Women and Birth 35 (2022) 232–241

Contents lists available at ScienceDirect

Women and Birth

journal homepage: www.elsevier.com/locate/wombi

Perceived social support and prenatal wellbeing; The mediating effects of loneliness and repetitive negative thinking on anxiety and depression during the COVID-19 pandemic

Virginia Harrison[a,*], Michelle L. Moulds[b], Katie Jones[a]

[a] The Open University, Walton Hall, Milton Keynes, MK7 6AA, United Kingdom
[b] The University of New South Wales, UNSW Sydney, Australia

ARTICLE INFO

Article history:
Received 26 August 2020
Received in revised form 6 November 2020
Accepted 25 December 2020

Keywords:
Prenatal
Anxiety
Depression
Repetitive negative thinking
Social support
Loneliness

ABSTRACT

Problem: Prenatal depression and anxiety are linked to poor maternal and infant outcomes. We need to understand predictors of poor mental health to identify at-risk women, and targets for support.
Background: Previous research has demonstrated a relationship between low levels of perceived social support, and depression and anxiety in pregnant women. However, there is a lack of research into the factors that may mediate this relationship.
Aim: As social distancing measures (e.g., lockdown) are likely to negatively affect women's perceived support in the prenatal period, we investigated the relationship between perceived social support and both anxiety and depression in UK-based pregnant women during the COVID-19 pandemic. Further, we examined two potential mediators that may contribute to psychological symptoms: repetitive negative thinking and loneliness.
Methods: We administered a battery of online measures to a sample of pregnant women ($N = 205$) between May-June 2020, during the first peak of the pandemic in the UK, when perceived social support was likely to be low.
Results: Consistent with predictions, perceived social support was significantly negatively related to depression, anxiety, loneliness and repetitive negative thinking. Furthermore, repetitive negative thinking and loneliness mediated the relationship between perceived social support and both depression and anxiety. Moreover, perceived social support and loneliness were associated with specific types of online behaviours.
Conclusions: Taken together, the findings shed light on the processes through which social support may exert its effects on depression and anxiety and highlight potential therapeutic targets for interventions which aim to prevent and treat mood disorders in perinatal cohorts.

Statement of Significance

Problem

Prenatal depression and anxiety are linked to poor maternal and infant outcomes. We need to understand predictors of poor mental health in order to identify at-risk women, and targets for support.

What is Already Known

Pregnant women with lower perceived social support experience more depression and anxiety symptoms. However, there is little research into the factors that may mediate this relationship. Loneliness and repetitive negative thinking (RNT) are potential mediators that are associated with all three variables.

What this Paper Adds

A new mediation model of the relationship between perceived social support and anxiety and depression. The identification of potential strategies (focusing on support, loneliness and RNT) to support prenatal wellbeing.

Abbreviations: EPDS, Edinburgh Postnatal Depression Scale; MPSS, Multidimensional Scale of Perceived Social Support; PASS, Perinatal Anxiety Screening Scale; RNT, Repetitive Negative Thinking; RTQ-10, Repetitive Negative Thinking Questionn.

* Corresponding author.
E-mail address: gini.harrison@open.ac.uk (V. Harrison).
@GiniHarrison
(V. Harrison) @MichelleMoulds (M.L. Moulds) @Katie_Jones2 (K. Jones)

http://dx.doi.org/10.1016/j.wombi.2020.12.014
1871-5192/

Introduction

The perinatal window is a high-risk period for maternal mental health. One in four pregnant women report mental health problems [1], and both depression [2] and anxiety [3] are prevalent in the perinatal period. Psychological wellbeing is critical to expectant mothers' capacity to care for themselves and their unborn child, and poor perinatal mental health has a host of adverse consequences for offspring both immediately and in the long term [4–6].

The COVID-19 pandemic of 2020 had a significant impact in the UK, in terms of the number of COVID-19 cases, mortality rate across the population, and the substantial strain imposed on healthcare services. In addition, the pandemic brought with it multiple stressors and potential risk factors for poor mental health, including fear of contracting the virus and its consequences, and concerns about the health of vulnerable family members [7,8]. For pregnant women (classed as 'vulnerable'), these stressors were likely compounded by worries about the potential consequences of contracting the virus on the foetus (which still remain unknown), as well as general concerns about access to healthcare and support [9–12]. Indeed, almost half of the pregnant responders in a large survey conducted in the UK during the first peak of the pandemic reported concerns about access to healthcare, and less than one-third of perinatal respondents (including pregnant women and postnatal parents) felt confident that mental health support would be available should they need it [12]. Lockdown periods (instituted to mitigate the spread of the virus) resulted in both physical and social isolation, and thus likely reduced levels of apparent social support [7,13]. This situation may have disproportionately affected pregnant women, for whom a lack of social support has been identified as a common source of distress [14] and an important correlate of psychological wellbeing [15]. Furthermore, restrictions on movement led some hospitals to prohibit partners attending antenatal check-ups, which may have further exacerbated a sense of lack of support. Thus, it is important to understand how a potential reduction in perceived social support may have impacted the psychological wellbeing of perinatal women during lockdown.

While there is emerging evidence of increases in perinatal depression and anxiety during the global pandemic [16–19], we still know relatively little about the predictors of psychological wellbeing of pregnant women in the context of COVID-19. However, a growing body of evidence suggests that social support is related to psychological wellbeing in the perinatal period [20] and previous studies have highlighted low levels of perceived social support as a risk factor for depression and anxiety in pregnant women (for review see Biaggi et al. [15]) - although Milgrom et al. [21] found that this relationship was stronger for depression than anxiety. Given that lockdown restrictions limited access to social support at a critical time for pregnant women, it is important to understand the relationship between perceived social support and symptoms of anxiety and depression during this period, as well as the psychological processes underpinning this association. In particular, understanding the way in which potentially modifiable cognitive factors may mediate the relationship between social support and psychological symptoms has scope to highlight potential targets for evidence-based prevention and treatment approaches, both during the pandemic and beyond.

One such factor is loneliness - defined as "a distressing feeling that accompanies the perception that one's social needs are not being met by the quantity or especially the quality of one's social relationships" [22]. Previous research has found that loneliness is strongly associated with depression [23] and anxiety [24]. While few studies have focused on perinatal loneliness [25,26], there is some evidence that these associations are also present in antenatal and postnatal periods [27]. Loneliness has also been hypothesised as a mediator by Stroebe et al. [28], who found that social support influences wellbeing through a dual pathway of emotional and social loneliness. Furthermore, loneliness is associated with negative perceptions of social interactions and hypervigilance for social threat information [29,30]. Thus, those with lower perceived social support may have an increased level of loneliness, which may lead to negative social and cognitive biases which, in turn, may reinforce and foster negative feelings and behaviours associated with depression and anxiety [31]. However, to our knowledge, no data currently exist regarding the extent to which women experienced loneliness in the perinatal period during the pandemic, and whether levels of loneliness mediate the relationship between perceived social support and depression and anxiety during this time.

