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Psychosocial experiences of pregnant women during the COVID-19 pandemic: a UK-wide study of prevalence rates and risk factors for clinically relevant depression and anxiety

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ABSTRACT

Purpose: Whilst the antenatal period is well established as a period of increased vulnerability to mental health difficulties, restrictions resulting from COVID-19 lockdown in the UK are likely to have negatively affected psychosocial outcomes in these women.

Materials and Methods: This study aimed to describe prevalence rates of clinically relevant antenatal anxiety and depression, and explore whether psychosocial changes as a result of the pandemic were predictive of clinically relevant anxiety and depression. Antenatal women ($N = 684$) completed an online survey of psychosocial measures during the UK government's initial lockdown restrictions.

Results: Descriptive statistics indicate women experienced high levels of anxiety and depression and that changes resulting from restrictions were perceived negatively. Whilst 11.7% of women reported a current, clinical diagnosis of depression, 47.8% reported a score of ≥13 on the EPDS, indicating clinically relevant depression. Similarly, 18.7% of women reported a current, clinical diagnosis of anxiety, but 68.1% scored ≥40 on the STAI, indicating clinically relevant anxiety. After controlling for known demographic risk factors, only psychosocial change because of COVID-19 restrictions predicted clinically relevant anxiety (28%) and depression (27%).

Conclusions: This study highlights the importance of considering antenatal women as a high-priority group, and ensuring antenatal care remains accessible and uninterrupted in any future crises.

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Maternal mental health; prenatal anxiety; prenatal depression; psychosocial experiences; pandemic

Introduction

From 23 March 2020, a range of measures were introduced to reduce the spread of the Coronavirus (SARS-CoV-2) or COVID-19. There were well-documented increases in poor psychosocial outcomes for antenatal populations in relation to the impact of COVID-19. These were as a result of disruptions to prenatal care and maternity resources [1], limited social support and interaction [2], fear of exposure and hospitalization [3], and the adverse impact on perinatal mental health [4]. Prior to "lockdown" measures, prevalence rates of antenatal depression were estimated at 7–21% [5,6] and antenatal anxiety at 21–25% [7]. However, recent reviews indicate the COVID-19 pandemic complicated and further exacerbated this vulnerability in this population [8–10]. Exploring the psychosocial impact of the COVID-19 pandemic in antenatal populations is essential as the impact of poor antenatal mental health is associated with short- and long-term developmental, somatic and psychological outcomes in both mothers and infants [11–13]. A recent study [14] specifically examined whether, self-reported psychosocial outcomes changed as a result of the pandemic COVID-19, postnatally. This study reported prevalence rates of clinically relevant maternal depression and anxiety were extremely high (43% for depression; 61% for anxiety) when compared to both self-reported current clinical diagnoses of depression and anxiety, and pre-pandemic prevalence studies. Risk of clinically significant maternal depression and anxiety was also predicted by perceived psychological changes brought about by the implementation of "lockdown" measures. The present study replicates the study above, but within the antenatal population, with the following specific aims:

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1. To describe prevalence rates of clinically relevant antenatal anxiety and depression.
2. To explore whether psychosocial change occurring as a result of COVID-19 is predictive of clinically relevant antenatal anxiety and depression.

Materials and methods

Participants and recruitment

Participants were recruited via social media and snowballing. To be eligible to take part, participants had to be over the age of 18, in their third trimester of pregnancy (>28 weeks') and reside in the UK due to global differences in lockdown restrictions. All participants were pregnant at the time of study completion. The study was open for completion from the 19 April 2020–9 May 2020 to coincide with initial lockdown restrictions in the UK.

Design and procedure

The current study is a cross-sectional design. Questionnaires contained demographic questions alongside a battery of psychosocial measures (Edinburgh Postnatal Depression Scale [EPDS] [15], State Trait Anxiety Inventory – State Form [STAI-S] [16], Pregnancy Related Anxiety Questionnaire – Revised 2 [PRAQ-R2] [17], Prenatal Attachment Inventory [PAI] [18], Multidimensional Scale of Perceived Social Support [MSPSS] [19], Relationship Questionnaire [RQ] [20], Short Assessment of Patient Satisfaction [SAPS] [21], see Table 1 for more information about each scale and their reliability).

Demographics

Participants were screened to ensure they met eligibility criteria, and were then asked various demographic questions about themselves, including age and occupation, as well as their current mental health status. They were also asked their current gestational week and if they or their family members had ever contracted COVID-19. *Ad-hoc* questions were added at the end of each psychosocial measure to assess if participants psychosocial experience had been affected by the introduction of social distancing measures and, if so, the extent to which they had been impacted (1 = less so, 10 = more so) on a Likert scale.

