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COVID-19 and Perinatal Intimate Partner Violence: A cross-sectional survey of pregnant and post-partum individuals in the early stages of the COVID-19 pandemic

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2021-049295
Article Type:	Original research
Date Submitted by the Author:	21-Jan-2021
Complete List of Authors:	Muldoon, K; Ottawa Hospital Research Institute; University of Ottawa, Obstetrics and Gynecology Denize, Kathryn; Ottawa Hospital Research Institute Talarico, Robert; Ottawa Hospital Research Institute Boisvert, Carlie; Ottawa Hospital Research Institute; University of Ottawa, Faculty of Medicine Frank, Olivia; Ottawa Hospital Research Institute; Columbia University, Mailman School of Public Health Harvey, Alysha; Ottawa Hospital Research Institute White, Ruth; Ottawa Hospital Research Institute Fell, DB; University of Ottawa, School of Epidemiology and Public Health; Children's Hospital of Eastern Ontario Research Institute O'Hare-Gordon, Meagan Ann; Ottawa Hospital Research Institute Guo, Yanfang; Children's Hospital of Eastern Ontario, BORN Ontario; University of Ottawa, School of Epidemiology and Public Health Murphy, Malia; Ottawa Hospital Research Institute, Clinical Epidemiology Program Corsi, Daniel J.; Ottawa Hospital Research Institute; Children's Hospital of Eastern Ontario Research Institute Sampsel, Kari; University of Ottawa, Emergency Medicine; Ottawa Hospital Research Institute Wen, Shi Wu; Ottawa Hospital Research Institute; University of Ottawa, School of Epidemiology and Public Health Walker, Mark; Ottawa Hospital Research Institute, Clinical Epidemiology Program; University of Ottawa, Obstetrics and Gynecology El-Chaar, Darine; Ottawa Hospital Research Institute, Clinical Epidemiology Program; University of Ottawa, Faculty of Medicine
Keywords:	COVID-19, OBSTETRICS, Maternal medicine < OBSTETRICS, PUBLIC HEALTH, SOCIAL MEDICINE

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COVID-19 and Perinatal Intimate Partner Violence: A cross-sectional survey of pregnant and post-partum individuals in the early stages of the COVID-19 pandemic

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Manuscript word count: 3449 (3500 max)
Abstract word count: 344 (350 max)
Key words: intimate partner violence, perinatal IPV, COVID-19, violence, abuse, perinatal health

Abstract

Objective: This study was designed to investigate the prevalence, patterns and risk factors for perinatal IPV among those who gave birth since COVID-19 began

Design: Cross-sectional survey

Setting: The Ottawa Hospital, Department of Obstetrics and Gynecology, Ottawa, Ontario

Participants: Patients who gave birth at TOH and were >20 days post-partum between March 17th-June 16th 2020.

Main outcomes and measures: Perinatal IPV was defined as psychological abuse, physical abuse, and/or sexual abuse in the 12 months before pregnancy, during pregnancy and/or post-partum. Log-binomial multivariable regression models were used to compute adjusted risk ratios (aRR) and 95% confidence intervals (CI) to quantify relationships with potential risk factors for IPV: maternal age, parity, household income, post-partum depression, and increase in partner substance use.

Results: Among 216 participants, the median maternal age was 33 years (interquartile range (IQR): 30-36). In total, 52 (24.1%) reported some form of IPV - 37 (17.1%) reported controlling partners; 13 (6.0%) reported abuse in the 12 months before pregnancy, 11 (5.1%) during pregnancy, and 15 (6.9%) during post-partum. Household income below the municipal median was the strongest risk factor for any IPV (aRR: 3.24, 95% CI: 1.87-5.59). There was no apparent association between maternal age (aRR: 0.99, 95% CI: 0.94-1.04), nulliparity (aRR: 1.18, 95% CI: 0.71-1.97), post-partum depression (aRR: 1.03, 95% CI: 1.00-1.07), or partner substance use increase since COVID-19 began (aRR: 0.73, 95% CI: 0.42-1.25) with IPV.

Conclusion: 1 in 4 individuals in this study experienced perinatal IPV since COVID-19 began. Household income was the strongest risk factor for perinatal IPV, and surprisingly, many hypothesized risk factors (e.g., mental health, increased partner substance use etc.) were not significantly associated with perinatal IPV in this sample. This highlights the challenges in both measuring IPV and identifying individuals exposed to perinatal IPV during the high stress of the COVID-19 pandemic.

Abstract word count: 300 (300 max)

Key words: intimate partner violence, perinatal IPV, COVID-19-19, violence, abuse, perinatal health

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Strengths and Limitations

- This study uses a detailed definition of IPV including emotional, psychological, physical and sexual violence during pre-pregnancy, prenatal and post-partum periods
- There is detailed information on household stressors and changes directly attributable to the COVID-19 pandemic protocols
- There is detailed information on race, socio-economic status, and partner characteristics
- Self-selection into the survey is a source of selection bias and under-reporting of IPV is a source of measurement bias
- This study does not have a comparison group of participants prior to COVID-19 and is unable to estimate changes in IPV attributable to the stress of the COVID-19 pandemic.

Funding

This work was supported by The Ottawa Hospital Academic Medical Organization (TOHAMO): TOH–20–005.

Competing interests

All authors declare no conflicts of interest

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Introduction

The evolving COVID-19 pandemic continues to cause extreme stress, unease and fear, all factors that can increase the risk of intimate partner violence (IPV).[1–5] IPV broadly encompasses any form of emotional abuse, threatening behaviour, psychological harm, physical violence or sexual violence from a current of former intimate partner or spouse.[6] Shortly after the initial declaration of COVID-19 as a global pandemic on March 11th 2020, the United Nations released a statement on March 27th 2020 warning of increased risks of IPV,[7] in addition to the health-related consequences of COVID-19 infection.[8–10] It is estimated that over 30% of women have experienced IPV in their lives[11] and 3-9% of individuals experience perinatal IPV, defined as violence or abuse that occurs 12 months prior to pregnancy, during pregnancy and up to one year post-partum.[12] To date, there is currently limited data on the prevalence and risk factors of perinatal IPV during the COVID-19 pandemic, despite the rising global concern for both pregnant people and the increase in violence.

The primary sources of data on violence during the COVID-19 pandemic have come from emergency departments (ED), policing or crime data, and online surveys. Most EDs saw drastic decreases in all-cause admissions immediately following the COVID-19 lockdown.[13,14] Investigations of cause-specific ED admissions varied, where some studies identified increases in IPV or assault-based cases[15,16] while others reported decreases.[17,18] Mixed patterns have also been observed in crime data from police departments, where some settings reported increases in domestic violence cases,[19–21] some found decreases,[22,23] and others identified no detectable changes.[24,25] An online survey of over 2000 cis-gendered women from the United States found

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that 16% had experienced IPV since the beginning of 2020, including 11% being emotionally abused, 5% forced to engage in unwanted sexual activity, and 6% physically harmed.[26] Another survey of over 2400 Americans found that 18% had a history of IPV, and of those, 17% reported that IPV had gotten worse since COVID-19 began.[27] A representative sample of over 2000 adults in New Zealand experienced some form of sexual, physical or emotional abuse during the first month of the COVID-19 pandemic.[28] Collectively, these studies highlight the complexities of assessing and evaluating patterns of violence and IPV during the pandemic, however none have included information on pregnancy or post-partum status, thus limiting our understanding of perinatal IPV during COVID-19.

There is a growing body of evidence on the adverse maternal and infant outcomes associated with COVID-19 infection, including higher risk of pre-term birth, cesarean birth, and some cases of fetal and maternal death.[29–35] A recent US Centers for Disease Control surveillance report of 24,434 pregnant individuals with COVID-19 infection identified higher risk of admission to intensive care, invasive ventilation, and death compared to non-pregnant individuals of reproductive age.[36] A systematic review of maternal mental health during COVID-19 found significant increases in risk of anxiety and higher scores on the Edinburgh Postnatal Depression Survey (EPDS) among pregnant and post-partum individuals during COVID-19 compared to pre-COVID-19.[37] A new scale, called the Pandemic Related Pregnancy Stress (PREPS) scale was developed and found that a history of abuse was an independent predictor of moderate or severe anxiety during COVID-19.[38] To our knowledge, this is the only study that captured information on historical abuse among a perinatal sample, however there was no information on perinatal IPV.

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Given the limited evidence base on perinatal IPV during COVID-19 and growing concern about maternal health and safety, the goal of this study was to investigate perinatal IPV among those who gave birth during the COVID-19 pandemic. The specific objectives were to: 1) document violent and abusive behaviours within intimate partnerships during the perinatal period; and 2) determine the household, interpersonal, and individual-level factors influencing the risk of perinatal IPV.

Methods

Study setting and context

This study took place in Ottawa, Ontario, the fourth largest city in Canada with a census metropolitan population of 1.3 million. At the time of the study, the cumulative number of confirmed COVID-19 cases in Ottawa was 2 650 (40 161 cases in the province of Ontario, and 119 451 cases in Canada.[39] The provincial government declared a state of emergency on March 17, 2020 to reduce the spread of COVID-19 infection. As a result, most public establishments were closed (e.g., schools, childcare centers, libraries, recreational centers, restaurants, theatres and concert venues etc.) and most workplaces transitioned to remote work.

This study was conducted at The Ottawa Hospital, a multi-site tertiary-care facility with two obstetrical wards across the city. In response to the pandemic, the Department of Obstetrics, Gynaecology and Newborn Care implemented safety protocols whereby all pregnant patients underwent symptomatic screening for COVID-19 at the hospital entrance and again upon entry

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to the Maternal and Newborn Care floor. Care providers wore full personal protective equipment at all times (e.g. universal masking) as part of the hospital wide policy. A partner or support person could only enter once (i.e., no in and out privileges) after screening negative for COVID-19. However, partners were not able to attend caesarean births in the operating room. After birth, patients were not allowed to leave their hospital room for any reason and no additional children or family members were allowed to visit. For infants admitted to the Neonatal Intensive Care Unit (NICU), only one parent could be present at a time.

Study design and recruitment

This is a cross-sectional survey of patients who gave birth at The Ottawa Hospital who were between 20-90 days post-partum. Patients were identified through the hospital birth records and contacted for a one-time survey if they had given birth after 17th March 2020, were 16 years of age or older, and consented to the hospital's Permission to Contact Program. Patients were contacted by phone and after they had provided verbal informed consent, a link to the survey was sent to their email address. The survey took 10 minutes to complete and was designed to estimate the prevalence of perinatal IPV and capture information on prenatal care, labour and delivery, and post-partum experiences during the COVID-19 pandemic that may influence the risk of IPV. All participants were provided with links to community resources or encouraged to contact the hospital for referrals.

