Confusing or conflicting medical information on the impact of COVID-19 on pregnancy and newborns, 395/557 (70.9)

COVID-19—coronavirus disease 2019.

during this pandemic, and in particular suggest key areas to target and prioritize when delivering perinatal services and resuming in-person health care services.

The high levels of distress (68.5%) in this population are in keeping with other recent perinatal studies during the COVID-19 pandemic,[35] and highlights the importance of considering mental health centrally in supports for this population.[8-11] The top perinatal concerns identified included access to support throughout the perinatal period (eg, support persons during labour and family support postpartum), the potential health impact of COVID-19 in pregnancy and on newborns (including confusing information related to this), and the emotional elements of the transition to parenthood (eg, not being able to introduce the baby to loved ones). Our results differ from 2 previous studies examining aspects of COVID-19–related perinatal concerns and expand on the concerns examined. An Italian study (N = 100) that only examined concerns related to vertical disease transmission found that this was a source of anxiety in 46% of women[10]; in our study, 79.2% of individuals were concerned about the potential health impact of COVID-19 in pregnancy. An Israeli study (N = 336 pregnant women) that examined 8 potential sources of COVID-19–related concerns found that the top concern was the risk of SARS-CoV-2 exposure from public transportation,[18] whereas only 6.3% of individuals in our study reported transportation difficulties during the pandemic (for context, public transportation use in Canada is among the lowest globally[36]). Previous studies have not examined psychosocial perinatal-related concerns during the COVID-19 pandemic; this is a novel contribution of our study. In contrast to the Israeli study,[18] we found multiple differing sources of concern based on parity, including that primiparous individuals were particularly concerned about changes to prenatal care and about preparation for their first baby (reflecting the main ways expecting parents report preparing for a first child in other studies[35]), whereas multiparous individuals were concerned about exposure from older children in the home. A large representative study of parents in the United Kingdom conducted just before the pandemic found that preparations for the arrival of a first child included purchasing items for the baby, attending antenatal classes, seeking support from family and friends, and attending health appointments.[35] Our results highlight how the pandemic has not just disrupted medical aspects of the perinatal period, but also the important family structure and psychosocial transitions that occur during this time. Beyond having examined a broader scope of concerns, differences between our study and others may reflect regional variations in maternal care, disease management and public health education, timing of data collection with respect to the pandemic, and the specific wording of questions.

To some degree, distress is an expected response to a global pandemic. However, the high level of perinatal distress (68.5% reporting at least moderate levels in our sample, compared with 28.4% to 32.3% in a population-based Japanese sample before the pandemic[37]) is concerning because of its potential downstream impact on maternal and child health and well-being.[14,15,35] Our e-survey measured distress early in the pandemic, and we cannot know how distress levels may have been impacted by evidence that emerged related to the risks of COVID-19 in pregnancy (eg, higher risk of severe illness and adverse pregnancy outcomes[3]), by the impact of prolonged isolation and public health restrictions, or