Method of analysis

Analyses followed a similar method to Fallon et al. [14]. Chi-square analysis was used to analyze whether the perceived change in social distancing measures was significant. Estimates of prevalence rates of anxiety and depression in the antenatal period conducted prior to the COVID-19 pandemic were identified and used as a comparison to the current study. For pre-pandemic estimates of clinically relevant depression, we used 26.2% [25], as this prevalence was also used in a recent systematic review [26], which also compared mental health during the perinatal period pre- and post-pandemic. They also used the same measure and clinical cutoff as this study, and it was conducted in the UK. For pre-pandemic estimates of clinically relevant anxiety, we used global prevalence rates as reported by Dennis et al. [7], 24.6% for any self-reported anxiety disorder) as these were also taken from self-reported anxiety symptoms.

Depressive and anxious symptoms were recoded into dichotomous variables (0 = below cutoff, 1 = at or above), according to the previously mentioned cutoffs and compared to previous pre-pandemic prevalence rates. To assess whether change in psychosocial feelings as a result of social distancing restrictions predicted clinically relevant anxiety and depression, binary logistic regressions were conducted. Bivariate correlations were conducted on the demographic variables with the outcomes to determine potentially confounding variables for addition in Block Two. In Block One, self-reported clinical diagnosis of anxiety and depression (0 = yes, 1 = no) were entered; socio-demographic predictors identified as potential confounders during bivariate correlations were entered into Block Two (maternal age (continuous), week of gestation (continuous), marital status (0 = other, 1 = married), housing status (0 = other, 1 = own home), occupation (0 = other, 1 = professional occupation), educational attainment (0 = other, 1 = Undergraduate degree or equivalent), pregnancy complications (0 = yes, 1 = no), planned mode of feeding (0 = other, 1 = exclusively breastfeeding), occupant number; perceived psychosocial changes as a result of the pandemic for each psychosocial variable (0 = yes, 1 = no) were entered into Block Three.

Results

Participants

Women (N=684) in their third trimester of pregnancy participated in the study. Participants were aged between 18 and 44 (M = 30.48, SD = 4.88) and gestational age ranged between 28 and 42 weeks (M = 33.68, SD = 3.69). Women were predominantly white (96.9%), married (56.4%) or living with a partner (37.4%), in a professional occupation (38.5%), who had completed

Table 1. Psychological measures.

Edinburgh Postnatal Depression Scale (EPDS) [15]	State Trait Anxiety Inventory – State Form (STAI-S) [16]	Pregnancy Related Anxiety Questionnaire – Revised 2 (PRAQ-R2) [17]	Prenatal Attachment Inventory (PAI) [18]	Multidimensional Scale of Perceived Social Support (MSPSS) [19]	Relationship Questionnaire (RQ) [20]	Short Assessment of Patient Satisfaction (SAPS) [21]
The EPDS is a 10-item self-report measure of depression. Despite being originally developed for use during the postpartum, it has been widely validated for use during pregnancy [22]. Although some suggest using a cutoff of >11 during pregnancy, a recent review suggests scores of >13 have high sensitivity in detecting clinically relevant levels of anxiety [23]. This was also chosen as it is largely consistent with cutoffs used in other studies. Reliability in the current study can be considered excellent (McDonald's ωt = 0.91).	The STAI-S is a 20-item state form of the STAI, measuring state anxiety, or an individual's tendency to avoid anxious situations. The measure is scored on a Likert scale from 1 to 4, with higher scores indicating higher levels of anxiety. The measure has been validated for use during pregnancy, with clinical cutoffs suggesting scores >40 indicative of clinically relevant anxiety [22]. Reliability in the current study is excellent (McDonald's ωt = 0.97).	The PRAQ-R2 is a measure of pregnancy-specific anxiety applicable to all women, regardless of parity. The questionnaire features 10-items and three subscales which can be scored separately (fear of giving birth; worries about bearing a physically or mentally handicapped child; and concern about own appearance). Participants score on a scale from 1 (definitely not true) to 5 (definitely true). Reliability in the current study can be considered poor (McDonald's ωh = 0.57) but is only presented for descriptive purposes and total scores were not used in the regression model.	The PAI is a 21-item scale measuring "the unique, affectionate relationship that develops between a woman and her fetus' [18, p.201). Participants rate items from 1 (almost never) to 4 (almost always). Although the original article suggest a unidimensional structure, others have disputed this and suggest a three-factor structure [24]. Reliability in the current study is good (McDonald's ωt = 0.78).	The MSPSS is a 12-item scale measuring an individual's perception of support from three domains; friends, family and a significant other. The scale is measured on a 7-item scale from 1 (very strongly disagree) to 7 (very strongly agree). Higher scores are indicative of higher social support. Reliability in the current study can be considered good (McDonald's ωh = 0.75).	The Relationship Questionnaire is a 12-item scale assessing an individual's perception of their relationship rated from 1 (never) to 4 (almost always). Higher scores indicate higher relationship satisfaction. Reliability in the current study can be considered excellent (McDonald's ωt = 0.90).	The SAPS is a 7-item scale used to measure a patient's satisfaction with their treatment, explanation of medical results and clinical care, amongst others. Participants rate on a scale from 0 to 4, with higher scores indicating higher satisfaction with care. Reliability in the current study is excellent (McDonald's ωt = 0.91).

an Undergraduate degree or equivalent (39.0%). Only 60 (8.8%) women suspected they had previously contracted COVID-19, with one (1.7%) of those women having been tested. Only 128 (18.7%) women believed a family member had previously contracted COVID-19, with 21 (16.4%) reporting they had been tested. See Table 2 for full characteristics.