Patient and Public Involvement

The survey and all study materials were developed in collaboration with a Patient Partner (O'Hare-Gordon), who was admitted to hospital during the COVID-19 pandemic and unable to

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see her partner and children for 5 weeks (22nd April to 27th May, 2020). She gave birth to pre-term twins who were admitted to the Neonatal Intensive Care Unit (NICU) for 19 days.[40] Her first-hand experience is invaluable to understanding the patient perspective and ensuring that the resources, study materials, and findings are relevant to the perinatal population. The Patient Partner was not involved in recruitment. Participants will not be directly contacted with the results of the study because of the sensitive nature of the project, however, public dissemination of the findings are available through the institutional online platforms.

Outcomes

Perinatal IPV was measured by two scales from the World Health Organization multi-country study on domestic violence.[41] Scale One, comprised of eight questions, measures different forms of controlling behaviour regularly exhibited by the partner (e.g., insists on knowing where you are at all times, restricting from connecting with friends or family, is suspicious of infidelity, etc.). Scale Two, measures specific acts of IPV. Four items measured emotional or psychological abuse (i.e., insulting, belittling, intimidating, threatening to hurt someone you care about), six items measured physical abuse (i.e., slapped, pushed, hit, strangled, threatened with a weapon), and three items measured sexual abuse (i.e., forced to have unwanted sexual intercourse, forced to have other unwanted sexual activities, forced to engage in unwanted sexual activities they considered degrading or humiliating). Participants were asked if they experienced emotional/psychological, physical and sexual abuse during each of the following perinatal time periods: 12 months before pregnancy, during pregnancy, and post-partum. A composite outcome of any perinatal IPV was defined as experiencing any form of regular controlling behaviour (Scale One) or emotional/psychological, physical, or sexual abuse (Scale Two).

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Covariables

Demographic characteristics included age of mother (in years) and age of infant (in days) at the time of the survey Maternal race or ethnicity was measured using the Ottawa Public Health questions on race and ethnicity developed with community members, which allows multiple categories.[42] The following ethnicities are presented White, Asian (including South, South-East, East), Middle Eastern, Black, and Another Person of Colour (POC)). Participants were asked if they were born in Canada or had immigrated from another country. Participants were asked to identify any languages they feel comfortable speaking (i.e. English, French, or another language). Marital status compared those who were married/common law versus single/another status. Education level was measured as completing a college diploma or undergraduate university degree or higher. Participants reported if they owned their dwelling (versus rented) and their combined household income (before taxes), which was dichotomized as either at or below the median total household income for the Ottawa region (119 440 CAD) as determined by the Canadian Census.[43]

COVID-19 related household stress was measured by loss of income due to COVID-19 protocols (i.e. permanent job loss, temporarily laid off, or reduced hours). We asked the participants if their partners were essential workers, defined as those who were required to continue working during lockdown to maintain the city infrastructure. Participants were asked if their partner had increased substance use since COVID-19 began (i.e. alcohol, cannabis, tobacco, another substance). Changes to childcare were measured as children stopped going to school or daycare, no changes to childcare, or no children.

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Maternal experiences of COVID-19-related isolation included not being able to have a baby shower (or other planned celebration), a family member could not come and stay with them as planned, friends and family could not visit the new infant, or they missed out on community resources (e.g. mom-baby groups, breastfeeding support groups, play dates).

Measures of maternal mental health include pre-existing anxiety, pre-existing depression, defined as receiving any counseling or treatment for anxiety or depression. Postpartum depression was measured using the Edinburgh Postnatal Depression Scale (EPDS). The EPDS is the most reliable and widely used screening tool for postpartum depression. The 10-item scale ranges from 0 to 30 and a score of 13 or greater on the EPDS indicates a high likelihood of depression and further assessment/management is needed. The score was presented continuously and dichotomized at 13 or greater to indicate post-partum depression. If a participant scored greater than 13 or indicated risk of suicidality (item 10), the Principal Investigator (DE, Obstetrician) was notified within 24 hours of survey completion for a chart review and clinical follow-up.

Participants reported on their in-hospital care experience including if they had to wear a mask during delivery and if they were alone for the whole admission (including early labour, active labour/delivery, and post-partum) without a support person. Participants were asked if they had any post-partum visit to an emergency department for mother or infant.

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A series of questions were asked around coping mechanisms to deal with the stress of COVID-19 pandemic, which were then dichotomized as positive coping strategies (e.g. yoga, exercising, donating to charities, connecting with friends/family) and negative coping strategies (e.g. sleeping more/less than usual; over/under eating, acting aggressively).

Analyses

All analyses were conducted using SAS 9.4.[44] In accordance with privacy guidelines, all cell sizes ≤5 were suppressed to ensure non-identification. The characteristics of the sample were summarized using descriptive statistics include frequencies and percentages for categorical variables. Continuous variables were summarized using median and interquartile range (IQR). The characteristics of the sample were compared between those who had experienced IPV versus those who had not by calculating Chi-square tests for categorical variables and Wilcoxon ranked sum test for continuous variables.

Log binomial regression models were calculated to investigate the association between five pre-specified risk factors and perinatal IPV using unadjusted Risk Ratios (RR) and 95% confidence intervals (CI). The selected factors included maternal age, parity, household income below the median, EPDS Score, and increase in partner substance use. All covariables of interest were included in the multivariable model and presented using adjusted RR and 95% CI.

Seven participants had at least one missing EPDS component. To compute the EPDS score we imputed missing components with the mean of the participant's non-missing components. In the

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multivariable model, missing data for household income was imputed by multiple imputation using chained equations and models were averaged across 10 imputed datasets.[45]

Ethics

This study was approved by the Ottawa Health Sciences Network Research Ethics Board (Protocol number: 20170390-01H).

Results

Between March 17th and June 16th, 1568 individuals gave birth at The Ottawa Hospital. Of those, 613 agreed to be contacted for research, 572 had valid phone numbers and were contacted, 302 consented to the study, and 261 completed the survey, for a response rate of 42.58%. After excluding those who did not finish the survey, the final analytical sample was of 216 participants (35.2% of those who agreed to be contacted). No participants in the study reported current or previous COVID-19 infection.

In total there were 52 (24.07%) participants who reported some form of perinatal IPV or controlling behaviour from a partner. In total, 37 (17.13%) reported that their partners regularly exhibited controlling behavior. The most common controlling behaviours were insisting on knowing where you are at all times (8.37%), try to keep you from seeing your friends (5.58%) and get angry if you speak with another man/person they would feel jealous of (4.65%) (Figure 1).

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Figure 2 displays the frequency of the specific forms of perinatal IPV experienced by participants during each window of the perinatal period. In total, 13 (6.05%) experienced any form of IPV during the 12 months prior to pregnancy, 11 (5.12%) during pregnancy, and 15 (6.98%) during post-partum. The most common form of IPV reported by participants across all time periods was emotional abuse (10.23%). Sexual abuse was reported by 2.33% of participants, and less than 1% reported any physical abuse.

The demographic characteristics of the sample are presented in Table 1. The maternal median age was 33 years (IQR:30-36) and the infant median age at the time of the survey was 76 days (IQR:66-90). The sample was diverse with 147 (68.06%) identifying as White, 31 (14.35%) South/South-East or East Asian, 18 (8.33%) Middle Eastern, 17 (7.87%) Black, and 25 (11.57%) identifying with another race or ethnic group. There were 151 (69.91%) participants who owned their homes and 80 (37.04%) had household incomes below the municipal median.

Owing to COVID-19 restrictions, 64 (29.63%) reported household income loss, 55 (25.46%) reported their partner was an essential worker who continued to work on the front line. There were 45 (20.83%) participants who reported that their partner had increased substance use since COVID-19 began. Regarding maternal mental health, 43 (19.91%) had pre-existing anxiety and 29 (13.43%) had pre-existing depression. There were 64 (29.63%) participants flagged for post-partum depression through the EPDS.

The bivariable and multivariable log-binomial regression models are presented in Table 2. At the bivariable level, household income below the municipal median (RR: 3.66, 95% CI:2.07-6.48) was

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significantly associated with perinatal IPV and EPDS score (RR:1.04, 1.00-1.10) was marginally associated. In the multivariable models, household income below the municipal median (aRR: 3.24, 95% CI: 1.87-5.59) was the strongest risk factor for any IPV and EPDS was marginally associated (aRR: 1.03, 95% CI: 1.00-1.07). There was no independent association between maternal age (aRR: 0.99, 95% CI: 0.94-1.04), nulliparity (aRR: 1.18, 95% CI: 0.71-1.97), or partner substance use increase (aRR: 0.73, 95% CI: 0.42-1.25) with IPV.

Discussion

In our study sample, almost a quarter (24.07%) of participants who gave birth during the COVID-19 pandemic reported some form of perinatal IPV, including in the 12 months pre-pregnancy, during pregnancy and post-partum. The most common forms of abuse included emotional/psychological abuse and having partners who regularly exhibited controlling behaviours. However, cases of sexual and physical abuse were also identified. Household income was the strongest risk factor for perinatal IPV, and surprisingly, many hypothesized risk factors (e.g., mental health, increased partner substance use etc.) were not significantly associated with perinatal IPV in this sample.

By capturing a broad spectrum of forms of IPV, we are able to identify general controlling behaviours that may have been normalized and not consider abusive, in addition to more distinct forms of emotional/psychological, physical or sexual abuse. Many participants reported that their partners insist on knowing where they are at all times, try to keep them from seeing their friends, or would get angry if they spoke to someone they would be jealous of. Some of these behaviours

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may be magnified because of the safety concerns during COVID-19. The stay-at-home protocols are important for infection control, however it raises ethical concerns if home is not a safe place.[46] Someone may be isolated with a partner known to be abusive, or someone may begin to exhibit abusive or controlling behaviours for the first time as a result of the increased stress and anxiety associated with the COVID-19 pandemic.[47–49]

In this analysis, the factor most strongly associated with perinatal IPV was socio-economic status, contributing to over three times the risk of IPV, while controlling for other risk factors. The association between income and violence is well-established in the literature.[50] Consistent with findings from national representative Canadian surveys,[51] almost 30% of participants reported household income loss because of COVID-19 protocols, and 25% reported that their partners were essential workers, but of interest, both of these factors were not significantly different by perinatal IPV status. This finding may be highlighting that the sustained stress of lower socio-economic status poses a greater risk for perinatal IPV than the potential short-term effects of COVID-19 related changes in financial stability. Socio-economic status is not routinely collected as part of clinical practice, however it is consistently one of the most powerful independent factors associated with IPV and may be a socio-demographic factor worth collecting as part of routine clinical care.

