SHORT COMMUNICATION

Google search behaviour relating to perinatal mental wellbeing during the United Kingdom's first COVID-19 lockdown period: a warning for future restrictions

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Abstract

Infodemiological studies derive public health information from internet activity. Here we compare Google searches of perinatal mental health-related terms during the U.K.'s first COVID-19 lockdown with the corresponding period in 2019. We report evidence of reduced pathologising/recognition of perinatal mental illness; increased perceived maternal inadequacy and estrangement from newborn baby; increased maternal domestic abuse; and increased domestic and substance abuse generally. These insights offer important population-level considerations ahead of further U.K. restrictions, and should be imminently confirmed with epidemiological work.

Keywords Coronavirus · Perinatal psychiatry · Infodemiology

Introduction

Infodemiological studies examine the distribution and determinants of information on the internet to guide public health policy (Eysenbach 2009). Such studies have attempted to estimate the effect of COVID-19 on worldwide mental wellbeing before global epidemiological information is available (Misiak et al. 2020; Sinyor et al. 2020).

A woman's mental health is particularly vulnerable perinatally. Most United Kingdom (U.K.) perinatal mental health screening is completed at antenatal or postnatal midwifery, health visiting and general practice appointments. These routine visits diminished considerably during the first U.K. lockdown, likely precluding early recognition of psychiatric illness (our unpublished observations; Gressier et al. 2020), whereby changes to service provision limited subsequent access to perinatal mental healthcare (Knight et al. 2020). Such reduced contact was likely exacerbated by a recommendation that all third-trimester pregnant women should be 'particularly attentive' to social distancing measures (Royal College of Obstetricians & Gynaecologists 2020). Moreover, quarantine measures are known to threaten psychological wellbeing directly (Brooks et al. 2020).

Approximately fifteen commentaries and editorials have discussed the challenges that COVID-19 poses for perinatal mental health, and nearly thirty peer-reviewed studies present convincing evidence for worsened perinatal mental health in regional non-U.K. populations. Here, we report Google search behaviour relating to perinatal mental health during the first U.K. COVID-19 lockdown period. To our knowledge, this study precedes any corresponding epidemiological work in the U.K. perinatal population.

Methods

Using publicly available data from Google Trends (Google LLC, United States), we compared the weekly relative search volume (RSV) of U.K. Google searches relating to perinatal mental health diagnoses, risk factors, red flags and suggested admission criteria during the U.K.'s first COVID-19

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lockdown period with the corresponding 16-week period in 2019. Owing to Google Trends' grouping of data into by predetermined weeks, we compared 24th March to 7th July 2019 with 22nd March to 5th July 2020. See Table 1 for all search terms—either perinatal-specific or prefixed/suffixed by maternalising words—with an explanation of how search terms were formulated. Unpaired two-tailed Student's *t* tests with unequal variances were used to identify statistically significant ($p < 0.05$) differences in the weekly RSVs of agreed terms between the corresponding time periods. 'Postpartum', 'postnatal' and 'puerperal' were used interchangeably to prefix diagnoses ('psychosis', 'depression' and 'anxiety') in searches, before individual data sets were combined by diagnosis for *t* testing as above.

Results

Perinatal mental health diagnoses

We found statistically non-significant decreases in the weekly RSVs for combined postnatal/postpartum/puerperal 'psychosis' ($p = 0.51$, − 8.66%*), postnatal/postpartum/puerperal 'depression' ($p = 0.13$, − 15.61%*) and postnatal/postpartum 'anxiety' ($p = 0.24$, − 22.91%*) in 2020 versus 2019. This was also true for 'baby blues' ($p = 0.58$, − 5.85%*). There were insufficient searches for Google Trends to return data for the search terms 'postnatal low mood', 'low mood after birth', 'puerperal anxiety', and interchangeably postnatal/postpartum/puerperal 'mania' and 'hypomania'.
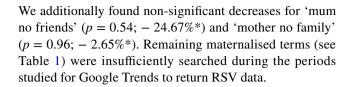
Guilt

We found a strong trend to a statistically significant decrease in the weekly RSV for 'mother guilt' ($p = 0.057$, − 61.80%*) in 2020 versus 2019. We found non-significant decreases for 'mum guilty' ($p = 0.48$; − 29.41%*) and 'mother guilty' ($p = 0.90$; − 5.26%*), and a non-significant increase for 'mum guilt' ($p = 0.92$; + 4.69%*).