Psychosocial experiences during COVID-19

Descriptive statistics for the psychological measures (EPDS; STAI-S; PRAQ-R2) and social measures (PAI; MSPSS; RQ, SAPS) can be found in Table 3.

COVID-19 specific changes in psychosocial experiences

When considering whether a change in psychological feelings were as a result of the introduction of social distancing measures, 424 (62.0%) women indicated depressive symptomatology had changed and this was significant ($\chi^2(1)=43.76$, $p<.001$). 562 (82.2%) indicated their feelings of state anxiety had changed and this was also significant ($\chi^2(1)=286.46$, $p<.001$). 327 (47.8%) felt like their feelings toward pregnancy-related anxiety had changed, but this was non-significant ($\chi^2(1)=0.99$, $p=.319$). 205 (30.0%) participants indicated their feelings of attachment had changed and this was significant ($\chi^2(1)=107.84$, $p<.001$). 296 (43.3%) indicated a significant change in social support ($\chi^2(1)=11.63$, $p<.001$) and 225 ($N=642$; 35.0%) indicated a change in relationship with their partner and this was statistically significant ($\chi^2(1)=56.41$, $p<.001$). Finally, over half of participants (354; 51.8%) reported a change in satisfaction with care although this was non-significant ($\chi^2(1)=1.07$, $p=.301$). All changes other than in relationships with partners ($M=4.77$, SD = 2.52), were reported negatively (1 = psychosocial feelings less affected by COVID-19, 10 = psychosocial feelings more affected by COVID-19) including levels of depression ($M=6.83$, SD = 1.90), anxiety ($M=5.96$, SD = 2.25), pregnancy-related anxiety ($M=7.43$, SD = 1.84), attachment to the baby ($M=5.49$, SD = 2.10), levels of social support ($M=6.70$, SD = 2.25), and satisfaction with care ($M=6.68$, SD = 2.09). See Table 3, Figures 1 and 2.

Prevalence of antenatal depression and antenatal anxiety

80 (11.7%) women reported a current, clinical diagnosis of depression, however 327 (47.8%) reported a score of

Table 2. Maternal and infant demographic characteristics ($N = 684$).