Repetitive negative thinking (RNT) is another potential mediator. RNT refers to thinking that is negative, perseverative, and difficult to control, and includes rumination (repetitive thinking about the past) and worry (repetitive thinking about the future) [32]. There is growing evidence that RNT predicts perinatal anxiety and depression [33,34]. For example, Schmidt et al. [35] found that RNT in the first trimester predicted depression levels in the third trimester, while Barnum et al. [36] reported that RNT in the third trimester predicted changes in depression symptoms from the third trimester to eight weeks postpartum. O'Mahen et al. [37] found that RNT interacted with levels of social functioning to predict postpartum depression symptoms. However, more research is needed to determine its relationship with anxiety in this period.

Outside of the perinatal context, associations have been found between RNT (i.e. rumination) and anxiety [38], depression and reduced social support [39]. These combined observations are consistent with the hypothesis that RNT might mediate the relationship between social support and depression and anxiety. For example, previous research has suggested that one pathway through which social support may exert its effects on wellbeing is via rumination, such that those with lower levels of social support may be more likely to engage in ruminative thoughts [40]. Indeed, there is evidence that RNT mediates the association between peer relationships and depression [39]. In addition, RNT mediates the relationship between loneliness and depression in other cohorts during transitional periods (for example, college students [41,42]), suggesting that loneliness and RNT may be serial mediators between perceived social support and depression. However, their role in anxiety is unclear. As far as these authors are aware, this is the first study to investigate a serial mediation model using loneliness and RNT as mediators in these relationships.

Lockdown may represent a particularly high-risk period for increased RNT amongst perinatal women, given the level of uncertainty around both childbirth and perinatal care [10], and limited social contact [13] during the pandemic. Furthermore, some researchers have suggested the combination of isolation-related confinement and the general uncertainties that accompany COVID-19 may have led to an increased risk of domestic violence [43,44], which is also likely to be associated with both significant mental health consequences, and RNT. For example, ruminative thinking has been found to occur when there is a discrepancy between an idealised or desired state and one's actual experience [45], and in times of uncertainty. For example, Nolen-Hoeksema (2000) found that participants' rumination often reflected the uncertainty (or lack of control) they felt about their situation. Lockdown restrictions resulted in significant uncertainty and practical disruption for pregnant women (e.g., changes to antenatal appointments, restrictions on partners attending the birth, altered birth plans and a lack of birth preparation classes [46];), potentially fuelling RNT and leading to anxiety and depression. Thus, the extent to which RNT

during the COVID-19 pandemic had an impact on perinatal depression and anxiety warrants investigation.

Social media and online forums have increased in popularity in recent years for expectant and new mothers, as a means to gather information (e.g., internet searches on sleep, feeding etc) and engage with other expectant/new mothers [47,48]. In the context of lockdown and social isolation, we expected these behaviours to increase to fill their social support needs. However, we do not know about the nature and frequency of such technology use and online behaviours by women in the perinatal period during the pandemic; nor do we know whether there is an association between loneliness, perceived levels of social support and online behaviours in this population.

With these gaps in mind, we conducted an online survey targeting a sample of pregnant women during the COVID-19 pandemic. Our primary aim was to explore the interrelationships of perinatal psychological wellbeing (i.e., depression, anxiety), perceived social support, loneliness, and RNT. In particular, we sought to determine whether perceived social support was associated with psychological symptoms, and if so, whether RNT and loneliness mediated this association. We hypothesised that (i) lower levels of perceived social support would be associated with higher depressive and anxiety symptoms; (ii) that higher levels of loneliness and RNT would be associated with higher depression and anxiety symptoms; and (iii) RNT and loneliness would mediate the relationship between perceived social support and both depression and anxiety. Our secondary aim was to investigate how COVID-19 affected perceived social support, and the mechanism(s) through which pregnant women sought support to mitigate effects of isolation and loneliness. We therefore examined the use of technology to facilitate social contact and support as well as exploring the relationship between loneliness and technology use/online behaviour.

Method

Participants and procedure

We recruited a convenience sample of participants using a combination of advertising on mum-focused social media sites and forums (including MumsNet, NetMums and local mum and baby Facebook groups), advertising through digital newsletters from companies providing services to mothers, and via online participant recruitment using Prolific. Inclusion criteria included: women who were (1) pregnant; (2) aged 18 and over; (3) living in the UK; and (4) fluent in English. Participants who expressed interest were directed to the online study information sheet and consent form. Participants who completed the questionnaire were entered into a prize draw to win one of three £20 Amazon vouchers.

Participants ($N = 205$) answered the questionnaires anonymously online between 1st May and 1st June 2020. All participants reported demographic data and completed five standardized measures described below. Participants' knowledge about COVID-19, adherence to government guidelines and perception of risk were measured using Likert-type scales (higher scores reflecting greater knowledge, adherence, risk perception, respectively; see Table 1 for means).

Measures

The *Edinburgh Postnatal Depression Scale (EPDS)* is a 10- item self-report measure of perinatal depressive symptoms [49]. Respondents rate the extent to which each item applied to them over the past week using a 4-point Likert scale. Scores over 10 indicate probable perinatal depression, with higher scores indicating higher levels of symptoms. Cronbach's $\alpha = 0.87$, indicates high reliability [49].

The *Perinatal Anxiety Screening Scale (PASS)* is a 31-item measure of perinatal anxiety symptoms [50]. Scores range from 0 to 93; scores between 21–41 indicate mild-moderate anxiety, and scores between 42–93 suggest severe symptoms [51]. It possesses excellent construct validity and reliability (Cronbach's $\alpha = 0.96$ [50];).

The *Repetitive Negative Thinking Questionnaire (RTQ-10)* [52,53] is a 10-item transdiagnostic measure of RNT. Respondents rate items about their thinking following a distressing event on a 5-

Table 1
Demographic information.