In the wake of COVID-19, attention has been drawn to the responsibility of health care practitioner's for screening for and addressing IPV, including investigating circumstances around injuries.[52] Within the obstetrical sphere, several commentaries have been written advocating for integrating IPV assessments into ambulatory gynecologic care, post-partum recovery, mental

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health, and reproductive life planning.[53–56] Systematic reviews and meta-analyses have identified that strongest socio-demographic factors associated with elevated risk of perinatal IPV include younger maternal age, single relationship status, visible minority status, lower socio-economic status, and substance use.[50] Of interest within this study, several of the typical risk factors for IPV were not significantly different by perinatal IPV status. This lends support for the importance of universal IPV screening as risk factor-based screening may miss many cases in need of help.

Despite the general pervasiveness of IPV and the increased risks posed by the COVID-19 pandemic, many health care providers are not well equipped to screen for violence or to take action if IPV is identified.[57,58] If children are in a home affected by violence there are legal requirements to contact Children's Aid as part of due diligence.[59] However, there are no such requirements for IPV, reinforcing a systemic barrier to violence prevention and care. During the pandemic period many services have introduced modifications to services, including closure of physical offices, which has limited access to interventionable options. However, obstetrical departments are one of the few services that have continued to see patients in person. Pregnancy and the postpartum period presents a window of opportunity to identify and support people experiencing violence who may have lost contact with other community services.

Limitations

Although a response rate of 42.58% is encouraging for an online survey administered to a patient population, self-selection into this study was a potential source of selection bias. Although all measures of IPV were self-reported and may underestimate the prevalence of IPV within this

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sample, the survey was designed to capture different forms of behaviours that may not be perceived as abusive (e.g., insisting on know where you are at all times, keeping you from seeing your friends) in addition to specific acts of emotional/psychological (e.g., insulting, scaring, belittling etc.), physical (e.g. hitting, slapping, pushing), or sexual abuse (e.g., forced sexual activity). We did not have a comparison group of participants prior to COVID-19 and were thus unable to estimate the change in prevalence of IPV attributable to the increased stress of the COVID-19 pandemic. Additionally, this study was unable to evaluate associations between IPV and clinical outcomes as we did not have information on maternal or newborn outcomes.

Conclusion

Almost a quarter of this obstetrical study population reported some form of perinatal IPV, including IPV experienced pre-pregnancy, during pregnancy and post-partum. Owing to COVID-19 lock-down measures, many participants reported household income loss, changes to childcare, and increased isolation during pregnancy and post-partum; however, it was the strong social determinant of income that was most strongly associated with IPV. As the COVID-19 pandemic evolves, it is critical to prioritize the health and safety of the perinatal population in public health planning to ensure that households are fully supported and risks are mitigated.

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Declarations

Ethical approval

This study was approved by the Ottawa Health Sciences Network Research Ethics Board (Protocol number: 20170390-01H). All participants provided informed verbal consent. All methods were performed in accordance with standard ethical guidelines and regulations (Declaration of Helsinki)

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and analyzed during the current study are not publicly available due to The Ottawa Hospital privacy protocols, but with a data sharing agreement, de-identified data, the data dictionary, and ethics protocol are available from the corresponding author

Competing interests

All authors declare no conflicts of interest

Funding

The Ottawa Hospital Academic Medical Organization (TOHAMO): TOH–20–005

Author Contributions:

KM, KD, RT, CB, OF, AH, RRW, KS, DE conceived and designed the study. KS, MW, DE provided clinical expertise and content. RT conducted the statistical analyses and KM, DF, YG, MM, DC, SW provided methodological and analytic expertise. CB, OF, KD collected the data. MOG is the patient partner. All authors critically reviewed the manuscript and approved the final version. KM and DE have primary responsibility for the final content.

Acknowledgements

We would like to acknowledge all the participants who took the time to respond to this survey. We thank Drs Jasmine Gandhi and Mark Kaluzienski for support developing the perinatal mental health response study protocols.

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Figure 1. Different forms of controlling behaviour from partner during COVID-19 (n=216)

*Note: Measured using items from the World Health Organization Multi-Country Study on Domestic Violence

Figure 2. Forms and timing of perinatal IPV (n=216)

*Note Participants can report multiple forms of IPV. Cases of physical and sexual abuse were identified, but suppressed because of small cell sizes

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Table 1. General characteristics of study participants who have given birth since the COVID-19 pandemic began (n=216)

Variables	IPV Yes (n=52)	IPV No (164)	Total N=216	p-values
Demographic characteristics				
Maternal Age in years (median, IQR)	32 (30-34)	33 (30-36)	33 (30-36)	0.089
Infant age in days at time of interview (med, IQR)	80 (67-89)	75 (65-90)	76 (66-90)	0.375
Month of Delivery in 2020				
March	11 (21.15)	28 (17.07)	39 (18.06)	0.800
April	21 (40.38)	61 (37.20)	82 (37.96)	
May	13 (25.00)	51 (31.10)	64 (29.63)	
June	7 (13.46)	24 (14.63)	31 (14.35)	
Nulliparous vs multiparous	32 (61.54)	86 (52.44)	118 (54.63)	0.251
Race or Ethnicity[1]				
White	31 (59.62)	116 (70.73)	147 (68.06)	0.134
Asian – South/East/South-East	9 (17.31)	22 (13.41)	31 (14.35)	0.485
Middle Eastern	8 (15.38)	10 (6.10)	18 (8.33)	0.035
Black	5 (9.62)	12 (7.32)	17 (7.87)	0.592
Another PoC group	9 (17.31)	16 (9.76)	25 (11.57)	0.138
Born in Canada vs immigrated	34 (65.38)	125 (76.22)	159 (73.61)	0.122
Marital status: Married/common law vs single/another status	48 (92.31)	156 (95.12)	204 (94.44)	0.440
Completed college diploma or under-graduate degree	44 (84.62)	144 (87.80)	188 (87.04)	0.551
Language(s) comfortable speaking[1]				
Speaks English	51 (98.08)	161 (98.17)	212 (98.15)	0.965
Speaks French	19 (36.54)	55 (33.54)	74 (34.26)	0.691
Speaks another language	9 (17.31)	20 (12.20)	29 (13.43)	0.346
Income				
Dwelling owned vs rented	29 (55.77)	122 (74.39)	151 (69.91)	0.011
Combined household income below Ottawa median[2]	34 (65.38)	46 (28.05)	80 (37.04)	<0.001
COVID-19 related household stress				
Any household income loss	19 (36.54)	45 (27.44)	64 (29.63)	0.211
Partner is essential worker	12 (23.08)	43 (26.22)	55 (25.46)	0.650
Partner substance use increased	12 (23.08)	33 (20.12)	45 (20.83)	0.648
Children's schedule				
Children stopped going to school or daycare	17 (32.69)	67 (40.85)	84 (38.89)	0.515
Children's schedule did not change	-	-	14 (6.48)	
No children	32 (61.54)	86 (52.44)	118 (54.63)	
Isolation due to COVID-19 restrictions				
No baby shower or planned celebration	29 (55.77)	70 (42.68)	99 (45.83)	0.099
Family member couldn't come to stay with me as planned	30 (57.69)	78 (47.56)	108 (50.00)	0.203
Friends and family could not visit my new baby	41 (78.85)	129 (78.66)	170 (78.70)	0.977

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Missed out on community resources	46 (88.46)	137 (83.54)	183 (84.72)	0.390
Mental health				
Pre-existing anxiety	13 (25.00)	30 (18.29)	43 (19.91)	0.291
Pre-existing depression	7 (13.46)	22 (13.41)	29 (13.43)	0.993
Post-partum depression (EPDS 13 cut-off)	20 (38.46)	44 (26.83)	64 (29.63)	0.109
EPDS Score (med, IQR)	10 (5-14)	8 (4-13)	8 (4-13)	0.130
Healthcare experiences				
Alone for all labour and delivery	-	-	16 (7.41)	0.928
Wear a mask during delivery	22 (42.31)	75 (45.73)	97 (44.91)	0.665
Any post-partum emergency department visit for mother or infant	11 (21.15)	31 (18.90)	42 (19.44)	0.721
Coping mechanisms				
Positive coping mechanisms[3]	49 (94.23)	160 (97.56)	209 (96.76)	0.237
Negative coping mechanisms[4]	38 (73.08)	101 (61.59)	139 (64.35)	0.132

- Cell sizes ≤5 and are suppressed

1. Participants can pick multiple race/ethnic groups or languages
2. Missing data=24 cases
3. Positive coping mechanisms include: yoga, exercising, donating to charity, connecting with friends/family
4. Negative coping mechanism include: sleeping more or less; over/under eating, acting aggressively

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Table 2. Bivariable and Multivariable log binomial regression models to assess factors associated with perinatal IPV (n=216)

Co-Variables	RR (95% CI)	p-value	ARR (95% CI)	p-value
Maternal Age in years (median, IQR)	0.95 (0.90-1.00)	0.082	0.99 (0.94-1.04)	0.660
Nulliparous vs multiparous	1.33 (0.76-2.32)	0.319	1.18 (0.71-1.97)	0.529
Household income below vs above Ottawa median[1]	3.66 (2.07-6.48)	<0.001	3.24 (1.87-5.59)	<0.001
EPDS Score (continuous)	1.04 (1.00-1.10)	0.040	1.03 (1.00-1.07)	0.077
Partner substance use increased	1.14 (0.60-2.17)	0.691	0.73 (0.42-1.25)	0.249

1. Missing data for household income was imputed by multiple imputation using chained equations and models were averaged across 10 imputed datasets