Other signs and symptoms of mental illness: hopelessness, rapidly changing mental state, evidence of psychosis and violent self-harm

The maternalised terms (see Table 1) were insufficiently searched during the periods studied for Google Trends to return RSV data.

Support networks

We found a significant decrease in the weekly RSV for 'mum no family' ($p = 0.036$; − 71.87%*) in 2020 versus 2019.

We additionally found non-significant decreases for 'mum no friends' ($p = 0.54$; − 24.67%*) and 'mother no family' ($p = 0.96$; − 2.65%*). Remaining maternalised terms (see Table 1) were insufficiently searched during the periods studied for Google Trends to return RSV data.

Maternal inadequacy and estrangement from infant

We found a statistically significant increase in the weekly RSV for 'bad mother' ($p = 0.013$; + 37.23%*) in 2020 versus 2019, and non-significant increases for 'bad mum' ($p = 0.18$; + 14.63%*), 'poor bond' ($p = 0.17$; + 83.94%*), 'connection baby' ($p = 0.78$; + 6.07%*) and 'detached baby' ($p = 0.64$; + 36.04%*). We found a significant decrease for 'unwanted pregnancy' ($p = 0.018$; − 45.10%*), a strong trend to a significant decrease for 'abortion' ($p = 0.06$; − 38.24%*), and non-significant decreases for 'poor attachment' ($p = 0.43$; − 27.84%*) and 'unplanned pregnancy' ($p = 0.21$; − 26.43%*). There were insufficient searches for Google Trends to return data for the search terms 'estrangement baby', 'detached from baby', 'disconnected from baby' and 'disconnected baby'.

Infant death

We found a statistically significant decrease in the weekly RSVs for 'miscarriage' ($p = 0.000074$; − 12.46%*) and 'neonatal death' ($p = 0.032$; − 35.22%*) in 2020 versus 2019, and a non-significant increase for 'still birth' ($p = 0.80$; + 2.27%*).

Substance misuse

The maternalised terms (see Table 1) were insufficiently searched during the periods studied for Google Trends to return RSV data. However, given the close association of substance misuse with maternal multiple disadvantage and death (Knight et al. 2019), we felt that it was critical to present some relevant data and thus searched the suggested substance misuse terms in their non-maternalised form. Accordingly, we found a statistically significant decrease in the weekly RSVs for 'substance misuse' ($p = 0.035$; − 20.20%*) and 'drug use' ($p = 0.045$; − 11.79%*) in 2020 versus 2019, and a strong trend to a decrease for 'come off drugs' ($p = 0.061$; − 50.89%*). We found a non-significant increase for 'stop doing drugs' ($p = 0.79$; + 20.60%*).

Domestic abuse

We found a strong trend to an increase in the weekly RSV for 'mother domestic abuse' ($p = 0.067$; + 241.28%*) in 2020 versus 2019. We found non-significant increases for 'mother domestic violence' ($p = 0.43$; + 52.97%*) and 'mother