	Pregnant women (N = 205) n (%)
Age	
18–24	13 (6.3)
25–34	129 (62.9)
35–44	63 (30.7)
Education	
None	2 (1.0)
GCSEs or equiv	13 (6.3)
A Levels or equiv	39 (19.0)
UG degree	78 (38.0)
PG degree	69 (33.7)
Other	3 (1.5)
Relationship	
Married or cohabiting	197 (96.1)
Single	4 (2.0)
Non-cohabiting partner	3 (1.5)
Living arrangements	
Living alone with child/ren	197 (96.1)
Live with partner and child/ren	4 (2.0)
Live with partner and no children	3 (1.5)
Employment	
Full-time employment	85 (41.5)
Part-time employment	38 (18.5)
Self-employed	12 (5.9)
Studying	4 (2.0)
On maternity or sick leave	20 (9.8)
Furlough	25 (12.2)
Not in paid employment	21 (10.2)
Ethnicity	
White	186 (90.7)
Mixed or multiple ethic groups	8 (3.9)
Asian or Asian British	6 (3.0)
Black / African / Caribbean / Black British	4 (2.0)
Other ethic group	1 (0.5)
Recruitment	
Social media	151 (73.7)
Prolific	54 (26.3)
Pregnancy Status (N = 158)[a]	
First time mothers	93 (58.7)
Mothers with existing children	65 (41.1)
Trimester	
1st	70 (34.1)
2nd	69 (33.7)
3rd	66 (32.2)
COVID-19 (scale min-max)	**Mean (SD)**
Knowledge (1–10)	8.34 (1.14)
Following recommendations (1–7)	6.58 (.76)
Risk of illness (1–7)	3.64 (1.61)

[a] Due to an error, pregnancy information was only collected from 158 participants.

point Likert-type scale; higher scores indicate more RNT. The RTQ-10 has very high internal consistency (α = .89 [49]).

The *Multidimensional Scale of Perceived Social Support* (MSPSS) [54] is a 12-item self-report measure in which participants indicate their perception of support from friends, family and a significant other along a seven-point Likert scale from 1 (very strongly disagree) to 7 (very strongly agree). A Cronbach's α of 0.92 has previously been reported in a perinatal cohort [55].

The *de Jong Gierveld Loneliness Scale* (short form) is a six-item scale used to assess loneliness [53]. Scores range from 0 (not lonely) to 6 (extremely lonely). The Cronbach's α coefficients for the 6-item loneliness scale vary from 0.70 and 0.76 for the total adult population [56].

In addition, demographic information was collected alongside information about how COVID-19 affected participants' access to social support, their use of technology to access support during lockdown, and their opinions and worries about COVID-19 in general.

Ethics

The study received ethical approval from the Open University's Human Research Ethics Committee and online informed consent was obtained from all participants. As asking participants to think about their feelings and circumstances had the potential to result in some participants feeling distressed, safeguarding procedures were put in place. Participants were presented with information regarding support services at the beginning and the end of the survey. Furthermore, if a participant's responses indicated particularly high anxiety or depression scores, they received an automated message within the survey which provided details of relevant mental health helplines and directed them to contact their healthcare professional.

Results

The demographic information of the participants can be seen in Table 1. For the statistical analyses, SPSS version 26 was used to perform a mediation analyses with depression and anxiety as separate outcome variables. Assumptions of normality and linearity were assessed, and the data were found to be appropriate for robust linear mediation modelling. There were no concerns about multicollinearity; that is, none of the predictors were too highly correlated (all <.9). Cook's Distance values were all less than 1, meaning that there were no influential outliers of concern.

Initial correlational analyses examined the relationships between anxiety, depression, RNT, social support, and loneliness. Descriptive statistics (mean, SD) and correlations are presented in Table 2.

There were significant correlations among all variables. Both depression and anxiety were negatively related to social support, and positively related to RTQ-10 and loneliness, supporting hypotheses (i) and (ii), and confirming the validity of the mediation analyses.

The demographic and perinatal variables in Table 1 were examined as potential covariates using a series of one-way ANOVAs and correlations, as appropriate. The only significant findings were that trimester had a significant effect on EPDS ($F(2, 202) = 4.21$, $p = .02$, $\eta_p^2 = .04$), PASS ($F(2, 202) = 6.12$), $p = .003$, $\eta_p^2 = .06$) and RTQ ($F(2, 202) = 4.50$, $p = .01$, $\eta_p^2 = .04$). In all cases, post hoc comparisons showed that this was due to significantly lower scores in the second trimester, compared to the third (all $ps < .01$).

Furthermore, probable mental health issues were determined using defined cut-offs for the PASS (≥26) [51] and EPDS (≥13) [49]. 48.8% of participants scored above the cut-off for anxiety, compared to 45.4% for depression.

Depression

A serial mediation model was used to test the roles of loneliness and RNT in mediating the relationship between social support and depression, with trimester (dummy coded as a categorical variable due to non-linearity) as a covariate. Fig. 1 illustrates the findings of the model. The analysis showed that the total effect of social support on depression was significant (without the mediators) (c=-.13, $SE = .03$, $t(201) = -4.81$, $p < .001$). In addition, perceived social support significantly predicted both mediators: loneliness (b_{a1} = -.06, $SE = .01$, $t(201) = -7.22$, $p < .001$) and RNT (b_{a2} = -.14, $SE = .06$, $t(200) = -2.40$, $p = .02$); and the direct effect of the first mediating variable (loneliness) on the second mediating variable (RNT) was also significant ($b_{a3} = 1.63$, $SE = .41$, $t(200) = -3.96$, $p < .001$). When perceived social support and the two mediating variables were entered sequentially into the model, the significant relationship between MPSS and depression disappeared ($c' = -.03$, $SE = .03$, $t(199) = -1.28$, $p = .20$). This result indicates that loneliness and RNT fully mediate the relationship between perceived social support and depression. Moreover, the overall model was significant ($F(5, 199) = 20.27$, $p < .001$).

The SPSS PROCESS macro model 6 [57] was used to test the significance of the indirect effects in the model using 5000 bootstrapped samples. Table 3 shows the indirect effects and their associated 95% CIs. As is typical in mediation analysis, these bootstrapped CIs were used to establish the significance of the indirect effects, such that when the upper and lower bounds of the CIs did not encompass 0, significance was inferred. As shown in the table, the total indirect effect of perceived social support through loneliness and RNT on depression (which represents the difference between total and direct effects/c-c') was significant (Total indirect = -.09, SE = .02, CI[-.13, -.06]). Furthermore, R^2 values showed that including the two mediators into the model more than doubled the variance explained by the model (R^2 mediation model = .34; R^2 total effect model = .14).

Within the tested model, when mediating variables were considered separately and together, the single mediation of loneliness (point estimate= -0.06, SE = .02, CI[-.09, -.03]) as well as the multiple-serial mediation of perceived loneliness and RNT (point estimate= -.02, SE = .01, CI[-.03, -.01]) were found to be statistically significant. However, the indirect effect through RNT alone was not (point estimate= -0.02, SE = .01, CI[-.04, .004]).

To investigate whether specific indirect pathways were stronger than each other, single and multiple mediation models were contrasted in pairs and findings are outlined in Table 3. No significant difference was found between the single mediation through loneliness versus the single mediation model through RNT. Furthermore, the single mediation of RNT was not found to be significantly different from the mediating effect through both mediators. However, the mediating role of loneliness alone was

Table 2
Intercorrelations between the five variables of interest.