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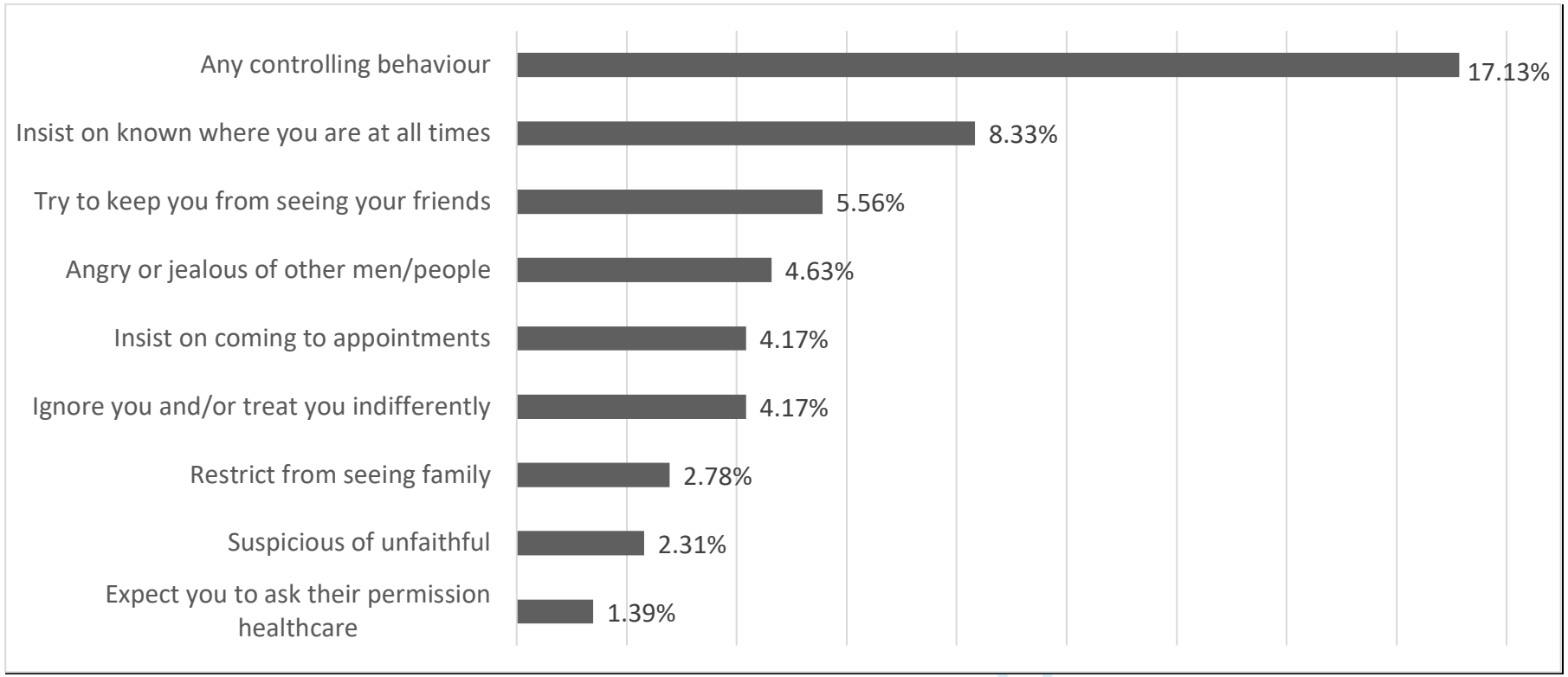
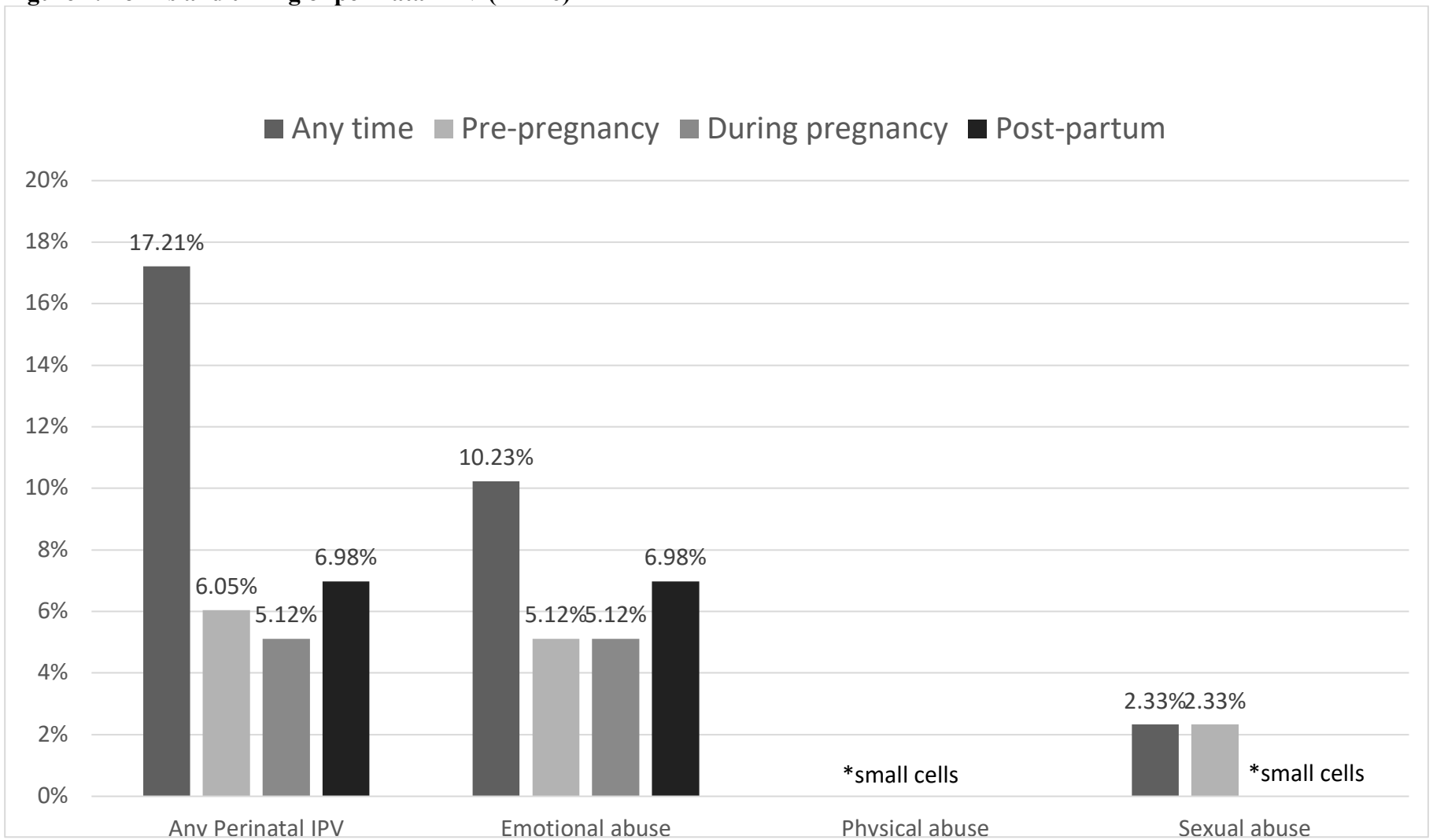
Figure 1. Different forms of controlling behaviour from partner during COVID-19 (n=216)



*Note: Measured using items from the World Health Organization Multi-Country Study on Domestic Violence

Figure 2. Forms and timing of perinatal IPV (n=216)



*Note: Participants can report multiple forms of IPV. Cases of physical and sexual abuse were identified, but suppressed because of small cell sizes

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract Included: abstract The study is a cross-sectional study
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found Included: Abstract, methods and results section
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported Included: Introduction Section (p.4-6)
Objectives	3	State specific objectives, including any prespecified hypotheses Included: Introduction Section (p. 6)
Methods		
Study design	4	Present key elements of study design early in the paper Included: Methods –Study design and recruitment (p. 7-8)
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection Included: Methods – Study setting and context, Study design and recruitment (p. 7-8)
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up na
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed na
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable Included: Methods – Outcomes, Covariables (p.8-10)
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group Included: Methods – Outcomes, Covariables (p.8-10)
Bias	9	Describe any efforts to address potential sources of bias Included: Methods Section – Study design and recruitment (p. 7-8), Analysis (p.11)
Study size	10	Explain how the study size was arrived at A sample size was not calculated because all eligible patients were contacted
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why Included: Methods – Outcomes, Covariables (p.8-10), Analysis (p.11)

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Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding Included: Methods Section – Analysis (p.11)
		(*b*) Describe any methods used to examine subgroups and interactions Included: Methods Section – Analysis (p.11)
		(*c*) Explain how missing data were addressed Methods Section – Analysis (p.11)
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed Included: na
		(*e*) Describe any sensitivity analyses NA

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Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed Included: The description of the study population is described in the Results Section. (p.12)
		(b) Give reasons for non-participation at each stage Included: Participation and response rate are described in the Results Section. (p.12)
		(c) Consider use of a flow diagram (Figure 1)
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders Included: Results Section – (p 12-13)
		(b) Indicate number of participants with missing data for each variable of interest Missing data is foot-noted in each table
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount) Included: na
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time Included: na
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included Included: Results Section – (p 13-14), Table 2
		(*b*) Report category boundaries when continuous variables were categorized Included: Results Section – (p 12), Table 1
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives Included: Discussion Section (p.14-17)
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias Included: Discussion Section (p.16)
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence Included: Discussion Section (p.14-17)
Generalisability	21	Discuss the generalisability (external validity) of the study results Included: Discussion Section (p. 16)
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based **Funding:** The Ottawa Hospital Academic Medical Organization (TOHAMO): TOH–20–005

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*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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BMJ Open

COVID-19 and Perinatal Intimate Partner Violence: A cross-sectional survey of pregnant and post-partum individuals in the early stages of the COVID-19 pandemic

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2021-049295.R1
Article Type:	Original research
Date Submitted by the Author:	13-Mar-2021
Complete List of Authors:	Muldoon, Katherine; Ottawa Hospital Research Institute; University of Ottawa, Obstetrics and Gynecology Denize, Kathryn; Ottawa Hospital Research Institute Talarico, Robert; Ottawa Hospital Research Institute Boisvert, Carlie; Ottawa Hospital Research Institute; University of Ottawa, Faculty of Medicine Frank, Olivia; Ottawa Hospital Research Institute; Columbia University, Mailman School of Public Health Harvey, Alysha; Ottawa Hospital Research Institute White, Ruth; Ottawa Hospital Research Institute Fell, DB; University of Ottawa, School of Epidemiology and Public Health; Children's Hospital of Eastern Ontario Research Institute O'Hare-Gordon, Meagan Ann; Ottawa Hospital Research Institute Guo, Yanfang; Children's Hospital of Eastern Ontario, BORN Ontario; University of Ottawa, School of Epidemiology and Public Health Murphy, Malia; Ottawa Hospital Research Institute, Clinical Epidemiology Program Corsi, Daniel J.; Ottawa Hospital Research Institute; Children's Hospital of Eastern Ontario Research Institute Sampsel, Kari; University of Ottawa, Emergency Medicine; Ottawa Hospital Research Institute Wen, Shi Wu; Ottawa Hospital Research Institute; University of Ottawa, School of Epidemiology and Public Health Walker, Mark; Ottawa Hospital Research Institute, Clinical Epidemiology Program; University of Ottawa, Obstetrics and Gynecology El-Chaar, Darine; Ottawa Hospital Research Institute, Clinical Epidemiology Program; University of Ottawa, Faculty of Medicine
Primary Subject Heading:	Obstetrics and gynaecology
Secondary Subject Heading:	Epidemiology, Public health
Keywords:	COVID-19, OBSTETRICS, Maternal medicine < OBSTETRICS, PUBLIC HEALTH, SOCIAL MEDICINE

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COVID-19 and Perinatal Intimate Partner Violence: A cross-sectional survey of pregnant and post-partum individuals in the early stages of the COVID-19 pandemic

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Manuscript word count: 3449 (3500 max)
Abstract word count: 344 (350 max)
Key words: intimate partner violence, perinatal IPV, COVID-19, violence, abuse, perinatal health

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Abstract

Objective: The objectives of this study were to: 1) document violent and controlling behaviours within intimate partnerships during the perinatal period; and 2) determine individual, interpersonal and household-level factors influencing the risk of perinatal intimate partner violence (IPV).