Figure 1. Perinatal-related concerns by parity: *Percentages correspond to the no. of participants who indicated that an item was of moderate to extreme concern, out of those for whom it was relevant.*
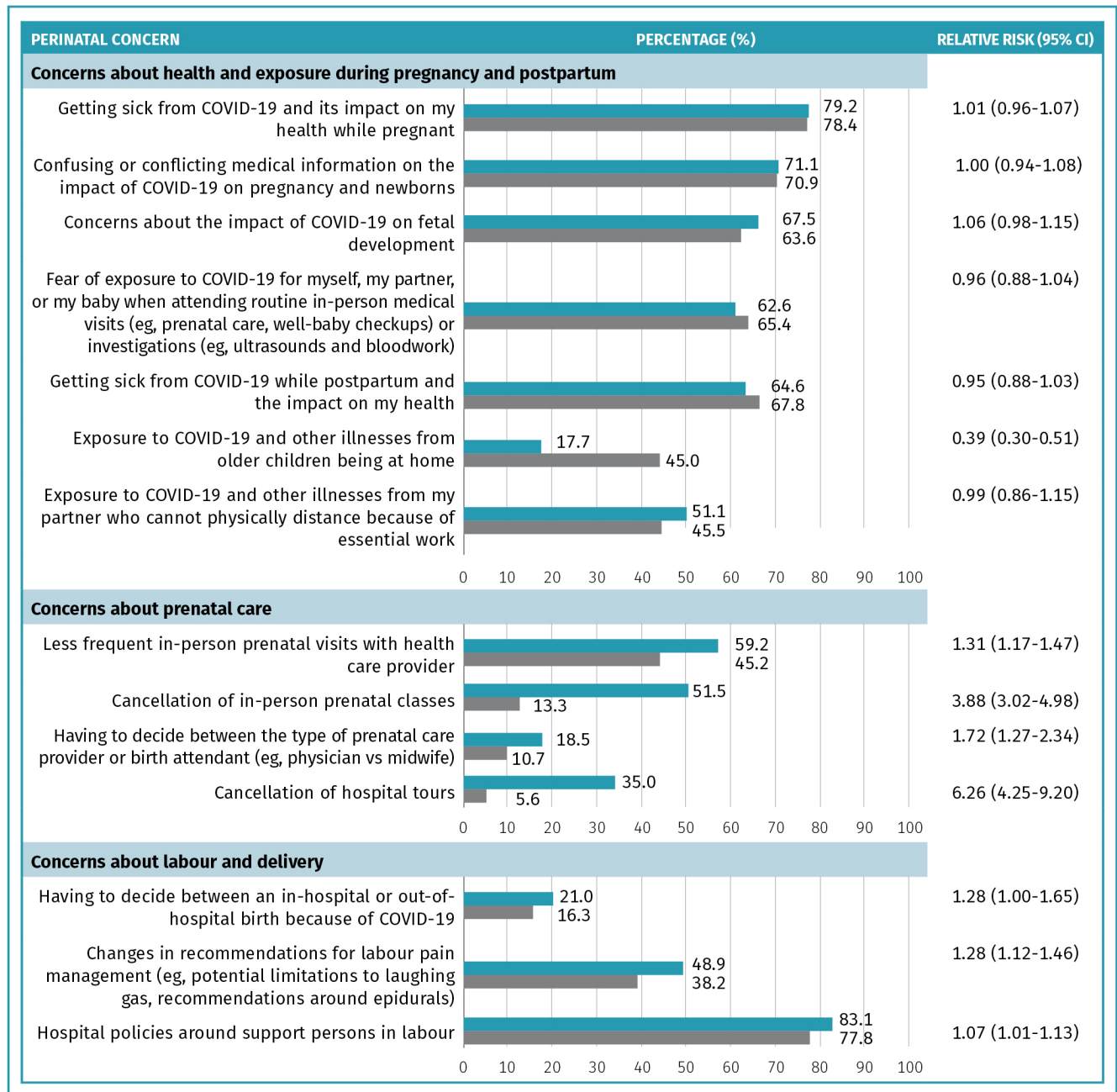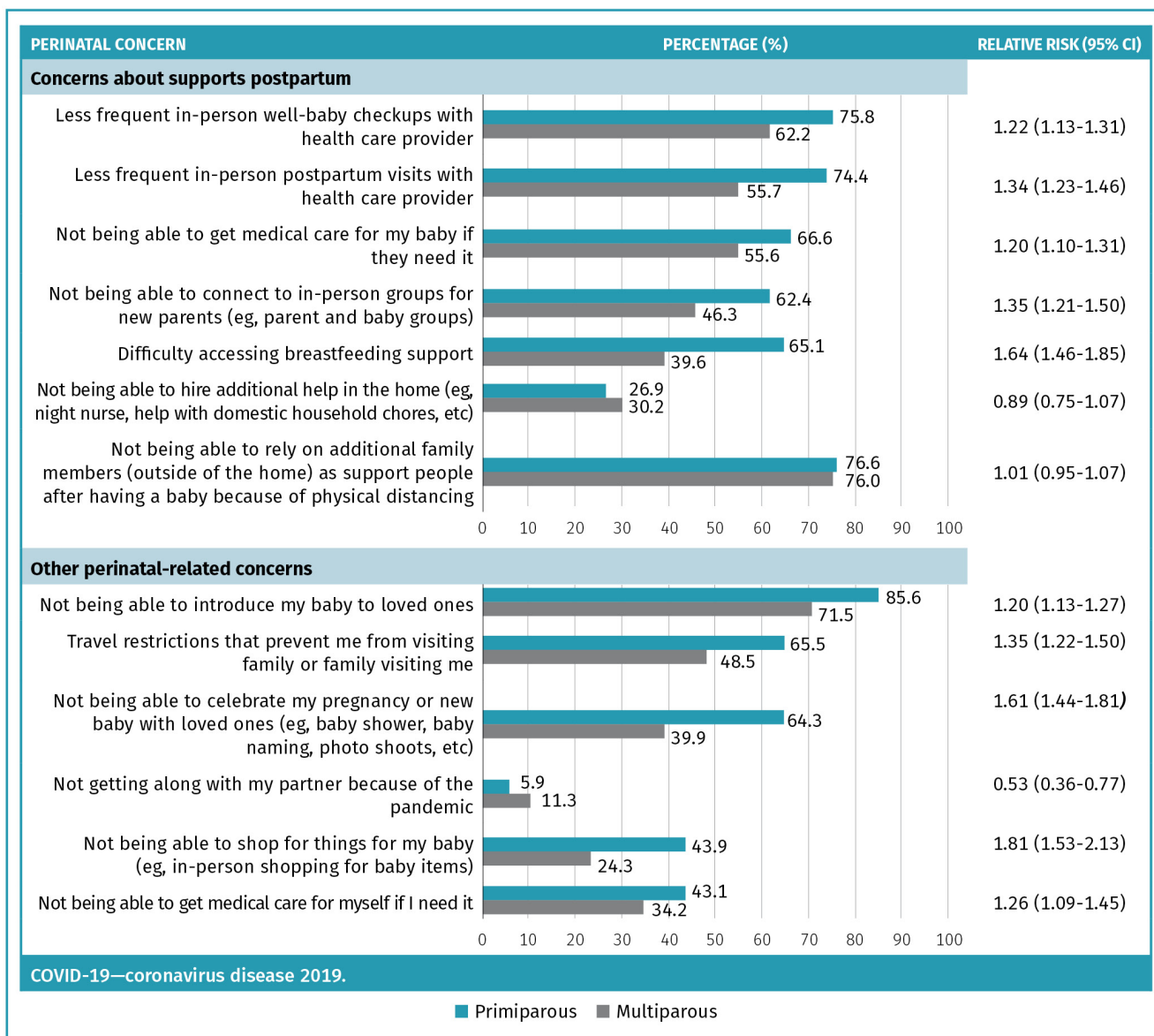
by the evidence and guidance related to COVID-19 vaccines in pregnancy. It is critical for family physicians and other maternity care providers to address perinatal mental health care needs by engaging in screening practices in conjunction with offering appropriate treatment, including timely referrals to appropriate supports when needed.[38] Family physicians, who provide both maternity and mental health care, are particularly well placed to support pregnant individuals during this challenging time. Additional services, such as counseling, public health nursing, and psychiatric appointments may often be delivered virtually, which is of particular benefit during the pandemic.[39] To address concerns, clinicians and hospital administrators are encouraged to explore innovative ways to increase perinatal support, particularly for those who are primiparous or who have multiple concerns. This could include the use of technology to have more frequent virtual check-ins, enhanced videoconferencing during health care visits and labour and delivery to include support people,[40] virtual hospital tours,[41] and the increased use of online resources (eg, social media) to disseminate evidence-based