Table 1 Strategy for derivation of perinatal mental health-related search terms from key resources. In all cases, identical data sets were returned whether the maternalising word prefixed or suffixed the search term; thus, data are only presented for terms in the former form
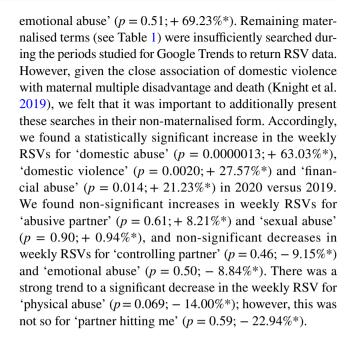
Search theme	Source consulted	Terms used in source	Terms searched by authors
Red flags	Cantwell et al. 2015—MBBRACE-UK 2011–2013; Diagnoses commonly seen in our clinical practice	• Recent significant change in mental state or emergence of new symptoms • New and persistent expressions of incompetency as a mother or estrangement from the infant	'baby blues', 'postnatal low mood', 'low mood after birth', 'postnatal[a] depression', 'postnatal[a] anxiety', 'postnatal[a] psychosis', 'postnatal[a] mania' and 'postnatal[a] hypomania' 'violent self-harm', 'self-harm', 'cutting myself', 'cutting wrists', 'hanging myself', 'hang myself', 'shooting myself', 'shoot myself', 'jumping from height' and 'maternal suicide': *each individually prefixed and suffixed with maternalising terms (i.e. 'mum', 'mother', 'maternal', 'after birth')* 'bad mother', 'bad mum', 'estrangement baby', 'connection baby', 'poor bond', 'poor attachment', 'detached from baby', 'detached baby', 'disconnected from baby', 'disconnected baby', 'unwanted pregnancy', 'unplanned pregnancy' and 'abortion': *each individually prefixed and suffixed with maternalising terms (i.e. 'mum', 'mother', 'maternal', 'after birth')*
Suggested admission criteria	Cantwell et al. 2015—MBBRACE-UK 2011–2013	• Rapidly changing mental state • Suicidal ideation (particularly of a violent nature) • Pervasive guilt or hopelessness • Significant estrangement from the infant • New or persistent beliefs of inadequacy as a mother • Evidence of psychosis	'mood swings', 'mood all over the place', 'all over the place', 'feeling really up and down', 'feeling up and down' and 'really up and down': *each individually prefixed and suffixed with maternalising terms (i.e. 'mum', 'mother', 'maternal', 'after birth')* 'guilt', 'hopeless' and 'hopelessness': *each individually prefixed and suffixed with maternalising terms (i.e. 'mum', 'mother', 'maternal', 'after birth')* 'seeing things', 'hearing voices', 'someone is after me' and 'people are after me': *each individually prefixed and suffixed with maternalising terms (i.e. 'mum', 'mother', 'maternal', 'after birth')* *See above for: (violent) suicidal ideation, estrangement from infant, maternal inadequacy*
Fatal risk factors	Knight et al., 2019—MBBRACE-UK 2015–2017	6% of women who died within one year of delivery suffered severe and multiple disadvantage — most commonly all three of: • Mental health diagnosis • Substance misuse • Domestic abuse	'substance misuse', 'drug use', 'stop doing drugs' and 'come off drugs': *as presented, and each individually prefixed and suffixed with maternalising terms (i.e. 'mum', 'mother', 'maternal', 'after birth')* 'domestic abuse', 'domestic violence', 'abusive partner', 'controlling partner', 'emotional abuse', 'physical abuse', 'partner hitting me', 'sexual abuse', 'financial abuse', 'partner spent my money', 'partner stole my money', 'partner took my money': *as presented, and each individually prefixed and suffixed with maternalising terms (i.e. 'mum', 'mother', 'maternal', 'after birth')* *See above for: mental health diagnoses*

Table 1 (continued)

Search theme	Source consulted	Terms used in source	Terms searched by authors
Other risk factors	Public Health England 2019—'Perinatal mental health'	Relevant dynamic risk factors for postpartum depression: ● History of mental health problems ● Domestic violence ● Interpersonal conflict ● Inadequate social support ● Alcohol or drug abuse ● Unplanned or unwanted pregnancy Relevant dynamic risk factors for postpartum mental health issues: ● Miscarriage ● Still birth ● Neonatal death	'support network', 'no family', 'no family nearby', 'no friends', 'no friends nearby', 'isolated', 'loneliness': *each individually prefixed and suffixed with maternalising terms (i.e. 'mum', 'mother', 'maternal', 'after birth')* 'miscarriage', 'still birth', 'neonatal death' *See above for: mental health diagnoses, domestic abuse, substance misuse, unplanned or unwanted pregnancy*