Variable	Value
Maternal age (M ± SD)	30.48 ± 4.88
Ethnicity (*N*/%)	
White	663 (96.9%)
Black Caribbean	1 (0.1%)
Black African	2 (0.3%)
Chinese	2 (0.3%)
Black other	1 (0.1%)
Other	14 (2.0%)
Prefer not to say	1 (0.1%)
Marital status (*N*/%)	
Married	386 (56.4%)
Living with partner	256 (37.4%)
Divorced	2 (0.3%)
Separated	7 (1.0%)
Single	33 (4.8%)
Housing status (*N*/%)	
Own your home	449 (65.6%)
Rent privately	144 (21.1%)
Rent from the local authority	43 (6.3%)
Live with parents	33 (4.8%)
Other	15 (2.2%)
Occupant number (incl. participant; *N*/%)	
Two	284 (41.5%)
Three	265 (38.7%)
Four	91 (13.3%)
Five or more	38 (5.6%)
Missing data	6 (0.9%)
Occupation (*N*/%)	
Managers, directors and senior officials	55 (8.0%)
Professional occupations	263 (38.5%)
Associate professional and technical occupations	10 (1.5%)
Administrative and secretarial occupations	81 (11.8%)
Skilled trades occupations	20 (2.9%)
Caring, leisure and other service occupations	94 (13.7%)
Sales and customer service occupations	77 (11.3%)
Process, plant and machine operatives	1 (0.1%)
Elementary occupations	5 (0.7%)
Not in a paid occupation	78 (11.4%)
Highest educational attainment (*N*/%)	
Completed postgraduate education (master's degree/PhD or equivalent)	127 (18.6%)
Completed undergraduate education (degree or equivalent)	267 (39.0%)
Completed A-levels (or equivalent)	180 (26.3%)
Completed GCSEs (or equivalent)	91 (13.3%)
No qualifications completed	2 (0.2%)
Other qualification (please specify)	17 (2.5%)
Suspected COVID-19 infection (*N*/%)	
Yes	60 (8.8%)
No	624 (91.2%)
Tested for COVID-19 (*N*/%)[a]	
Yes	1 (1.7%)
No	59 (98.3%)
Severity of illness from 1 to 10 (M ± SD)[a]	6.18 ± 2.40
Suspected family member with COVID-19 (*N*/%)	
Yes	128 (18.7%)
No	556 (81.3%)
Family member tested for COVID-19[a]	
Yes	21 (16.4%)
No	107 (83.6%)
Family member severity of illness from 1 to 10 (M ± SD)[a]	6.25 ± 2.30
Current clinical diagnosis of anxiety (*N*/%)	
Yes	128 (18.7%)
No	549 (80.3%)
Prefer not to say	7 (1.0%)
Timing of diagnosis (*N*/%)[a]	
Before pregnancy	114 (89.1%)
During pregnancy	14 (10.9%)
Prescribed medication for diagnosis (*N*/%)[a]	
Yes	36 (28.1%)
No	91 (71.1%)
Prefer not to say	1 (0.8%)
Clinical diagnosis of depression (*N*/%)	
Yes	80 (11.7%)
No	597 (87.3%)
Prefer not to say	7 (1.0%)
Timing of diagnosis (*N*/%)[a]	
Before pregnancy	69 (86.3%)
During pregnancy	11 (13.8%)
Prescribed medication for diagnosis (*N*/%)[a]	
Yes	25 (31.3%)
No	55 (68.8%)
Current clinical diagnosis of post traumatic stress disorder (PTSD; *N*/%)	
Yes	18 (2.6%)
No	665 (97.2%)
Prefer not to say	1 (0.1%)
Timing of diagnosis (*N*/%)[a]	
Before pregnancy	18 (100.0%)
During pregnancy	0 (0.0%)
Prescribed medication for diagnosis (*N*/%)[a]	
Yes	2 (11.1%)
No	16 (88.9%)
Weeks of gestation (M ± SD)	33.68 ± 3.69
Complications during pregnancy at the time of questionnaire completion (*N*/%)	
Yes	159 (23.2%)
No	523 (76.5%)
Prefer not to say	2 (0.3%)
Parous	375 (54.8%)
Nulliparous	309 (45.2%)
Number of other children (excl. current pregnancy; *N*/%)[a]	
One	272 (72.5%)
Two	79 (21.1%)
Three	20 (5.3%)
Four	2 (0.5%)
Five	2 (0.5%)
Multiple pregnancy (*N*/%)	
Yes	4 (0.6%)
No	680 (99.4%)
Planned mode of feeding (*N*/%)	
Exclusively breastfeeding (100%)	378 (55.3%)
Predominantly breast milk (over 80%) with a little formula milk (under 20%)	122 (17.8%)
Mainly breast milk (50–80%) with some formula	32 (4.7%)
A combination of both breast milk (50%) and formula milk (50%)	48 (7.0%)
Mainly formula milk (50–80%) with some breast milk	12 (1.8%)
Predominantly formula milk (over 80%) with a little breast milk (under 20%)	15 (2.2%)
Exclusively formula feeding (100%)	77 (11.3%)
Planned mode of delivery (*N*/%)	
Vaginal birth	580 (84.7%)
Caesarean section (C-section)	104 (15.2%)

[a]Only participants who answered "yes" to the above question are included here.

≥13 on the EPDS which is indicative of clinically relevant depression during the antenatal period. See Figure 3. Mean EPDS scores for participants who met the clinical cutoff of ≥13 were $M = 16.98$ (SD = 3.46), whereas scores for those who did not meet clinical cutoff were $M = 7.90$ (SD = 3.06). A comparison of clinically relevant antenatal depression in this study comparative to pre-pandemic prevalence rates can be seen in Figure 4.

128 (18.7%) of women reported a current, clinical diagnosis of anxiety, however 466 (68.1%) reported a score of ≥40 on the STAI-S which is indicative of clinically relevant anxiety during this period. See Figure 3.

Table 3. Descriptive statistics for psychosocial variables and COVID-19-specific questions ($N = 684$).

EPDS	12.24 ± 5.59
STAI-S	47.27 ± 14.08
PRAQ-R2	25.26 ± 7.86
PAI	61.59 ± 11.89
MSPSS	69.85 ± 12.46
RQ[a]	38.76 ± 5.59
SAPS	18.06 ± 3.53
COVID-19-specific change (change occurred = yes; *N*/%)	
EPDS	424 (62.0%)
STAI-S	562 (82.2%)
PRAQ-R2	327 (47.8%)
PAI	205 (30.0%)
MSPSS	296 (43.3%)
RQ[a]	225 (35.0%)
SAPS	354 (51.8%)
How was change experienced (mean/SD; 1 = less so to 10 = more so)[b]	
EPDS	6.83 ± 1.90
STAI-S	5.96 ± 2.25
PRAQ-R2	7.43 ± 1.84
PAI	5.49 ± 2.10
MSPSS	6.70 ± 2.25
RQ[a]	4.77 ± 2.52
SAPS	6.68 ± 2.09

[a]N = 642 as this only includes participants married/living with a partner.
[b]Only includes participants who answered yes to the previous question.

Mean STAI-S scores for those who met the clinical cut-off of ≥40 were $M = 54.71$ (SD = 10.09), whilst scores for those who did not meet the criteria were $M = 31.36$ (SD = 5.68). A comparison of clinically relevant antenatal anxiety in this study comparative to pre-pandemic prevalence rates can be seen in Figure 4.