Figure 1 *continued from page e265*

PERINATAL CONCERN	PERCENTAGE (%)	RELATIVE RISK (95% CI)
Concerns about supports postpartum		
Less frequent in-person well-baby checkups with health care provider	75.8 / 62.2	1.22 (1.13-1.31)
Less frequent in-person postpartum visits with health care provider	74.4 / 55.7	1.34 (1.23-1.46)
Not being able to get medical care for my baby if they need it	66.6 / 55.6	1.20 (1.10-1.31)
Not being able to connect to in-person groups for new parents (eg, parent and baby groups)	62.4 / 46.3	1.35 (1.21-1.50)
Difficulty accessing breastfeeding support	65.1 / 39.6	1.64 (1.46-1.85)
Not being able to hire additional help in the home (eg, night nurse, help with domestic household chores, etc)	26.9 / 30.2	0.89 (0.75-1.07)
Not being able to rely on additional family members (outside of the home) as support people after having a baby because of physical distancing	76.6 / 76.0	1.01 (0.95-1.07)
Other perinatal-related concerns		
Not being able to introduce my baby to loved ones	85.6 / 71.5	1.20 (1.13-1.27)
Travel restrictions that prevent me from visiting family or family visiting me	65.5 / 48.5	1.35 (1.22-1.50)
Not being able to celebrate my pregnancy or new baby with loved ones (eg, baby shower, baby naming, photo shoots, etc)	64.3 / 39.9	1.61 (1.44-1.81)
Not getting along with my partner because of the pandemic	5.9 / 11.3	0.53 (0.36-0.77)
Not being able to shop for things for my baby (eg, in-person shopping for baby items)	43.9 / 24.3	1.81 (1.53-2.13)
Not being able to get medical care for myself if I need it	43.1 / 34.2	1.26 (1.09-1.45)

COVID-19—coronavirus disease 2019.

■ Primiparous ■ Multiparous

information on COVID-19 that is relevant to expectant parents (eg, PPG on Instagram). As restrictions ease, prioritization for in-person support could be considered for primiparous individuals, as they were particularly concerned about not having access to such services. Targeted knowledge translation to address the concerns of multiparous pregnant individuals, particularly about SARS-CoV-2 transmission from older children, is similarly warranted. Health care providers also need to remain vigilant in screening for intrafamily conflict and advocating for resources and support for families.

Strengths and limitations
Strengths of this study include a large sample of individuals who were pregnant during the pandemic, alongside high rates of survey participation (88.7%) and completion (82.9%). Compared with prior studies, our e-survey asked about more potential perinatal concerns, including psychosocial concerns. No new major concerns emerged in the free-text answers, confirming that the preselected concerns were comprehensive. Limitations in our study design and analysis include those inherent to survey methodology in general (eg, self-selection of participants), participants having high socioeconomic status and educational attainment, and overrepresentation of Canadian (in particular, Ontarian) respondents (both limiting generalizability). We could not use a unique site identifier within REDCap to identify duplicate participants; however, there were no duplicate names in the gift card draw.

Not all concerns were relevant to all participants, and as a result the denominator was different across concerns; this can make interpretation more challenging and is an inherent limitation to such survey questions. Finally,

Table 4. Nonperinatal pandemic-related difficulties and concerns overall, by parity