	Mean	SD	EPDS	PASS	RTQ-10	MSPSS	Loneliness
EPDS	11.93	5.22	1				
PASS	28.06	15.82	.719**	1			
RTQ-10	26.56	10.35	.469**	.591**	1		
MSPSS	65.74	13.04	−.314**	−.315**	−.300**	1	
Loneliness	3.48	1.81	.478**	.411**	.384**	−.449**	1

Abbreviations: EPDS - Edinburgh Postnatal Depression Scale; MPSS - Multidimensional Scale of Perceived Social Support; PASS - Perinatal Anxiety Screening Scale; RTQ-10 - Repetitive Negative Thinking Questionnaire.
** : correlation is significant at p < .001.

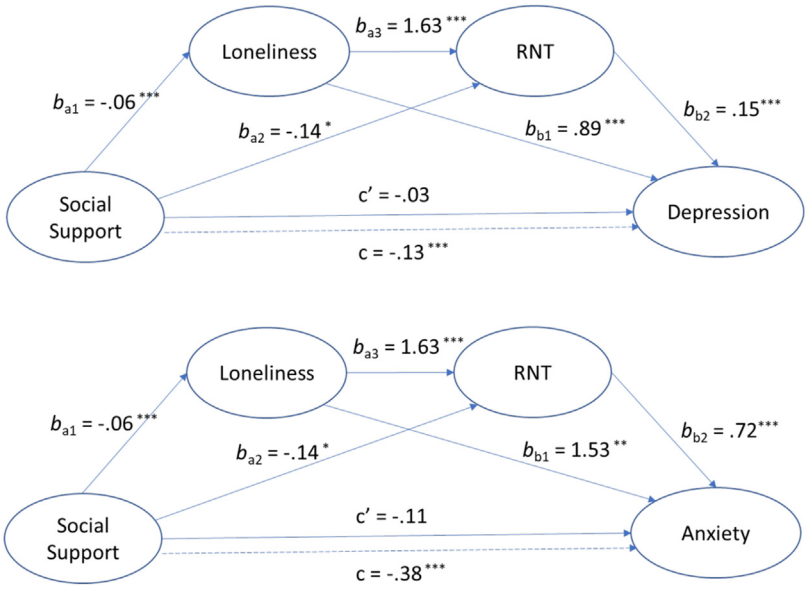

Fig. 1. Serial multiple mediation role of perceived loneliness and RNT in the relationships between perceived social support and depression and anxiety. Unstandardized beta values are reported. *p < .05, **p < .01, ***p < .001.

Table 3
Comparisons of indirect effects and specific indirect effects of perceived social support through loneliness and RNT on depression (unstandardised coefficients are reported).

	Estimated *b*	SE	Lower BCa CI	Upper BCa CI
Indirect Effects				
Total indirect effect	−.0924[a]	.0173	−.1316	−.0626
Soc Sup → Loneliness → Depression	−.0557[a]	.0165	−.0942	−.0288
Soc Sup → RNT → Depression	−.0210	.0122	−.0438	.0042
Soc Sup → Loneliness → RNT → Depression	−.0157[a]	.0075	−.0346	−.0056
Contrasts				
Model 1 vs Model 2	−.0347	.0245	−.0905	.0069
Model 1 vs Model 3	−.0400[a]	.0158	−.0739	−.0120
Model 2 vs Model 3	−.0053	.0168	−.0318	.0335

Model 1 = Soc. Supp. Loneliness Depression, Model 2= Soc. Supp. RNT Depression, Model 3= Soc. Supp. Loneliness RNT Depression.
[a] 95% CI does not include zero.

found to be stronger than the serial-multiple mediation of loneliness and RNT together.

Anxiety

Another serial mediation model was used with the same predictors and covariates, but with anxiety as the outcome variable. Statistics for the pathways from perceived social support to the mediators (b_{a1}, b_{a2}) are described above, and can be seen in Fig. 1. The pathway from the mediator loneliness to anxiety was significant (b_{b1} = 1.53, *SE* = .56, *t*(199) = 2.73, *p* = .001), as was the pathway through RNT (b_{b2} = .72, *SE* = .09, *t*(199)= -7.78, *p* < .001). In contrast, the direct effect of perceived social support on anxiety did not reach significance (*c'*= -.11, *SE* = .08, *t*(199)= -1.48, *p* = .14). Given that the total effect of social support on anxiety was significant (without the mediators) (c=-.38, *SE* = .08, *t*(201)= -4.81, *p* < .001), this suggests mediation has taken place.

Table 4
Comparisons of indirect effects and specific indirect effects of perceived social support through loneliness and RNT on anxiety (unstandardised coefficients are reported).

	Estimated *b*	SE	Lower BCa CI	Upper BCa CI
Indirect Effects				
Total indirect effect	−.2672[a]	.0563	−.3805	−.1582
Soc Sup → Loneliness → Anxiety	−.0956[a]	.0392	−.1768	−.0230
Soc Sup → RNT → Anxiety	−.0981	.0547	−.1954	.0205
Soc Sup → Loneliness → RNT → Anxiety	−.0734[a]	.0348	−.1616	−.0260
Contrasts				
Model 1 vs Model 2	.0025	.0740	−.1596	.1348
Model 1 vs Model 3	−.0222	.0494	−.1013	.0931
Model 2 vs Model 3	−.0247	.0782	−.1460	.1627

Model 1 = Soc. Supp. Loneliness Anxiety, Model 2= Soc. Supp. RNT Anxiety, Model 3= Soc. Supp. Loneliness RNT Anxiety..
[a] 95% CI does not include zero.

Again, the PROCESS bootstrapping procedures were used to test the significance of the indirect effects, and results can be seen in Table 4. As before, the total indirect effect of perceived social support through loneliness and RNT on anxiety was significant (Total indirect = -.27, SE = .06, CI[-.38, -.16]). Furthermore, R^2 values showed that including the two mediators into the model more than doubled the variance explained by the model (R^2 mediation model = .41; R^2 total effect model = .15).

Within the tested model, the single mediation of loneliness (point estimate= -0.10, SE = .04, CI[-0.18, -0.02]) as well as the multiple-serial mediation of perceived loneliness and RNT (point estimate= -0.07, SE = .03, CI[-0.16, -0.03]) were found to be statistically significant. However, the indirect effect through RNT alone was not (point estimate= -.10, SE = .05, CI[-.20, .02]).

To investigate whether specific indirect effect pathways were stronger than each other, single and multiple mediation models were contrasted in pairs and findings are outlined in Table 4. In this case, no significant differences were found between any of the indirect pathways.

COVID-19 and perceived social support

Participants were asked to indicate the importance of different sources of support during the pandemic on a scale from 1–5. Partners were rated as most important (mean = 4.97, SD = .38), followed by family (mean = 4.31, SD = .83), parent friends (mean = 3.77, SD = .97) and non-parent friends (mean = 3.64, SD = 1.02). Paired t-tests with Bonferroni corrections showed that all groups significantly differed from one another (all *ps*<.001), except parent vs non-parent friends ($p = .43$).