[a]Two additional searches were completed where 'postnatal' was exchanged for 'postpartum' and 'puerperal'

emotional abuse' ($p = 0.51; + 69.23\%*$). Remaining maternalised terms (see Table 1) were insufficiently searched during the periods studied for Google Trends to return RSV data. However, given the close association of domestic violence with maternal multiple disadvantage and death (Knight et al. 2019), we felt that it was important to additionally present these searches in their non-maternalised form. Accordingly, we found a statistically significant increase in the weekly RSVs for 'domestic abuse' ($p = 0.0000013; + 63.03\%*$), 'domestic violence' ($p = 0.0020; + 27.57\%*$) and 'financial abuse' ($p = 0.014; + 21.23\%*$) in 2020 versus 2019. We found non-significant increases in weekly RSVs for 'abusive partner' ($p = 0.61; + 8.21\%*$) and 'sexual abuse' ($p = 0.90; + 0.94\%*$), and non-significant decreases in weekly RSVs for 'controlling partner' ($p = 0.46; - 9.15\%*$) and 'emotional abuse' ($p = 0.50; - 8.84\%*$). There was a strong trend to a significant decrease in the weekly RSV for 'physical abuse' ($p = 0.069; - 14.00\%*$); however, this was not so for 'partner hitting me' ($p = 0.59; - 22.94\%*$).

$*$ = % difference in total RSVs

Discussion

We report consistent but non-significant reductions in the RSVs of Google searches relating to perinatal mental health diagnoses during the first U.K. lockdown. Taken alongside more convincing reductions in the RSVs of terms related to maternal guilt and weakened maternal support networks, this may represent reduced pathologising of expectedly difficult experiences during a pandemic, as has been suggested previously (Misiak et al. 2020; Sinyor et al. 2020). Although reflective of psychological resilience within the U.K.'s perinatal population, this risks under-recognition of perinatal mental illness during this pandemic, possibly delaying timely diagnosis and management.

We report an increase in searches relating to maternal inadequacy and potentially estrangement from the newborn baby. However, this did not apply to the unborn baby, as we found notable reductions in searches for 'unwanted pregnancy' and 'abortion'. We believe that this is secondary to reduced unprotected sexual intercourse due to reduced socialising, reflected by the non-significant decrease for 'unplanned pregnancy'. Additionally, such times of crisis might promote women's connectedness with their pregnancies, and could encourage more considered family planning decisions. Potentially relatedly, we additionally report significant reductions in the RSVs for 'miscarriage' and 'neonatal death', which could reflect attenuated abortive and infanticidal ideation, respectively. It might also reflect a true fall in infant mortality, whereby social distancing

measures have reduced the incidence of fatal infections and exposure to environmental (e.g. road traffic) and occupational (e.g. radiation) hazards.

A trend towards increased RSVs relating to maternal domestic abuse indicates increased maternal multiple disadvantage and post-partum mortality. Herein, our data suggest that a known increase in domestic abuse (Bradbury-Jones and Isham 2020) could be more attributable to domestic violence and financial abuse than other forms of abuse. Significantly decreased RSVs for 'substance misuse' and 'drug use', alongside a strong trend to a decrease for 'come off drugs', could indicate increased drug use through reduced aversion to drug-taking behaviour, potentially as a maladaptive coping strategy. Indeed, an interim Global Drug Survey has identified a worldwide increase in the use of alcohol, cannabis and benzodiazepines during the pandemic (Winstock et al. 2020). Given nationwide travel restrictions, increased drug-related RSVs may have also been influenced by a potential shift from face-to-face to online acquisition of drugs.

We acknowledge two methodological weaknesses. First, we are unable to comment on absolute numbers of searches. However, this is inferred—a data set comprising RSVs of predominantly 0 and 100 reflects a term that is seldom searched. Notwithstanding, this is compensated for by the statistics: even large percentage differences for infrequently searched terms do not reach significance due to large variance of data, e.g. 'mother domestic abuse'. Thus, although non-maternalised search terms of domestic abuse and substance misuse yielded robustly significant observations between large RSVs, their limited specificity to the U.K. perinatal population must be noted.