DIFFICULTY OR CONCERN	ALL PARTICIPANTS, n (%)	PRIMIPAROUS (N = 820), n (%)	MULTIPAROUS (N = 590), n (%)
Difficulties (N = 1212)*†			
• Decreased physical activity	815 (67.2)	471 (57.4)	322 (54.6)
• Reduced household income	502 (41.4)	288 (35.1)	206 (34.9)
• Childcare disruptions	471 (38.9)	28 (3.4)	440 (74.6)
• Trouble getting household supplies	461 (38.0)	255 (31.1)	193 (32.7)
• Trouble accessing health care	231 (19.1)	138 (16.8)	90 (15.3)
• Trouble getting food	219 (18.1)	110 (13.4)	106 (18.0)
• Job loss	145 (12.0)	95 (11.6)	49 (8.3)
• Trouble getting routine or essential medications	83 (6.8)	48 (5.9)	34 (5.8)
• Transportation difficulties	76 (6.3)	64 (7.8)	10 (1.7)
• Other	37 (3.1)	22 (2.7)	14 (2.4)
• Increased substance use (alcohol, drugs) in the home	9 (0.7)	NR	NR
Concerns (N = 1371)†			
• Getting sick from COVID-19	1128 (82.3)	660 (80.5)	443 (75.1)
• Feeling isolated, anxious, or depressed	894 (65.2)	521 (63.5)	356 (60.3)
• Not being able to take care of family members	356 (26.0)	157 (19.1)	196 (33.2)
• Not being able to get medical care	349 (25.5)	243 (29.6)	98 (16.6)
• Other	324 (23.6)	198 (24.1)	116 (19.7)
• Child's education	193 (14.1)	7 (0.9)	184 (31.2)
• Not being able to work	187 (13.6)	127 (15.5)	61 (10.3)
• Not being able to pay rent, mortgage, or utility bills	183 (13.3)	124 (15.1)	57 (9.7)
• Not being able to put food on the table	51 (3.7)	34 (4.1)	19 (3.2)

COVID-19—coronavirus disease 2019, NR—not reportable.
*Increased exposure to violence (physical, emotional, sexual) not reported as cell size was less than 6.
†Total greater than 100% as participants could select all options that applied.

our questions were clear to ask about concerns only during pregnancy, and not in the postpartum period, but there is nevertheless the potential for some recall bias among participants who were postpartum at the time of survey completion (n = 257). Despite these limitations, we are confident in the validity of our principal findings, which elucidate tangible sources of concern for perinatal individuals early in the COVID-19 pandemic.

The similarity in pandemic-related concerns in our study to typical first-time parent concerns identified in a large representative United Kingdom sample suggests that our findings may indeed be more broadly applicable to the general populations of affluent countries and across sociodemographic contexts within them.[35] More research is needed to confirm this and to study the perinatal impact of the COVID-19 pandemic in underresourced settings, and among marginalized populations. Further research

is needed to identify high-risk pregnant groups in order to further target concerns. For example, we did not explore the impact of being a pregnant front-line worker, or how concerns are influenced by stressors worsened by the pandemic, such as unemployment, housing and food insecurity, social isolation, or racism.[42]

Conclusion

The perinatal period is a major life transition, which requires medical, social, and emotional support. These needs are greatly compounded during a global pandemic. Our study outlines the many concerns of pregnant individuals during this time, which should be used to inform adaptive and innovative responses to perinatal care during the COVID-19 pandemic, and preparedness for future pandemics or other major care disruptions. Our findings highlight the need for targeted support

strategies to meet the unique needs of both primiparous and multiparous individuals coping with pregnancy during the pandemic. This study identifies concrete opportunities to re-evaluate how we provide holistic, targeted perinatal care to better address concerns during this pandemic and beyond.

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Dr Tali Bogler, Neesha Hussain-Shamsy, and Drs Eliane M. Shore, Sheila Wijayasinghe, Cindy-Lee Dennis, Simone N. Vigod, and Lucy C. Barker conceived of and contributed to the design of the study. All authors acquired the data. Dr Tali Bogler, Neesha Hussain-Shamsy, Dr Andrée Schuler, Jenna Pirmohamed, Dr Cindy-Lee Dennis, Dr Simone N. Vigod, and Dr Lucy C. Barker analyzed and interpreted the data. All authors drafted the article, contributed to critical revisions for important intellectual content, and approved the final version to be published.

Competing interests

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