Examining sociodemographic factors and psychosocial change as a result of the introduction of social distancing measures as risk factors for clinically relevant antenatal depression

The final regression model was significant, correctly identifying 73.5% of cases: Cox and Snell $R^2 = .28$, $\chi^2(7) = 148.08$, $p < .001$. Step one (clinical diagnoses of anxiety and depression) was statistically significant (Cox & Snell $R^2 = .06$; $\chi^2(2) = 39.07$, $p < .001$). Only clinical diagnosis of anxiety (OR = 0.53, 95%CI 0.311 to 0.897) and clinical diagnosis of depression (OR = 0.29, 95%CI 0.135 to 0.616) were significant individual predictors.

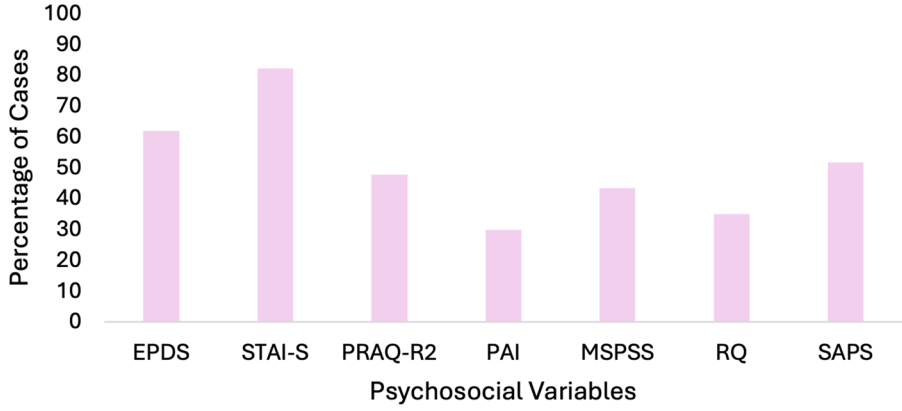

Figure 1. Percentage of women who felt their psychological feelings or social relationships had been affected by the introduction of social distancing measures.

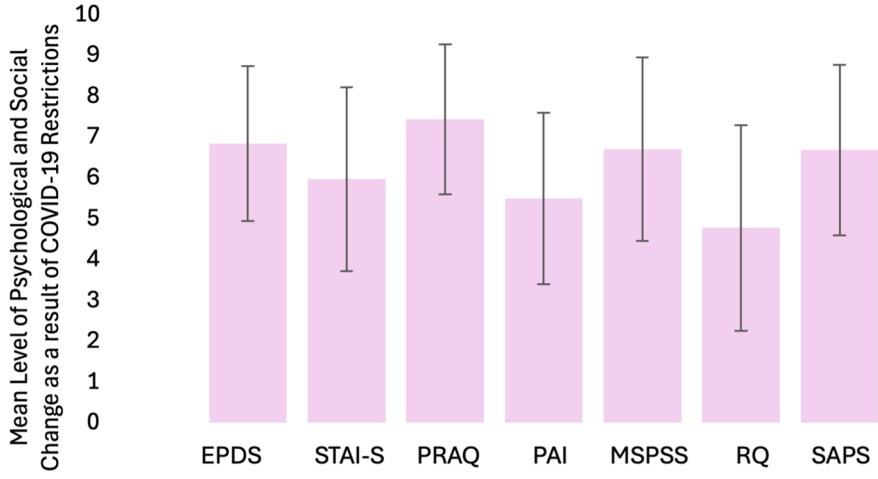

Figure 2. Level of psychosocial change occurring as a result of COVID-19 restrictions. Error bars represent SD.

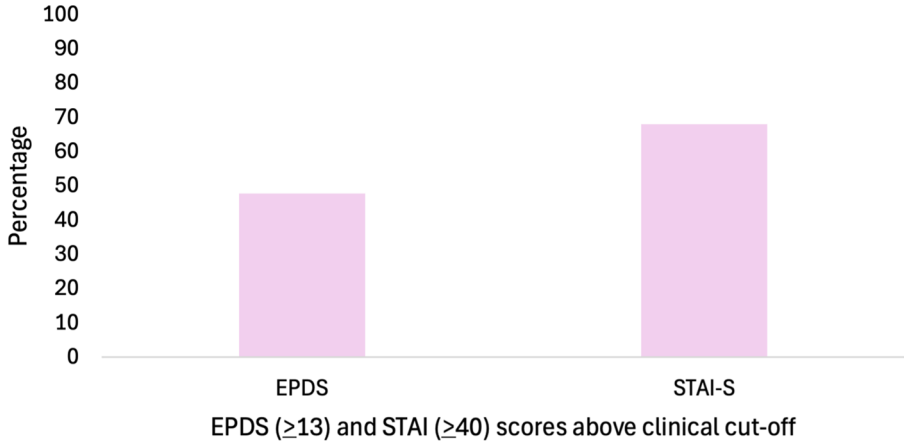

Figure 3. Percentage of mothers scoring above the clinical cutoff for the EPDS and STAI-S.