Design: Cross-sectional survey

Setting: The Ottawa Hospital, Department of Obstetrics and Gynecology, Ottawa, Ontario

Participants: Patients who gave birth at The Ottawa Hospital and were >20 days post-partum between March 17th-June 16th 2020.

Main outcomes and measures: Perinatal IPV was defined as regular controlling behaviours or act-based forms of emotional/physical/sexual abuse in the 12 months before pregnancy, during pregnancy and/or post-partum. Log-binomial multivariable regression models were used to compute adjusted risk ratios (aRR) and 95% confidence intervals (CI) to identify potential risk factors for IPV: maternal age, post-partum depression, parity, increase in partner substance use, and household income.

Results: Among 216 participants, the median maternal age was 33 years (interquartile range (IQR): 30-36). In total, 52 (24.07%) reported some form of perinatal IPV, 37 (17.13%) reported regular controlling behaviour, and 9 (4.17%) reported both. Household income below the municipal median was the strongest risk factor for perinatal IPV (aRR: 3.24, 95% CI: 1.87-5.59). There was no apparent association between maternal age (aRR: 0.99, 95% CI: 0.94-1.04), post-partum depression (aRR: 1.03, 95% CI: 1.00-1.07), nulliparity (aRR: 1.18, 95% CI: 0.71-1.97), or increases in partner substance use (aRR: 0.73, 95% CI: 0.42-1.25) with IPV.

Conclusion: 1 in 4 individuals in this study experienced perinatal IPV. Household income was the strongest risk factor, and surprisingly, many hypothesized risk factors (e.g., mental health, partner substance use etc.) were not significantly associated with perinatal IPV in this sample. This highlights the challenges in both measuring IPV and identifying individuals exposed to perinatal IPV during the high stress of the COVID-19 pandemic.

Abstract word count: 298 (300 max)

Key words: intimate partner violence, perinatal IPV, COVID-19-19, violence, abuse, perinatal health

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Strengths and Limitations

- This study uses a detailed definition of perinatal IPV including regular controlling behaviours, emotional, physical and sexual abuse during three perinatal time periods: pre-pregnancy, prenatal and post-partum periods
- There is detailed information on household stressors and changes directly attributable to the COVID-19 pandemic protocols
- There is detailed information on ethnicity, socio-economic status, and partner characteristics
- Self-selection and non-response bias is a source of selection bias and under-reporting of IPV and residual confounding is a source of measurement bias
- This study does not have a comparison group of participants prior to COVID-19 and is unable to estimate changes in perinatal IPV directly attributable to the stress of the COVID-19 pandemic.

Funding

This work was supported by The Ottawa Hospital Academic Medical Organization (TOHAMO): TOH–20–005.

Competing interests

All authors declare no conflicts of interest

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Introduction

The evolving COVID-19 pandemic continues to cause extreme stress, unease and fear, all factors that can increase the risk of intimate partner violence (IPV).[1–5] IPV broadly encompasses any form of emotional abuse, threatening behaviour, psychological harm, physical violence or sexual violence from a current of former intimate partner or spouse.[6] Shortly after the initial declaration of COVID-19 as a global pandemic on March 11th 2020, the United Nations released a statement on March 27th 2020 warning of increased risks of IPV,[7] in addition to the health-related consequences of COVID-19 infection.[8–10] It is estimated that over 30% of women have experienced IPV in their lives[11] and 3-9% of individuals experience perinatal IPV, defined as violence or abuse that occurs 12 months prior to pregnancy, during pregnancy and up to one year post-partum.[12] To date, there is limited data on the prevalence and risk factors of perinatal IPV during the COVID-19 pandemic, despite the rising global concern for both pregnant people and the increase in violence.

The primary sources of data on violence during the COVID-19 pandemic have come from emergency departments (ED), policing or crime data, and online surveys. Most EDs saw drastic decreases in all-cause admissions immediately following the COVID-19 lockdown.[13–15] Investigations of cause-specific ED admissions varied, where some studies identified increases in IPV or assault-based cases[16,17] while others reported decreases.[18,19] Mixed patterns have also been observed in crime data from police departments, where some settings reported increases in domestic violence cases,[20–22] some found decreases,[23,24] and others identified no detectable changes.[25,26] An online survey of over 2000 cis-gendered women from the United States found

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that 16% had experienced IPV since the beginning of 2020, including 11% being emotionally abused, 5% forced to engage in unwanted sexual activity, and 6% physically harmed.[27] Another survey of over 2400 Americans found that 18% had a history of IPV, and of those, 17% reported that IPV had gotten worse since COVID-19 began.[28] A representative sample of over 2000 adults in New Zealand found 10% experienced some form of sexual, physical or emotional abuse during the first month of the COVID-19 pandemic.[29] Collectively, these studies highlight the complexities of assessing and evaluating patterns of violence and IPV during the pandemic, however none have included information on pregnancy or post-partum status, limiting our understanding of perinatal IPV during COVID-19.

Adverse maternal and infant outcomes associated with COVID-19 infection, include higher risk of pre-term birth, cesarean birth, and some cases of fetal and maternal death.[30–36] A recent US Centers for Disease Control surveillance report of 24,434 pregnant individuals with COVID-19 infection identified higher risk of admission to intensive care, invasive ventilation, and death compared to non-pregnant individuals of reproductive age.[37] A systematic review of maternal mental health during COVID-19 found significant increases in risk of anxiety and higher scores on the Edinburgh Postnatal Depression Survey (EPDS) among pregnant and post-partum individuals during COVID-19 compared to pre-COVID-19.[38] A new scale, called the Pandemic Related Pregnancy Stress (PREPS) scale was developed and found that a history of abuse was an independent predictor of moderate or severe anxiety during COVID-19.[39] To our knowledge, this is the only study that captured information on historical abuse among a perinatal sample, however there was no information on perinatal IPV.

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Given the limited evidence base on perinatal IPV during COVID-19 and growing concern about maternal health and safety, the goal of this study was to investigate perinatal IPV among those who gave birth during the COVID-19 pandemic. The objectives of this study were to: 1) document violent and controlling behaviours within intimate partnerships during the perinatal period; and 2) determine individual, interpersonal and household-level factors influencing the risk of perinatal intimate partner violence (IPV).

Methods

Study setting and context

This study took place in Ottawa, Ontario, the fourth largest city in Canada with a census metropolitan population of 1.3 million. The provincial government declared a state of emergency on March 17, 2020. As a result, most public establishments were closed (e.g., schools, childcare centers, libraries, recreational centers, restaurants, etc.) and most workplaces transitioned to remote work, where possible. At the time of the study (June, 2020), the cumulative number of confirmed COVID-19 cases in Ottawa was 2 650 (40 161 cases in the province of Ontario, and 119 451 cases in Canada.[40]

This study was conducted at The Ottawa Hospital, a multi-site tertiary-care facility with two obstetrical wards across the city. The Department of Obstetrics, Gynaecology and Newborn Care implemented safety protocols whereby all pregnant patients underwent symptomatic screening for COVID-19 at the hospital entrance and again upon entry to the Maternal and Newborn Care floor. Care providers wore full personal protective equipment at all times (e.g. universal masking) as part of the hospital wide policy. A partner or support person could only enter once

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(i.e., no in and out privileges) after screening negative for COVID-19. Partners were not able to attend caesarean births in the operating room. After birth, patients were not allowed to leave their hospital room for any reason and no additional children or family members were allowed to visit. For infants admitted to the Neonatal Intensive Care Unit (NICU), only one parent could be present at a time.

Study design and recruitment

This is a cross-sectional survey of patients who gave birth at The Ottawa Hospital. Patients were identified through the hospital birth records and contacted for a one-time survey if they met the following inclusion criteria: had given birth after 17th March 2020, >20 days post-partum, 16 years of age or older, and consented to the hospital's Permission to Contact Program. Patients were excluded if their pregnancy resulted in a still birth or neonatal death and were not contacted. We chose 20 days post-partum as the cut-off to allow for at least 20 days to pass where post-partum IPV could occur. To improve response rate, eligible patients were contacted by phone and after obtaining verbal informed consent, a link to the online survey was sent to a private email address. This allowed for private completion of the survey on a personal computer or device. The survey took 10 minutes to complete. All participants were provided with links to community resources for IPV, maternal support, or encouraged to contact the hospital for referrals.

Patient and Public Involvement

The survey and all study materials were developed in collaboration with a Patient Partner (O'Hare-Gordon), who was admitted to hospital during the COVID-19 pandemic and unable to

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see her partner and children for 5 weeks (22nd April to 27th May, 2020). She gave birth to pre-term twins who were admitted to the Neonatal Intensive Care Unit (NICU) for 19 days.[41] The Patient Partner was not involved in recruitment. Participants will not be directly contacted with the results of the study because of the sensitive nature of the project, however, public dissemination of the findings are available through the institutional online platforms.