Participants also indicated how lockdown affected their involvement in certain social activities. Over ninety three percent (i.e., 93.7%) of participants said they had been less involved (or not involved) in antenatal classes; and 73.2% said they had had fewer (or no) conversations with groups of other mums. In contrast, 89.8% of women had seen or spoken to their family online or on the phone the same as or more than they usually would, compared to 68.8% for non-parent friends and 43.9% for parent friends. Correlations between the frequency of these social activities, perceived social support, RNT, loneliness, depression and anxiety are shown in Table 5.

Use of technology, perceived social support and loneliness

We asked participants about their general technology use, as well as their use of technology for social purposes, to gain information about parenting/pregnancy, or to access wellbeing support. In order of strength, loneliness was significantly negatively related to making/receiving traditional voice calls ($r = -.27$, $p < .001$), sending/receiving group texts ($r = -0.25$, $p < .001$), video calling individuals ($r = .-25$, $p < .001$), sending/receiving texts to/from individuals (r=-0.19, $p < .01$), video calling groups ($r = .-18$, $p < .01$), and posting photos on social media sites ($r = -0.15$, $p = .03$). General frequency of technology use, social media use, and searching for information and support were not related to feelings of loneliness. These variables were also positively related to perceived social support, along with use of apps for pregnancy/parenting information ($r = .14$, $p = .04$). Additionally, Table 5 shows increased internet searching behaviours and app usage for pregnancy/parenting and wellbeing information was associated with increased anxiety, while posting on forums was negatively related to anxious symptoms. Technology use was not significantly associated with depression, and posting photos was the only variable significantly negatively associated with RNT.

Discussion

We found negative relationships between perceived social support and depression and anxiety in a sample of women who were pregnant during the COVID-19 pandemic, indicating that women with lower levels of perceived support experienced more depressive and anxiety symptoms, in alignment with research conducted prior to the pandemic [15]. Furthermore, social support was negatively correlated with loneliness and RNT, indicating that pregnant women with lower levels of support experienced greater loneliness and engaged in more RNT.

Mediation analyses supported our hypotheses that loneliness and RNT would mediate the effect of perceived social support on

Table 5
Relationship between social contact and technology use, and key variables of interest (Spearman's *r* reported, *p < .05, **p < .01, ***p < .001).

	MSPSS	Loneliness	RTQ-10	EPDS	PASS
Social Contact					
Antenatal classes	.011	−.112	−.061	−.093	−.074
Group chats with mums	.174*	−.171*	−.175*	−.038	−.151*
Contact with family	.207**	−.150*	−.068	−.025	.016
Contact with non-parent friends	.245***	−.199**	−.031	−.126	.000
Contact with parent friends	.193**	−.186**	−.061	−.063	−.097
Technology Use					
Texting individuals	.199**	−.189**	−.104	−.055	−.094
Texting groups	.339***	−.249***	−.073	−.029	−.016
Traditional phone calls	.311***	−.266***	−.002	−.070	−.014
Video call individuals	.253***	−.246***	−.053	−.062	−.048
Video call groups	.280***	−.184**	.029	.038	.064
Browse internet	.056	.045	.069	−.022	.019
Use apps for pregnancy/parenting information	.141*	−.027	.039	.085	.169*
Use wellbeing apps	.047	−.027	.023	.070	.156*
Use other apps	.044	.013	.047	.111	.077
Search internet for pregnancy/parenting information	.090	−.005	.121	.047	.174*
Search internet for wellbeing support/information	.046	−.111	.105	.044	.164*
Search internet for any other purpose	−.015	−.033	.082	−.025	.050
Read posts on large online forums	.053	−.064	−.015	−.006	.011
Actively post on large online forums	.096	−.109	−.136	−.127	−.170*
Engage with smaller group forums	.076	−.065	−.098	−.020	−.090
Check social media	.081	.016	.009	.101	.018
Post photos on social media	.154*	−.151*	−.168*	−.061	−.080
Comment on social media	.121	−.057	−.041	.025	.002

depression and anxiety, as the pathways from perceived support to both depression and anxiety via loneliness and RNT were significant, and both models achieved full mediation. This finding is consistent with previous research suggesting that poor social support may negatively impact wellbeing due to an increased likelihood of rumination [40]. Conversely, social support may help to protect against mental health issues by reducing loneliness and RNT. One potential mechanism may be that social support reduces self-focused attention, which has previously been related to loneliness [58] and is a key component of rumination [59]. This possibility is consistent with research that has suggested perceived social support may affect the coping strategies implemented in negative contexts. For example, having social support may mean that individuals are better able to talk through (and act on) their issues, which may help to prevent perseverative thinking. In contrast, the absence of such support may result in unproductive negative thought spirals, which in turn may negatively affect mood [60,61].

The serial mediation pathway through loneliness and then RNT is also consistent with previous work that has found a mediating role of RNT between loneliness and depression in university students [41]. Our findings extend this work and demonstrate that loneliness and RNT combined may mediate not only the relationship between perceived social support and depression, but also the relationship with anxiety. The breakdown of the indirect effects within the mediation model showed that the single mediation path through loneliness (but not RNT) was also significant for both depression and anxiety. The comparison of the three mediation models for depression indicated that the mediating effect of loneliness alone was stronger than the pathway through both mediators together. However, this was not the case for anxiety, suggesting the relative importance of the two mediators varies for depression and anxiety.

In terms of the COVID-19 context, our findings are consistent with evidence of elevated rates of mood disorders [16,62] as well as increased fear, loneliness and worry [10] in pregnant women during the pandemic, reinforcing concerns that COVID-19 presents a significant psychological challenge for pregnant women [13,63,64]. Participants reported high levels of psychological distress, with almost half of the sample scoring above the cut-offs for probable anxiety and depression. Furthermore, levels of social isolation and loneliness were also quite high, with 62% of participants scoring 3 or more on the de Jong Gierveld loneliness scale – suggesting that loneliness may have been particularly problematic for perinatal cohorts during the pandemic. These findings speak to the impact of the pandemic on this group and highlight the importance of screening pregnant women's mental health as part of routine antenatal care.

Given the important role of loneliness in mediating the relationship between perceived social support and depression and anxiety, it may be beneficial for future interventions to target behaviours that are associated with loneliness. Our findings suggest that some technology usage behaviours may be more effective in terms of protecting against symptoms of depression and anxiety whilst in social isolation. Specifically, using technology to make voice or video calls, or to send texts and video-call groups may be particularly helpful in this regard, while general social media, forum or internet use may not. Preventive interventions which seek to reduce the emergence of psychological symptoms in the perinatal period could potentially encourage pregnant women to maintain social contact via these means. Interestingly, correlations suggest increased internet searching behaviours and app usage for pregnancy/parenting and wellbeing information was associated with increased anxiety. We speculate that anxiety may have driven these behaviours [65], but the direction of this relationship needs to be tested in future work.