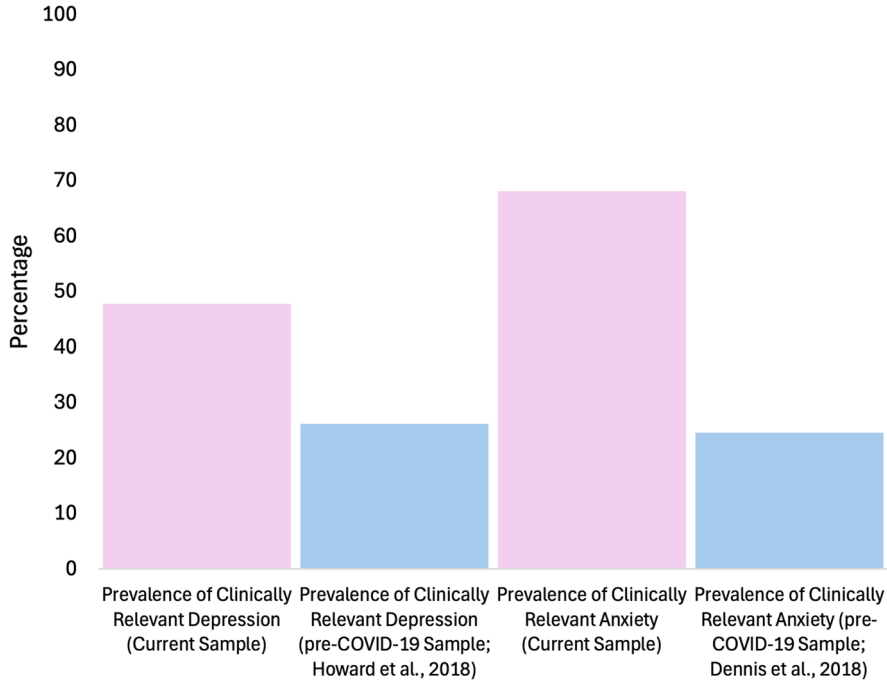

Figure 4. Prevalence of clinically relevant depression and anxiety compared to pre-pandemic estimates.

Step two (maternal age, gestational age, marital status, housing situation, occupation, highest educational attainment, pregnancy complications, planned mode of feeding, occupant number) was statistically significant (Cox & Snell R^2=.09; $\chi^2(9)$=17.30, p=.044). Clinical diagnoses of depression (OR = 0.30, 95% CI 0.139 to 0.655) was the only significant individual predictor. Step three (psychosocial change variables as a result of COVID-19 restrictions) was also significant (Cox & Snell R^2=.28; $\chi^2(7)$=148.08, p<.001). Clinical diagnosis of depression (OR = 0.25, 95%CI 0.103 to 0.604), change in depressive symptoms (OR = 0.17, 95%CI 0.108 to 0.281), change in pregnancy-related anxiety (OR = 0.50, 95%CI 0.333 to 0.754), and change in social support (OR = 0.64, 95%CI 0.431 to 0.959) were significant individual predictors. See Table 4.

Examining sociodemographic factors and psychosocial change as a result of the introduction of social distancing measures as risk factors for clinically relevant antenatal anxiety

The final regression model was significant correctly identifying 76.3% of cases: Cox and Snell R^2=.27, $\chi^2(7)$=119.77, p<.001. Step one (clinical diagnoses of anxiety and depression) was statistically significant (Cox & Snell R^2=.06; $\chi^2(2)$=36.20, p<.001) Clinical diagnosis of anxiety (OR = 0.22, 95%CI 0.101 to 0.463) and clinical diagnosis of depression (OR = 0.73, 95%CI 0.276 to 1.920) were significant individual predictors. Step two (maternal age, gestational age, marital status, housing situation, occupation, highest educational attainment, pregnancy complications, planned mode

Table 4. Hierarchical logistic regressions examining sociodemographic factors and psychosocial change as a result of the introduction of social distancing measures as risk factors for clinically relevant antenatal depression and anxiety.