Outcomes

Perinatal IPV was measured by two scales from the World Health Organization multi-country study on domestic violence.[42] Scale One, comprised of eight questions, measures different forms of regular controlling behaviour exhibited by the partner (e.g., insist on knowing where you are at all times, try to keep you from seeing your friends, are often suspicious that you are unfaithful etc.). Scale Two, measures act-based forms of IPV including emotional abuse (i.e., insulting, belittling, intimidating, threatening to hurt someone you care about), physical abuse (i.e., slapped, pushed, hit, strangled, threatened with a weapon), and sexual abuse (i.e., forced to have unwanted sexual intercourse, forced to have other unwanted sexual activities, forced to engage in unwanted sexual activities they considered degrading or humiliating). The act-based forms of perinatal IPV were asked for each perinatal time periods: 12 months before pregnancy, during pregnancy, and post-partum. A composite outcome of any perinatal IPV was defined as experiencing any regular controlling behaviour (Scale One) or any act-based forms of IPV (Scale Two) during the perinatal period.

Covariables

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Demographic characteristics included age of mother (in years) and age of infant (in days) at the time of the survey. The following maternal ethnicities are presented: White, Asian (including South, South-East, East), Middle Eastern, Black, and Another Person of Colour (POC)). [43] Participants were asked if they were born in Canada or had immigrated from another country. Participants identified any languages they feel comfortable speaking (i.e. English, French, or another language). Marital status compared those who were married/common law versus single/another status. Education level was measured as completing a college diploma or undergraduate university degree or higher. Participants reported if they owned their dwelling (versus rented) and their combined household income (before taxes), which was dichotomized as either at or below the median total household income for the Ottawa region (119 440 CAD) as determined by the Canadian Census.[44]

COVID-19 related household stress was measured by loss of income due to COVID-19 protocols (i.e. permanent job loss, temporarily laid off, or reduced hours) or if their partners were essential workers, defined as those who were required to continue working during lockdown to maintain the city infrastructure. Participants were asked if their partner had increased substance use since COVID-19 began (i.e. alcohol, cannabis, tobacco, another substance). Changes to childcare were measured as children stopped going to school or daycare, no changes to childcare, or no children.

Maternal experiences of COVID-19-related isolation included not being able to have a baby shower (or other planned celebration), a family member could not come and stay with them as planned, friends and family could not visit the new infant, or they missed out on community resources (e.g. mom-baby groups, breastfeeding support groups, play dates).

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Measures of maternal mental health include pre-existing anxiety, pre-existing depression, defined as receiving any counseling or treatment for anxiety or depression. Postpartum depression was measured using the Edinburgh Postnatal Depression Scale (EPDS). The EPDS is the most reliable and widely used screening tool for postpartum depression. The 10-item scale ranges from 0 to 30 and a score of 13 or greater on the EPDS indicates a high likelihood of depression and further assessment/management is needed. The score was presented continuously and dichotomized at 13 or greater to indicate post-partum depression. If a participant scored greater than 13 or indicated risk of suicidality (item 10), the Principal Investigator (DE, Obstetrician) was notified within 24 hours of survey completion for a chart review and clinical follow-up.

Participants reported on their in-hospital care experience including if they had to wear a mask during delivery and if they were alone without a support person for the whole admission (including early labour, active labour/delivery, and post-partum). Participants were asked if they had any post-partum visit to an emergency department for mother or infant.

Analyses

All analyses were conducted using SAS 9.4.[45] In accordance with privacy guidelines, all cell sizes <5 were suppressed to ensure non-identification. The characteristics of the sample were summarized using descriptive statistics include frequencies and percentages for categorical variables. Continuous variables were summarized using median and interquartile range (IQR),

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which are more robust measures and less sensitive to outliers. The characteristics of the sample were compared between those who had experienced perinatal IPV versus those who had not by calculating Chi-square tests for categorical variables and Wilcoxon ranked sum test for continuous variables.

Log binomial regression models were calculated to investigate the association between five pre-specified risk factors and perinatal IPV using unadjusted Risk Ratios (RR) and 95% confidence intervals (CI). The risk factors were selected to capture individual, interpersonal and household level factors that influence risk of violence including: maternal age, EPDS, parity, increases in partners substance use, and household income below the municipal median. All covariables of interest were included in the multivariable model and presented using adjusted RR and 95% CI.

Seven participants had at least one missing EPDS component. To compute the EPDS score we imputed missing components with the mean of the participant's non-missing components. In the multivariable model, missing data for household income was imputed by multiple imputation using chained equations and models were averaged across 10 imputed datasets.[46]

To evaluate the robustness of the analyses, we conducted a sensitivity analysis to remove participants from the sample who reported pre-pregnancy act-based forms of IPV alone (i.e. no controlling behaviours, no pregnancy or post-partum act-based forms of IPV) to assess concerns of perinatal IPV that occurred before COVID-19 began.

Ethics

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This study was approved by the Ottawa Health Sciences Network Research Ethics Board (Protocol number: 20170390-01H).

Results

Between March 17th and June 16th, 1568 individuals gave birth at The Ottawa Hospital. Of those, 613 agreed to be contacted for research, 572 had valid phone numbers and were contacted, 302 consented to the study, and 261 started the survey, for a response rate of 42.58%. After excluding those who did not finish the survey, the final analytical sample was of 216 participants. No participants in the study reported current or previous COVID-19 infection.

There were 52 (24.07%) participants who reported perinatal IPV. In total, 37 (17.13%) reported regular controlling behaviours from their partners, 24 (11.11%) reported act-based forms of IPV, and 9 (4.17%) reported both (Table 1). The most common forms of regular controlling behaviours from partners were that they 'insist on knowing where you are at all times' (8.33%), 'try to keep you from seeing your friends' (5.58%) and 'get angry if you speak with another man or person they would feel jealous of' (4.65%) (Figure 1, Appendix 1 for data tables)

Figure 2 displays the frequency of act-based forms of perinatal IPV experienced by participants during each window of the perinatal period. In total, 13 (6.05%) experienced any form of IPV during the 12 months prior to pregnancy, 11 (5.12%) during pregnancy, and 15 (6.98%) during post-partum. The most common form of IPV reported by participants across all time periods was

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emotional abuse (10.23%). Sexual abuse was reported by 2.33% of participants, and <5 reported physical abuse (see Appendix 2 for data tables).

The demographic characteristics of the sample are presented in Table 2. The maternal median age was 33 years (IQR:30-36) and the infant median age at the time of the survey was 76 days (IQR:66-90). The sample was diverse with 147 (68.06%) identifying as White, 31 (14.35%) South/South-East or East Asian, 18 (8.33%) Middle Eastern, 17 (7.87%) Black, and 25 (11.57%) identifying with another race or ethnic group. There were 151 (69.91%) participants who owned their homes and 80 (37.04%) had household incomes below the municipal median.

Owing to COVID-19 restrictions, 64 (29.63%) reported household income loss and 55 (25.46%) reported their partner was an essential worker who continued to work on the front line. There were 45 (20.83%) participants who reported that their partner had increased substance use since COVID-19 began. Regarding maternal mental health, 43 (19.91%) had pre-existing anxiety and 29 (13.43%) had pre-existing depression. There were 64 (29.63%) participants flagged for post-partum depression through the EPDS.

The bivariable and multivariable log-binomial regression models are presented in Table 3. At the bivariable level, household income below the municipal median (RR: 3.66, 95% CI:2.07-6.48) was significantly associated with perinatal IPV and EPDS score (RR:1.04, 1.00-1.10) was marginally associated. In the multivariable models, household income below the municipal median (aRR: 3.24, 95% CI: 1.87-5.59) was the strongest risk factor for any IPV and EPDS was marginally associated (aRR: 1.03, 95% CI: 1.00-1.07). There was no independent association between

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maternal age (aRR: 0.99, 95% CI: 0.94-1.04), nulliparity (aRR: 1.18, 95% CI: 0.71-1.97), or partner substance use increase (aRR: 0.73, 95% CI: 0.42-1.25) with IPV.

In sensitivity analyses, 5 individuals were identified who reported pre-pregnancy act-based forms of perinatal IPV alone, when removed from the sample, the estimates remained the same. The bivariable and multivariable results are available in Appendix 3.

Discussion

In our study sample, almost a quarter (24.07%) of the participants who gave birth during the COVID-19 pandemic reported some form of perinatal IPV, including regular controlling behaviours and act-based forms of IPV. Emotional abuse was the most common form of act-based perinatal IPV, however, cases of sexual and physical abuse were also identified. Household income was the strongest risk factor associated with perinatal IPV, and surprisingly, many hypothesized risk factors (e.g., mental health, increased partner substance use etc.) were not significantly associated with perinatal IPV in this sample.

A strength of this study is the detailed breakdown of the different forms, timing and frequency of perinatal IPV, including revictimization that happened in multiple perinatal time periods.[47] The estimated prevalence of perinatal IPV in this study is higher than previous studies of the perinatal population (estimated to be an average of 3-9%) and online surveys investigating violence during the COVID-19 pandemic (estimated between 10-17%).[27,48] This may be influenced by the broad definition of perinatal IPV that we used (i.e. two scales from the World Health Organization

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multi-country study on domestic violence), that capture more forms of perinatal IPV compared to other scales.[47,49–54] We chose an online survey as the method of administration, as online surveys have been shown to have higher rates of disclosure compared to face-to-face, paper, or voice/telephone. [49]Additionally, perinatal IPV included an observation window that included pre-pregnancy IPV that occurred before the COVID-19 pandemic began.

In this analysis, the factor most strongly associated with perinatal IPV was socio-economic status, contributing to over three times the risk of IPV. The association between income and violence is well-established in the literature.[55] Consistent with findings from national representative Canadian surveys,[56] almost 30% of participants reported household income loss because of COVID-19 protocols, and 25% reported that their partners were essential workers, but of interest, both of these factors were not significantly different by perinatal IPV status. This finding may be highlighting that the sustained stress of lower socio-economic status poses a greater risk for perinatal IPV than the potential short-term effects of COVID-19 related changes in financial stability.

In the wake of COVID-19, attention has been drawn to the responsibility of health care practitioner's for screening for and addressing IPV, including investigating circumstances around injuries.[57] Within the obstetrical sphere, several commentaries have been written advocating for integrating IPV assessments into ambulatory gynecologic care, post-partum recovery, mental health, and reproductive life planning.[58–61] Systematic reviews and meta-analyses have identified that strongest socio-demographic factors associated with elevated risk of perinatal IPV include younger maternal age, single relationship status, visible minority status, lower socio-economic

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status, and substance use.[59,62] Of interest within this study, several of the typical risk factors for IPV were not significantly different by perinatal IPV status. This lends support for the importance of universal IPV screening as risk factor-based screening may miss cases.