With the exception of antenatal classes (which were inaccessible to most women at the time of data-collection due to the restrictions imposed to control the pandemic), all forms of social contact were significantly negatively correlated with loneliness, and positively correlated with perceived social support. However, group contact with other mums was the only form of contact which was significantly (negatively) correlated with RNT and anxiety scores. This finding reinforces qualitative evidence of peer support being the most valued form of social support amongst women experiencing perinatal anxiety [14], and accords with evidence of perceived support from friends, but not family, being associated with a reduction in perinatal anxiety-depressive symptoms [66]. However, participants in this study rated partner support as being most important to them; possibly because it was the most readily available form of support available at the time. However, while the effects of COVID-19 on perceived social support outside of the domestic context is readily apparent (i.e., our findings indicated that access to friends, family and antenatal classes was hindered as a direct result of the pandemic), the impact of COVID-19 on support from partners is currently unclear. The exclusion of partners from pre-natal scans and appointments may have had a negative effect on perceptions of support. Conversely, partners remaining at home during the pandemic may have increased women's sense of support. As research shows that partner support is significantly related to maternal prenatal and postnatal mental health [67,68], it is possible that COVID-19 may have had a positive impact in this way. However, given the high levels of anxiety and depression seen in this study, any advantages seen from increased partner support may not have been enough to overcome the loss of support in other areas. Alternatively, it may be that the presence of partners at home during the pandemic did not, in fact, translate into more support when partners (as well as pregnant women themselves) were likely working from home – particularly in households with older children who required care, as well as home-schooling. Indeed, the increased challenges associated with having the whole family at home may have counteracted any benefit of partners physically being there. Furthermore, it is also worth considering the potential negative impact of virus containment policies on women's wellbeing, with research suggesting isolation measures have led to higher rates of domestic violence [43,44], which may also lead to significantly elevated levels of psychological distress during this period.

Implications

The findings have important applications in terms of protecting perinatal cohorts from poor mental health during the ongoing COVID-19 outbreak. Understanding how perinatal women have been affected during the recent lockdown, and the potential positive effects of specific forms of social contact, technology use and online behaviours, has the potential to guide the development of interventions to support women's recovery and reduce the long-term psychological consequences of this challenging time. Although aspects of our results (e.g., elevated levels of probable depression and anxiety) are likely to be specific to the pandemic context, the mediating relationship of RNT and loneliness may not be. Further research should explore whether this relationship is replicated in a more typical context of general perinatal wellbeing, and also consider its application in other situations in which perinatal women face extended periods of social isolation (e.g., during prescribed bedrest for pregnancy complications or during recovery from a caesarean birth). Furthermore, the strength of the relationship between RNT and both depression and anxiety symptoms indicate that RNT may be a suitable transdiagnostic target for intervention during the perinatal period. Pregnant women's tendency to engage in RNT

could be readily assessed during routine prenatal care (e.g., by administration of a brief self-report measure in the context of routine antenatal appointments with midwives). Such a simple assessment approach has the potential to identify a key psychological vulnerability, and in turn prompt a referral to relevant mental health care provider, which may circumvent fears of disclosure which reduce help seeking behaviours during the perinatal period [14,69], and help identify women at-risk of developing clinical symptoms (see Moulds et al. [34]).

Limitations

Despite these important implications, several limitations of the study should be acknowledged. First, the cross-sectional design limits the causal conclusions; nonetheless, the mediation path explored benefits from empirical and theoretical grounding. Furthermore, although rates of anxiety and depression were higher than those documented in research conducted outside of the COVID-19 pandemic [1,3] our design does not provide a comparison of measures from before and after COVID-19. As such, it is not possible to comment on the unique impact of the COVID-19 context, nor on how findings may generalise to beyond the pandemic. Second, participants lacked diversity demographically (being predominantly white, educated, over 25, and in relationships) and technologically (as all regularly used technology and were engaged in social media), restricting generalisability. Third, we note that the mean scores for depression and anxiety in our sample were relatively high for participants drawn from the community. One possibility is that the pregnant women who volunteered for this study were particularly vulnerable to experiencing psychological symptoms. However, we note that participants' levels of depression and anxiety were comparable to those reported in other studies of pregnant samples in the UK during the pandemic [12] and beyond [16,19,70]. Together, these data suggest that the pandemic had a significant impact on the mental health of pregnant women. Fourth, the variables used were self-report measures which included data on psychopathology symptoms rather than clinical disorders, however understanding such symptoms is vital to improving outcomes for women with subclinical and early manifestations of perinatal mental health disorders [71]. Additionally, self-report measures are subject to social-desirability and response biases which may impact the reliability of the data. Future replications with large community cohorts and including additional measures (e.g., structured clinical interviews) may enhance generalisability, reliability and validity.

Conclusions and future directions

Overall, the findings have important implications for interventions that seek to reduce depression and anxiety in pregnant women with low levels of perceived social support. Given the relative similarity of the findings for depression and anxiety (and the high levels of comorbidity between these symptoms, [72]), our results suggest that transdiagnostic treatment approaches which target modifiable behaviours may have utility in the perinatal period. In particular, the findings suggest that interventions to promote wellbeing may benefit from targeting RNT (e.g., by tailoring existing interventions to perinatal populations, such as that of Hirsch et al. [73]), as well as incorporating strategies to bolster social support and reduce loneliness (e.g., promoting practical social behaviours such as scheduling times to contact friends and family, or focusing on peer support models, which have an element of social support built into them), in order to prevent and reduce depression and anxiety in pregnancy. This study may be a useful resource for perinatal healthcare professionals to help them identify women at risk of anxiety and depression in the prenatal period, and create protective and preventive approaches to support them.

Ethics approval and consent to participate

The study received ethical approval from the Open University's Human Research Ethics Committee. Written consent was obtained from all participants for participation in this study.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data statement

Anonymised dataset is available upon request to corresponding author.

Conflict of interest

None

Acknowledgments

None.

References

[1] L.M. Howard, E.G. Ryan, K. Trevillion, et al., Accuracy of the Whooley questions and the Edinburgh Postnatal Depression Scale in identifying depression and other mental disorders in early pregnancy, Br. J. Psychiatry [Internet] 212 (2018) 50–56 [cited 2020 Aug 3]; Available from: /pmc/articles/PMC6457164/?report=abstract.

[2] L.M. Howard, E. Molyneaux, C.-L. Dennis, et al., Series Perinatal Mental Health 1 Non-psychotic Mental Disorders in the Perinatal Period [Internet], (2014) www.thelancet.com. [cited 2018 Dec 12]. Available from: www.thelancet.com.

[3] E.J. Fawcett, N. Fairbrother, M.L. Cox, et al., The prevalence of anxiety disorders during pregnancy and the postpartum period: a multivariate Bayesian meta-analysis, J. Clin. Psychiatry [Internet] (2019). [cited 2020 Aug 3];80. Available from: https://pubmed.ncbi.nlm.nih.gov/31347796/.