Clinically relevant depression[a]									
	Step 1			Step 2			Step 3		
Variables	B(SE)	OR	95% CI	B(SE)	OR	95% CI	B(SE)	OR	95%CI
Step 1									
Current clinical diagnosis of anxiety (yes/no)	−0.64(0.27)	**0.53**	0.311 to 0.897	−0.47(0.28)	0.62	0.359 to 1.079	−0.53(0.33)	0.59	0.309 to 1.127
Current clinical diagnosis of depression (yes/no)	−1.24(0.39)	**0.29**	0.135 to 0.616	−1.20(0.40)	**0.30**	0.139 to 0.655	−1.39(0.45)	**0.25**	0.103 to 0.604
Step 2									
Maternal age				−0.04(0.02)	0.97	0.927 to 1.006	−0.03(0.02)	0.97	0.928 to 1.109
Week of gestation				−0.04(0.02)	0.96	0.915 to 1.003	−0.04(0.03)	0.96	0.908 to 1.008
Marital status (married/other)				<0.01(0.19)	1.00	0.696 to 1.437	0.20(0.21)	1.22	0.805 to 1.855
Housing status (own home/other)				−0.11(0.20)	0.90	0.604 to 1.340	−0.14(0.23)	0.87	0.555 to 1.372
Occupation (professional occupation/other)				−0.19(0.19)	0.83	0.572 to 1.199	−0.27(0.22)	0.77	0.502 to 1.165
Educational attainment (undergraduate degree/other)				0.15(0.18)	1.16	0.816 to 1.647	0.26(0.21)	1.30	0.869 to 1.940
Pregnancy complications (yes/no)				−0.25(0.21)	0.78	0.517 to 1.167	−0.07(0.24)	0.94	0.585 to 1.498
Planned mode of feeding (exclusively breastfeeding/other)				−0.18(0.18)	0.84	0.589 to 1.187	−0.24(0.21)	0.79	0.526 to 1.174
Occupant number				0.17(0.10)	1.19	0.972 to 1.448	0.17(0.11)	1.18	0.944 to 1.478
Step 3									
Change in depression (absent/present)							−1.75(0.24)	**0.17**	0.108 to 0.281
Change in anxiety (absent/present)							−0.15(0.34)	0.86	0.442 to 1.675
Change in pregnancy-related anxiety (absent/present)							−0.69(0.21)	**0.50**	0.333 to 0.754
Change in prenatal attachment (absent/present)							−0.39(0.22)	0.68	0.439 to 1.056
Change in social support (absent/present)							−0.44(0.20)	**0.64**	0.431 to 0.959
Change in relationship quality (absent/present)							−0.12(0.21)	0.89	0.590 to 1.337
Change in satisfaction with care (absent/present)							−0.13(0.20)	0.88	0.592 to 1.299
Clinically relevant anxiety[b]									
	Step 1			Step 2			Step 3		
Variables	B(SE)	OR	95% CI	B(SE)	OR	95% CI	B(SE)	OR	95%CI
Step 1									
Current clinical diagnosis of anxiety (yes/no)	−1.53(0.39)	**0.22**	0.101 to 0.463	−1.37(0.41)	**0.25**	0.114 to 0.567	−1.66(0.46)	**0.19**	0.077 to 0.471
Current clinical diagnosis of depression (yes/no)	−0.32(0.50)	0.73	0.276 to 1.920	−0.12(0.52)	0.89	0.322 to 2.453	.07(0.57)	1.08	0.351 to 3.302
Step 2									
Maternal age				−0.04(0.02)	0.96	0.916 to 1.001	−0.04(0.03)	0.96	0.916 to 1.103
Week of gestation				−0.04(0.03)	0.96	0.915 to 1.008	−0.03(0.03)	0.97	0.919 to 1.026
Marital status (married/other)				−0.33(0.20)	0.72	0.488 to 1.070	−0.18(0.23)	0.84	0.537 to 1.300
Housing status (own home/other)				0.11(0.22)	1.11	0.721 to 1.713	0.13(0.25)	1.14	0.700 to 1.858
Occupation (professional occupation/other)				−0.30(0.20)	0.74	0.503 to 1.093	−0.41(0.22)	0.67	0.430 to 1.034
Educational attainment (undergraduate degree/other)				0.04(0.19)	1.04	0.715 to 1.500	0.04(0.21)	1.04	0.686 to 1.576
Pregnancy complications (yes/no)				−0.38(0.24)	0.69	0.432 to 1.089	−0.26(0.27)	0.77	0.458 to 1.295
Planned mode of feeding (exclusively breastfeeding/other)				−0.20(0.19)	0.82	0.559 to 1.191	−0.29(0.22)	0.75	0.491 to 1.148
Occupant number				0.39(0.12)	**1.48**	1.164 to 1.881	0.39(0.14)	**1.47**	1.130 to 1.924
Step 3									

(*Continued*)

Table 4. Continued.

	Clinically relevant depression[a]								
	Step 1			Step 2			Step 3		
Variables	B(SE)	OR	95% CI	B(SE)	OR	95% CI	B(SE)	OR	95%CI
Change in depression (absent/present)							−1.10(0.23)	**0.33**	0.212 to 0.525
Change in anxiety (absent/present)							−0.77(0.29)	**0.46**	0.262 to 0.819
Change in pregnancy-related anxiety (absent/present)							−0.37(0.23)	0.69	0.443 to 1.086
Change in prenatal attachment (absent/present)							−0.26(0.25)	0.78	0.473 to 1.271
Change in social support (absent/present)							−0.85(0.22)	**0.43**	0.276 to 0.661
Change in relationship quality (absent/present)							−0.33(0.23)	0.72	0.456 to 1.141
Change in satisfaction with care (absent/present)							−0.17(0.21)	0.84	0.558 to 1.275