Despite the general pervasiveness of IPV and the increased risks posed by the COVID-19 pandemic, many health care providers are not well equipped to screen for violence or to take action if IPV is identified.[63,64] If children are in a home affected by violence there are legal requirements to contact Children's Aid as part of due diligence.[65] However, there are no such requirements for IPV, reinforcing a systemic barrier to violence prevention and care. During the pandemic period many services have introduced modifications to services, including closure of physical offices, which has limited access to interventionable options.[15] However, obstetrical departments are one of the few services that have continued to see patients in person. Pregnancy and the postpartum period is a window of opportunity to identify and support people experiencing violence who may have lost contact with other community services.

Limitations

We do not have information on those who did not consent to participate, which may introduce self-selection bias, non-response bias or residual confounding, all factors that may explain why several hypothesized risk factors were not significantly associated with perinatal IPV. All measures of IPV were self-reported and may underestimate the prevalence of IPV within this sample, however, the survey captured regular controlling behaviours that may not be perceived as abusive in addition to act-based forms of emotional abuse (e.g., insulting, scaring, belittling etc.), physical abuse (e.g. hitting, slapping, pushing), or sexual abuse (e.g., forced sexual

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activity). While 94.4% were married/common law, we do not have information on the length of the relationship or if the participant had the same partner throughout the perinatal period. We did not have a comparison group of participants prior to COVID-19 and are unable to estimate the change in prevalence of perinatal IPV attributable to the increased stress of the COVID-19 pandemic. Additionally, this study was unable to evaluate associations between IPV and clinical outcomes as we did not have information on maternal or newborn outcomes.

Conclusion

Almost a quarter of this obstetrical study population reported some form of perinatal IPV, including IPV experienced pre-pregnancy, during pregnancy and post-partum. Owing to COVID-19 lock-down measures, many participants reported household income loss, changes to childcare, and increased isolation during pregnancy and post-partum; however, it was the strong social determinant of income that was most strongly associated with IPV. As the COVID-19 pandemic evolves, it is critical to prioritize the health and safety of the perinatal population in public health planning to ensure that households are fully supported and risks are mitigated.

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Declarations

Ethical approval

This study was approved by the Ottawa Health Sciences Network Research Ethics Board (Protocol number: 20170390-01H). All participants provided informed verbal consent. All methods were performed in accordance with standard ethical guidelines and regulations (Declaration of Helsinki)

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and analyzed during the current study are not publicly available due to The Ottawa Hospital privacy protocols, but with a data sharing agreement, de-identified data, the data dictionary, and ethics protocol are available from the corresponding author

Competing interests

All authors declare no conflicts of interest

Funding

The Ottawa Hospital Academic Medical Organization (TOHAMO): TOH–20–005

Author Contributions:

KM, KD, RT, CB, OF, AH, RRW, KS, DE conceived and designed the study. KS, MW, DE provided clinical expertise and content. RT conducted the statistical analyses and KM, DF, YG, MM, DC, SW provided methodological and analytic expertise. CB, OF, KD collected the data. MOG is the patient partner. All authors critically reviewed the manuscript and approved the final version. KM and DE have primary responsibility for the final content.

Acknowledgements

We would like to acknowledge all the participants who took the time to respond to this survey. We thank Drs Jasmine Gandhi and Mark Kaluzienski for support developing the perinatal mental health response study protocols.

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Figure 1. Different forms of regular controlling behaviour from partner during COVID-19 (n=216)

*Note: Measured using items from the World Health Organization Multi-Country Study on Domestic Violence

Figure 2. Forms and timing of act-based perinatal IPV (n=216)

*Note Participants can report multiple forms of IPV. Cases of physical and sexual abuse were identified, but suppressed because of small cell sizes

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Table 1. Different forms of perinatal violence and combinations

Perinatal IPV measures	N=216 n(%)
Act-based forms of perinatal IPV or regular controlling behaviour	
Yes	52 (24.07)
No	164 (75.93)
Act-based forms of perinatal IPV	
Yes	24 (11.11)
No	192 (88.89)
Regular controlling behaviours	
Yes	37 (17.13)
No	179 (82.87)
Acts of perinatal IPV and regular controlling behaviour	
Yes	9 (4.17)
No	207 (95.83)
Frequency of act-based forms of perinatal IPV	
Single time period	13 (6.02)
Multiple time periods	11 (5.09)
No acts of perinatal IPV	192 (88.89)

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Table 2. General characteristics of study participants who have given birth since the COVID-19 pandemic began (n=216)

Variables	Perinatal IPV Yes (n=52)	Perinatal IPV No (164)	Total N=216	p-values
Demographic characteristics				
Maternal Age in years (median, IQR)	32 (30-34)	33 (30-36)	33 (30-36)	0.089
Infant age in days at time of interview (median, IQR)	80 (67-89)	75 (65-90)	76 (66-90)	0.375
Month of Delivery in 2020				
March	11 (21.15)	28 (17.07)	39 (18.06)	0.800
April	21 (40.38)	61 (37.20)	82 (37.96)	
May	13 (25.00)	51 (31.10)	64 (29.63)	
June	7 (13.46)	24 (14.63)	31 (14.35)	
Nulliparous vs multiparous	32 (61.54)	86 (52.44)	118 (54.63)	0.251
Race or Ethnicity[1]				
White	31 (59.62)	116 (70.73)	147 (68.06)	0.134
Asian – South/East/South-East	9 (17.31)	22 (13.41)	31 (14.35)	0.485
Middle Eastern	8 (15.38)	10 (6.10)	18 (8.33)	0.035
Black	5 (9.62)	12 (7.32)	17 (7.87)	0.592
Another PoC group	9 (17.31)	16 (9.76)	25 (11.57)	0.138
Born in Canada vs immigrated	34 (65.38)	125 (76.22)	159 (73.61)	0.122
Marital status: Married/common law vs single/another status	48 (92.31)	156 (95.12)	204 (94.44)	0.440
Completed college diploma or under-graduate degree	44 (84.62)	144 (87.80)	188 (87.04)	0.551
Language(s) comfortable speaking[1]				
Speaks English	51 (98.08)	161 (98.17)	212 (98.15)	0.965
Speaks French	19 (36.54)	55 (33.54)	74 (34.26)	0.691
Speaks another language	9 (17.31)	20 (12.20)	29 (13.43)	0.346
Income				
Dwelling owned vs rented	29 (55.77)	122 (74.39)	151 (69.91)	0.011
Combined household income below Ottawa median[2]	34 (65.38)	46 (28.05)	80 (37.04)	<0.001
COVID-19 related household stress				
Any household income loss	19 (36.54)	45 (27.44)	64 (29.63)	0.211
Partner is essential worker	12 (23.08)	43 (26.22)	55 (25.46)	0.650
Partner substance use increased	12 (23.08)	33 (20.12)	45 (20.83)	0.648
Children's schedule				
Children stopped going to school or daycare	17 (32.69)	67 (40.85)	84 (38.89)	0.515
Children's schedule did not change	-	-	14 (6.48)	
No children	32 (61.54)	86 (52.44)	118 (54.63)	
Isolation due to COVID-19 restrictions				
No baby shower or planned celebration	29 (55.77)	70 (42.68)	99 (45.83)	0.099
Family member couldn't come to stay with me as planned	30 (57.69)	78 (47.56)	108 (50.00)	0.203
Friends and family could not visit my new baby	41 (78.85)	129 (78.66)	170 (78.70)	0.977
Missed out on community resources	46 (88.46)	137 (83.54)	183 (84.72)	0.390
Mental health				

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Pre-existing anxiety	13 (25.00)	30 (18.29)	43 (19.91)	0.291
Pre-existing depression	7 (13.46)	22 (13.41)	29 (13.43)	0.993
Post-partum depression (EPDS 13 cut-off)	20 (38.46)	44 (26.83)	64 (29.63)	0.109
EPDS Score (med, IQR)	10 (5-14)	8 (4-13)	8 (4-13)	0.130
Healthcare experiences				
Alone for all labour and delivery	-	-	16 (7.41)	0.928
Wear a mask during delivery	22 (42.31)	75 (45.73)	97 (44.91)	0.665
Any post-partum emergency department visit for mother or infant	11 (21.15)	31 (18.90)	42 (19.44)	0.721
Coping mechanisms				
Positive coping mechanisms[3]	49 (94.23)	160 (97.56)	209 (96.76)	0.237
Negative coping mechanisms[4]	38 (73.08)	101 (61.59)	139 (64.35)	0.132

Cell sizes ≤5 and are suppressed; p-values are calculated with Chi-square test for categorical variables and Wilcoxon rank sum tests for continuous variables; IQR= interquartile range

1. Participants can pick multiple race/ethnic groups or languages
2. Missing data=24 cases
3. Positive coping mechanisms include: yoga, exercising, donating to charity, connecting with friends/family
4. Negative coping mechanism include: sleeping more or less; over/under eating, acting aggressively

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Table 3. Bivariable and Multivariable log binomial regression models to assess factors associated with perinatal IPV (n=216)

Co-Variables	RR (95% CI)	p-value	ARR (95% CI)	p-value
Maternal Age in years (median, IQR)	0.95 (0.90-1.00)	0.082	0.99 (0.94-1.04)	0.660
EPDS Score (continuous)	1.04 (1.00-1.10)	0.040	1.03 (1.00-1.07)	0.077
Nulliparous vs multiparous	1.33 (0.76-2.32)	0.319	1.18 (0.71-1.97)	0.529
Partner substance use increased	1.14 (0.60-2.17)	0.691	0.73 (0.42-1.25)	0.249
Household income below vs above Ottawa median[1]	3.66 (2.07-6.48)	<0.001	3.24 (1.87-5.59)	<0.001

1. Missing data for household income was imputed by multiple imputation using chained equations and models were averaged across 10 imputed datasets
2. Outcome is defined as any reported regular controlling behaviour or act-based perinatal IPV (emotional, physical, sexual)