[4] R.M. Pearson, C. Fernyhough, R. Bentall, et al., Association Between Maternal Depressogenic Cognitive Style During Pregnancy and Offspring Cognitive Style 18 Years Later, Am. J. Psychiatry [Internet] 170 (2013) 434–441. [cited 2018 Dec 12]Available from: http://www.ncbi.nlm.nih.gov/pubmed/23318526.

[5] E. Netsi, R.M. Pearson, L. Murray, et al., Association of persistent and severe postnatal depression with child outcomes, JAMA Psychiatry [Internet] 75 (2018) 247–253. [cited 2020 Aug 3]Available from: https://jamanetwork.com/.

[6] S. Rees, S. Channon, C.S. Waters, The impact of maternal prenatal and postnatal anxiety on children's emotional problems: a systematic review, Eur. Child Adolesc. Psychiatry [Internet] 28 (2019) 257–280, doi:http://dx.doi.org/10.1007/s00787-018-1173-5 [cited 2020 Aug 3]Available from:.

[7] E.A. Holmes, R.C. O'Connor, V.H. Perry, et al., Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science [Internet], Lancet Psychiatry (2020) 547–560. Elsevier Ltd [cited 2020 Aug 3] Available from: www.thelancet.com/psychiatry.

[8] J.J. Van Bavel, K. Baicker, P.S. Boggio, et al., Using social and behavioural science to support COVID-19 pandemic response [Internet], Nat. Hum. Behav. Nat. Res. (2020), doi:http://dx.doi.org/10.1038/s41562-020-0884-z [cited 2020 Aug 3]. p. 460–471. Available from:.

[9] S.K. Brooks, R.K. Webster, L.E. Smith, et al., The psychological impact of quarantine and how to reduce it: rapid review of the evidence [Internet], Lancet (2020) Lancet Publishing Group; [cited 2020 Aug 3]. p. 912–920. Available from: https://doi.org/10.1016/.

[10] C. Ravaldi, A. Wilson, V. Ricca, et al., Pregnant women voice their concerns and birth expectations during the COVID-19 pandemic in Italy, Women Birth (2020).

[11] M.H. Nanjundaswamy, L. Shiva, G. Desai, et al., COVID-19-related anxiety and concerns expressed by pregnant and postpartum women—a survey among obstetricians, Arch. Womens Ment. Health [Internet] (2020), doi:http://dx.doi.org/10.1007/s00737-020-01060-w [cited 2020 Nov 6];1–4. Available from:.

[12] Best Beginnings, U.K. Home-Start, Parent-Infant Foundation. Babies in Lockdown Report: Listening to Parents to Build Back Better [Internet], (2020) https://parentinfantfoundation.org.uk/. 2020 [cited 2020 Nov 6]. Available from: https://parentinfantfoundation.org.uk/our-work/campaigning/babies-in-lockdown/.