[a]Note for depression analyses. R^2 (step 3)=.28 (Cox & Snell); .38 (Nagelkerke). Step 1 block χ^2=39.07, df = 2, p<.001. Step 2 block χ^2=17.30, df = 9, p=.044. Step 3 block χ^2=148.08, df = 7, p<.001. SE: standard error; CI: confidence interval. Significant (p<.05) odds ratios (OR) are indicated in bold. Current diagnosis coded as 0 = yes, 1 = no; presence of change coded as 0 = yes, 1 = no.
[b]Note for anxiety analyses. R^2 (step 3)=.27 (Cox & Snell); .37 (Nagelkerke). Step 1 block χ^2=36.20, df = 2, p<.001. Step 2 block χ^2=32.60, df = 9, p<.001. Step 3 block χ^2=119.77, df = 7, p<.001. SE: standard error; CI: confidence interval. Significant (p<.05) odds ratios (OR) are indicated in bold. Current diagnosis coded as 0 = yes, 1 = no; presence of change coded as 0 = yes, 1 = no.

of feeding, occupant number) was also significant (Cox & Snell R^2=.11; $\chi^2(9)$=32.60, p<.001). Clinical diagnoses of anxiety (OR = 0.25, 95% CI 0.280 to 0.957), clinical diagnoses of depression (OR = 0.22, 95%CI 0.114 to 0.567) and occupant number (OR = 1.48, 95%CI 1.164 to 1.881) were significant individual predictors. Step three (psychosocial change variables as a result of COVID-19 restrictions) was also significant (Cox & Snell R^2=.27; $\chi^2(7)$=119.77, p<.001). Clinical diagnosis of anxiety (OR = 0.19, 95%CI 0.077 to 0.471), occupant number (OR = 1.47, 95%CI 1.130 to 1.924), change in depression (OR = 0.33, 95%CI 0.212 to 0.525), change in anxiety (OR = 0.46, 95%CI 0.262 to 0.819) and change in social support (OR = 0.43, 95%CI = 0.43, 95%CI 0.276 to 0.661) were significant individual predictors. See Table 4.

Discussion

This study first aimed to explore the psychosocial experiences of UK pregnant women during initial government "lockdown" restrictions in the COVID-19 pandemic. Descriptive findings from the overall sample indicated a high percentage of mothers self-reported psychological and social changes as a result of the introduction of social distancing measures and all changes other than pregnancy-related anxiety and satisfaction with care, were significant. Importantly, a significant proportion of a change in state anxiety was reported, which may reflect the widespread situational concern about the COVID-19 pandemic and related social distancing measures. These findings are expected given the previously discussed effects of COVID-19 measures on perinatal mental health [4], limited social support and interaction [2], fear of exposure and hospitalization [3] and disruptions to prenatal care and maternity resources [1]. However, relationship quality was not negatively impacted by social distancing measures. This may be explained by the fact couples might have prospered as a result of the pandemic as they valued the social distancing measures as a way to rekindle and deepen their relationship [27].

The secondary aim of the study was to examine the prevalence rates of clinically relevant prenatal maternal depression and anxiety. In the current study, 47.8% of participants exceeded the cutoff for clinically relevant depression and 68.1% exceeded the cut off for clinically relevant anxiety. Additionally, the rates of prenatal depression and anxiety during the pandemic in the current study were significantly higher than the prevalence of clinically relevant depression and anxiety using the same measures in pre-pandemic cohorts (26.2%; [25] and 24.6%; [7], respectively). They were also higher than in the postnatal companion study [14]. After accounting for current clinical diagnoses of depression or anxiety and demographic factors known to influence mental health, only perceived psychological change occurring as a result of the introduction of social distancing measures predicted unique variance in the risk of clinically relevant maternal depression and anxiety.

These high rates of clinically relevant anxiety and depression may be understood by the fact that many mothers predominantly obtained mental health information *via* online sources. Although telehealth is often a viable alternative during health crises, this meant many mothers did not receive appropriate diagnosis, treatment and intervention throughout the pandemic [28].

Strengths, limitations and future directions

This study was cross-sectional in nature due to the rapid progression of COVID-19, therefore precluding causality as all comparisons to pre-pandemic data were made using cohorts already published.

In regard to future health crises, this study highlights the importance of considering pregnant women as a high-priority group and ensuring prenatal care remains accessible and uninterrupted, given the psychosocial risk of this population. Future research endeavors should also continue to identify the populations at risk of poor psychosocial outcomes as a result of a health crises.

Conclusion

This study provides a UK-wide report of psychosocial experiences in pregnancy during the COVID-19 pandemic and insight into how psychosocial experiences have changed in relation to the introduction of social distancing measures. Through acknowledgment of the current study's findings, this will enable better preparation to ensure maternal mental health is addressed and protected during future health crises. Specifically, this study provides information for clinicians, funders, policy makers and researchers, to inform the immediate next steps in perinatal research, policy and care in the event of a pandemic or other infectious disease outbreak in the future.

Ethical statement

The study received full ethical approval from the University of Liverpool Institute of Population Health Research Ethics Committee (ref:7630). All aspects of the study were conducted in accordance with the latest version of the Declaration of Helsinki. Informed consent was gained electronically via a form on Qualtrics prior to the beginning of the questionnaire, and all participants were fully debriefed on completion of the study.

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Data availability statement

Data are available upon reasonable request.

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