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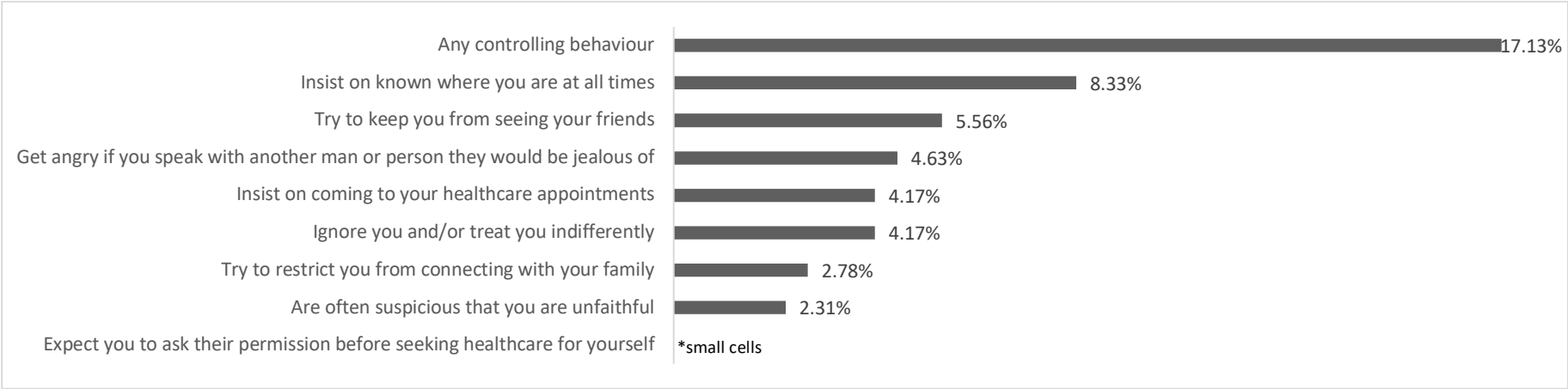
Figure 1. Different forms of regular controlling behaviour from partner during COVID-19 (n=216)



*Note: Measured using items from the World Health Organization Multi-Country Study on Domestic Violence

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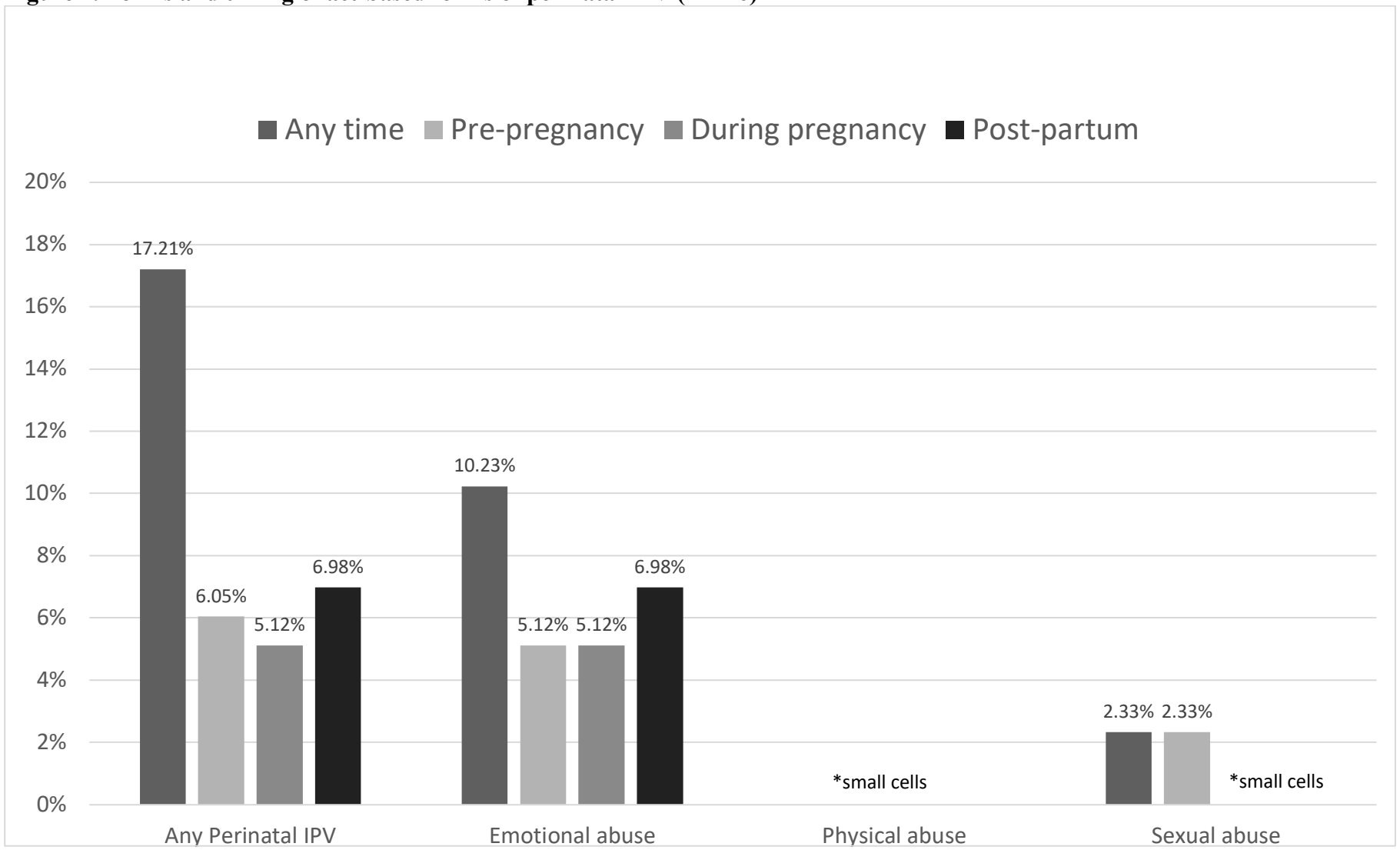
Figure 2. Forms and timing of act-based forms of perinatal IPV (n=216)



Note: Participants can report multiple forms of IPV. Cases of physical and sexual abuse were identified, but suppressed because of small cell sizes

Appendix Tables perinatal IPV

Appendix 1. Data tables for figure 1

Forms of regular controlling behaviour	n(%)
Any controlling behaviour	37 (17.21)
Insist on knowing where you are at all times	18 (8.37)
Try to keep you from seeing your friends	12 (5.58)
Get angry if you speak with another man or a person they would be jealous of	10 (4.65)
Insist on coming to your healthcare appointments	9 (4.19)
Ignore you and/or treat you indifferently	9 (4.19)
Try to restrict you from connecting with your family	6 (2.79)
Are often suspicious that you are unfaithful	5 (2.33)
Expect you to ask their permission before seeking healthcare for yourself	-

- Cell suppressed because of small cell size

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Appendix 2. Data tables for figure 2

Perinatal IPV variables	n(%)
Any acts of perinatal IPV	37 (17.21)
12 months pre-pregnancy	13 (6.05)
During pregnancy	11 (5.12)
Post-partum	15 (6.98)
Emotional abuse	
12 months pre-pregnancy	11 (5.12)
During pregnancy	11 (5.12)
Post-partum	15 (6.98)
Any perinatal time period	22 (10.23)
Physical abuse	
12 months pre-pregnancy	-
During pregnancy	-
Post-partum	-
Any perinatal time period	-
Sexual abuse	
12 months pre-pregnancy	5 (2.33)
During pregnancy	-
Post-partum	-
Any perinatal time period	5 (2.33)

- Cell Cell suppressed because of small cell size

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Appendix Tables perinatal IPV

Appendix 3. Sensitivity analyses for bivariable and multivariable log binomial regression models to assess factors associated with perinatal IPV by removing 5 participants who indicated act-based pre-pregnancy IPV alone (n=211)[1]

Co-Variables	RR (95% CI)	p-value	ARR (95% CI)	p-value
Maternal Age in years (median, IQR)	0.95 (0.90-1.01)	0.090	0.99 (0.94-1.05)	0.807
Nulliparous vs multiparous	1.56 (0.85-2.85)	0.151	0.71 (0.41-1.24)	0.230
Household income below vs above Ottawa median[2]	3.47 (1.94-6.19)	<0.001	3.42 (1.89-6.19)	<0.001
EPDS Score (continuous)	1.03 (0.99-1.08)	0.169	1.03 (0.98-1.07)	0.279
Partner substance use increased	1.16 (0.59-2.28)	0.667	0.67 (0.38-1.16)	0.153

1. Sample restricted to participants who reported any controlling behaviours or perinatal IPV acts during pregnancy and post-partum. Five individuals were removed from this analysis who reported perinatal IPV acts during the pre-pregnancy period alone
2. Missing data for household income was imputed by multiple imputation using chained equations and models were averaged across 10 imputed datasets

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STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract Included: abstract The study is a cross-sectional study
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found Included: Abstract, methods and results section
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported Included: Introduction Section (p.4-6)
Objectives	3	State specific objectives, including any prespecified hypotheses Included: Introduction Section (p. 6)
Methods		
Study design	4	Present key elements of study design early in the paper Included: Methods –Study design and recruitment (p. 7-8)
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection Included: Methods – Study setting and context, Study design and recruitment (p. 7-8)
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up na
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed na
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable Included: Methods – Outcomes, Covariables (p.8-10)
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group Included: Methods – Outcomes, Covariables (p.8-10)
Bias	9	Describe any efforts to address potential sources of bias Included: Methods Section – Study design and recruitment (p. 7-8), Analysis (p.11)
Study size	10	Explain how the study size was arrived at A sample size was not calculated because all eligible patients were contacted
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why Included: Methods – Outcomes, Covariables (p.8-10), Analysis (p.11)

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Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding Included: Methods Section – Analysis (p.11)
		(*b*) Describe any methods used to examine subgroups and interactions Included: Methods Section – Analysis (p.11)
		(*c*) Explain how missing data were addressed Methods Section – Analysis (p.11)
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed Included: na
		(*e*) Describe any sensitivity analyses NA

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Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed Included: The description of the study population is described in the Results Section. (p.12)
		(b) Give reasons for non-participation at each stage Included: Participation and response rate are described in the Results Section. (p.12)
		(c) Consider use of a flow diagram (Figure 1)
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders Included: Results Section – (p 12-13)
		(b) Indicate number of participants with missing data for each variable of interest Missing data is foot-noted in each table
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount) Included: na
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time Included: na
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included Included: Results Section – (p 13-14), Table 2
		(*b*) Report category boundaries when continuous variables were categorized Included: Results Section – (p 12), Table 1
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives Included: Discussion Section (p.14-17)
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias Included: Discussion Section (p.16)
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence Included: Discussion Section (p.14-17)
Generalisability	21	Discuss the generalisability (external validity) of the study results Included: Discussion Section (p. 16)
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based **Funding:** The Ottawa Hospital Academic Medical Organization (TOHAMO): TOH–20–005

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*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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