Albeit speculative, this study is a clear mandate to accelerate corresponding epidemiological work. It raises several imminent considerations for the perinatal mental health practitioner, and should be of interest to population-level U.K. decision-makers during this extended period of locally and nationally changeable restrictions.

Declarations

References

Bradbury-Jones C, Isham I (2020) The pandemic paradox: the consequences of COVID-19 on domestic violence. J Clin Nurs. https://doi.org/10.1111/jocn.15296

Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, Rubin GJ (2020) The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet 395(10227):912–920. https://doi.org/10.1016/S0140-6736(20)30460-8

Cantwell R, Knight M, Oates M , Shakespeare J, on behalf of the MBRRACE-UK mental health chapter writing group (2015) Lessons on maternal mental health. In: Knight M, Tuffnell D, Kenyon S, Shakespeare J, Gray R, Kurinczuk JJ (Eds) on behalf of MBRRACE-UK. Saving Lives, Improving Mothers' Care - Surveillance of maternal deaths in the UK 2011–13 and lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–13. National Perinatal Epidemiology Unit, University of Oxford, Oxford, p22–41

Eysenbach G (2009) Infodemiology and Infoveillance: framework for an emerging set of public health informatics methods to analyze Ssearch, communication and publication behavior on the Internet. J Med Internet Res 11(1):e11. https://doi.org/10.2196/jmir.1157

Gressier F, Mezzacappa A, Lasica P-A, Fourcade C, Corruble E (2020) COVID outbreak is changing our practices of perinatal psychiatry. Arch Womens Ment Health. https://doi.org/10.1007/s00737-020-01039-7

Knight M, Bunch K, Tufnell D, Shakespeare J, Kotnis R, Kenyon S, Kurinczuk JJ (Eds), on behalf of MBRRACE-UK (2019) Saving lives, improving mothers' care - lessons learned to inform maternity care from the UK and Ireland confidential enquiries into maternal deaths and morbidity 2015–17. National Perinatal Epidemiology Unit, University of Oxford, Oxford

Knight M, Bunch K, Cairns A, Cantwell R, Cox P, Kenyon S, Kotnis R, Lucas DN, Lucas S, Marshall L, Nelson-Piercy C, Page L, Rodger A, Shakespeare J, Tufnell D, Kurinczuk JJ, on behalf of MBRRACE-UK (2020) Saving lives, improving mothers' care rapid report: learning from SARS-CoV-2-related and associated maternal deaths in the UK March – May 2020. National Perinatal Epidemiology Unit, University of Oxford, Oxford

Misiak B, Szczesniak D, Koczanowicz L, Rymaszewska J (2020) The COVID-19 outbreak and Google searches: is it really the time to worry about global mental health. Brain Behav Immun 87:126–127. https://doi.org/10.1016/j.bbi.2020.04.083

Public Health England (2019) Perinatal mental health: overview. URL: https://www.gov.uk/government/publications/better-mental-health-jsna-toolkit/4-perinatal-mental-health

Royal College of Obstetricians & Gynaecologists (2020) Coronavirus infection and pregnancy: coronavirus and pregnancy. URL: https://www.rcog.org.uk/en/guidelines-research-services/guidelines/coronavirus-pregnancy/covid-19-virus-infection-and-pregnancy/

Sinyor M, Spittal MJ, Niederkrotenhaler T (2020) Changes in suicide and resilience-related Google searches during the early

stages of the COVID-19 Pandemic. Can J Psychiatr. https://doi.org/10.1177/0706743720933426

Winstock AR, Davies EL, Gilchrist G, Zhuparris A, Ferris JA, Maier LJ, Barratt MJ (2020) Global Drug Survey (GDS) special edition on COVID-19 global interim report. URL: https://www.globaldrugsurvey.com/wp-content/themes/globaldrugsurvey/assets/GDS_COVID-19-GLOBAL_Interim_Report-2020.pdf