[13] D.B. O'Connor, J.P. Aggleton, B. Chakrabarti, et al., Research priorities for the COVID-19 pandemic and beyond: a call to action for psychological science, Br. J. Psychol. [Internet] (2020), doi:http://dx.doi.org/10.1111/bjop.12468 [cited 2020 Aug 3]; Available from:.
[14] V. Harrison, D. Moore, L. Lazard, Supporting perinatal anxiety in the digital age; A qualitative exploration of stressors and support strategies, BMC Pregnancy Childbirth [Internet] (2020) [cited 2020 Aug 3];20. Available from: /pmc/articles/PMC7298791/?report=abstract.
[15] A. Biaggi, S. Conroy, S. Pawlby, et al., Identifying the women at risk of antenatal anxiety and depression: a systematic review, J. Affect Disord. [Internet] 191 (2016) 62–77, doi:http://dx.doi.org/10.1016/j.jad.2015.11.014 Available from:.
[16] M.H. Davenport, S. Meyer, V.L. Meah, et al., Moms are not OK: COVID-19 and maternal mental health, Front Glob Women's Heal [Internet] 1 (2020) 1. [cited 2020 Aug 3] Available from: https://www.frontiersin.org/article/10.3389/fgwh.2020.00001/full.
[17] C.A. Moyer, E. Kaselitz, M. Muzik, Pregnancy-related Anxiety during COVID-19: a Nationwide Survey of 2,740 Pregnant Women, (2020), doi:http://dx.doi.org/10.21203/rs.3.rs-37887/v1 [cited 2020 Aug 3]; Available from:.
[18] Y. Wu, C. Zhang, H. Liu, et al., Perinatal depressive and anxiety symptoms of pregnant women along with COVID-19 outbreak in China, Am. J. Obstet. Gynecol. (2020).
[19] C. Lebel, A. MacKinnon, M. Bagshawe, et al., Elevated depression and anxiety among pregnant individuals during the COVID-19 pandemic, PsyArXiv [Internet] (2020). [cited 2020 Aug 3]; Available from: https://psyarxiv.com/ky4x8/.
[20] E. Emmanuel, W. St John, Relationship between Social Support and Quality of Life in Childbearing Women during the Perinatal Period Prevention and treatment of obesive-compulsive disorder using cognitive behaviour therapy approach View project, J. Obstet. Gynecol Neonatal Nurs. [Internet] (2012). [cited 2020 Aug 3];e62. Available from: http://jognn.awhonn.org.
[21] J. Milgrom, Y. Hirshler, J. Reece, et al., Social support—a protective factor for depressed perinatal women? Int. J. Environ. Res. Public Health [Internet] 16 (2019) 1426. [cited 2020 Aug 3] Available from: https://www.mdpi.com/1660-4601/16/8/1426.
[22] L.C. Hawkley, J.T. Cacioppo, Loneliness matters: a theoretical and empirical review of consequences and mechanisms, Ann. Behav. Med. [Internet] 40 (2010) 218–227 [cited 2020 Aug 3] Available from: /pmc/articles/PMC3874845/?report=abstract.
[23] J.T. Cacioppo, M.E. Hughes, L.J. Waite, et al., Loneliness as a specific risk factor for depressive symptoms: cross-sectional and longitudinal analyses, Psychol. Aging 21 (2006) 140–151.
[24] L.M. Heinrich, E. Gullone, The clinical significance of loneliness: a literature review [Internet], Clin. Psychol. Rev. (2006) [cited 2020 Jul 21]. p. 695–718. Available from: /record/2006-11682-003.
[25] A.M.I. Rokach, Self-perception of the antecedents of loneliness among new mothers and pregnant women, Psychol. Rep. [Internet] 100 (2007) 231–243. [cited 2020 Aug 3] Available from: https://pubmed.ncbi.nlm.nih.gov/17451030/.
[26] N. Junttila, S. Ahlqvist-Björkroth, M. Aromaa, et al., Intercorrelations and developmental pathways of mothers' and fathers' loneliness during pregnancy, infancy and toddlerhood - STEPS study, Scand. J. Psychol. [Internet] 56 (2015) 482–488, doi:http://dx.doi.org/10.1111/sjop.12241 [cited 2020 Aug 3] Available from:.
[27] I. Luoma, M. Korhonen, K. Puura, et al., Maternal loneliness: concurrent and longitudinal associations with depressive symptoms and child adjustment, Psychol. Heal Med. [Internet] 24 (2019) 667–679, doi:http://dx.doi.org/10.1080/13548506.2018.1554251 [cited 2020 Jul 21]Available from:.
[28] W. Stroebe, M. Stroebe, H. Schut, et al., The role of loneliness and social support in adjustment to loss: a test of attachment versus stress theory, J. Pers. Soc. Psychol. 70 (1996) 1241–1249.
[29] W.L. Gardner, C.L. Pickett, V. Jefferis, et al., On the outside looking in: loneliness and social monitoring, Pers. Soc. Psychol. Bull [Internet] 31 (2005) 1549–1560. [cited 2020 Aug 3] Available from: http://www.ncbi.nlm.nih.gov/pubmed/16207773.
[30] J.T. Cacioppo, L.C. Hawkley, Perceived social isolation and cognition [Internet], Trends Cogn. Sci. (Regul. Ed.) (2009) NIH Public Access; [cited 2020 Aug 3]. p. 447–454. Available from: /pmc/articles/PMC2752489/?report=abstract.
[31] D.A. West, R. Kellner, M. Moore-West, The effects of loneliness: a review of the literature, Compr. Psychiatry. W.B. Saunders (1986) 351–363.
[32] S. Samtani, M.L. Moulds, Assessing maladaptive repetitive thought in clinical disorders: a critical review of existing measures, Clin. Psychol. Rev. (2017) 14–28 Elsevier Inc..
[33] H. DeJong, E. Fox, A. Stein, Rumination and postnatal depression: a systematic review and a cognitive model, Behav. Res. Ther. 82 (2016) 38–49.
[34] M.L. Moulds, M.J. Black, J.M. Newby, et al., Repetitive negative thinking and its role in perinatal mental health, Psychopathology [Internet] 51 (2018) 161–166. [cited 2020 Aug 3] Available from: https://www.karger.com/Article/FullText/488114.
[35] D. Schmidt, S. Seehagen, S. Vocks, et al., Predictive importance of antenatal depressive rumination and worrying for maternal–Foetal attachment and maternal well-being, Cognit. Ther. Res. [Internet] 40 (2016) 565–576. [cited 2020 Aug 3]Available from: https://link.springer.com/article/10.1007/s10608-016-9759-z.
[36] S.E. Barnum, M.L. Woody, B.E. Gibb, Predicting changes in depressive symptoms from pregnancy to postpartum: the role of brooding rumination and negative inferential styles, Cognit. Ther. Res. [Internet] 37 (2013) 71–77 [cited 2020 Aug 3] Available from: /pmc/articles/PMC4221243/?report=abstract.
[37] H.A. O'Mahen, H.A. Flynn, S. Nolen-Hoeksema, Rumination and interpersonal functioning in perinatal depression, J. Soc. Clin. Psychol. 29 (2010) 646–667.
[38] S. Nolen-Hoeksema, The role of rumination in depressive disorders and mixed anxiety/depressive symptoms, J. Abnorm. Psychol. 109 (2000) 504–511.
[39] S. Nolen-Hoeksema, B.E. Wisco, S. Lyubomirsky, Rethinking rumination, Perspect. Psychol. Sci. [Internet] 3 (2008) 400–424, doi:http://dx.doi.org/10.1111/j.1745-6924.2008.00088.x [cited 2020 Aug 3]Available from:.
[40] E. Puterman, A. Delongis, G. Pomaki, Protecting us from ourselves: social support as a buffer of trait and state rumination, J. Soc. Clin. Psychol. (2010).
[41] J. Vanhalst, K. Luyckx, F. Raes, et al., Loneliness and depressive symptoms: the mediating and moderating role of uncontrollable ruminative thoughts, J. Psychol. Interdiscip. Appl. [Internet] 146 (2012) 259–276, doi:http://dx.doi.org/10.1080/00223980.2011.555433 [cited 2020 Jul 23] Available from:.
[42] M.J. Zawadzki, J.E. Graham, W. Gerin, Rumination and anxiety mediate the effect of loneliness on depressed mood and sleep quality in college students, Heal. Psychol. [Internet] 32 (2013) 212–222. [cited 2020 Aug 3]Available from: https://pubmed.ncbi.nlm.nih.gov/22823068/.
[43] A. Anurudran, L. Yared, C. Comrie, et al., Domestic violence amid COVID-19, Int. J. Gynecol. Obstet. [Internet] 150 (2020) 255–256, doi:http://dx.doi.org/10.1002/ijgo.13247 [cited 2020 Nov 4]Available from:.
[44] N.L. Bradley, A.M. DiPasquale, K. Dillabough, et al., Health care practitioners' responsibility to address intimate partner violence related to the COVID-19 pandemic [Internet], CMAJ (2020). Canadian Medical Association; [cited 2020 Nov 4]. p. E609–E610. Available from: https://go.gale.com/ps/i.do?p=AONE&sw=w&issn=08203946&v=2.1&it=r&id=GALE%7CA625575138&sid=googleScholar&linkaccess=fulltext.
[45] L.L. Martin, A. Tesser, Some ruminative thoughts, in: R.S. Wyer (Ed.), Ruminative Thoughts Adv Soc Cogn, Lawrence Erlbaum Associates, Hillsdale, NJ, 1996, pp. 1–47.
[46] Royal College of Obstetricians and Gynaecologists, Coronavirus (COVID-19) Infection in Pregnancy (Version 11) Available from:, (2020) . https://www.rcog.org.uk/globalassets/documents/guidelines/2020-07-24-coronavirus-covid-19-infection-in-pregnancy.pdf.
[47] D.M. Gleeson, A. Craswell, C.M. Jones, Women's use of social networking sites related to childbearing: an integrative review, Women Birth (2019) 294–302 Elsevier B.V..
[48] S. Pedersen, D. Lupton, What are you feeling right now?' communities of maternal feeling on Mumsnet, Emot. Sp. Soc. 26 (2018) 57–63.
[49] J. Cox, J. Holden, R. Sagovsky, Detection of postnatal depression: development of the 10-item edinburgh postnatal depression scale, Br. J. Psychiatry 150 (1987) 1–2.
[50] S. Somerville, K. Dedman, R. Hagan, et al., The perinatal anxiety screening scale: development and preliminary validation, Arch. Womens Ment. Health 17 (2014) 443–454.
[51] S. Somerville, S.L. Byrne, K. Dedman, et al., Detecting the severity of perinatal anxiety with the Perinatal Anxiety screening Scale (PASS), J. Affect. Disord. [Internet] 186 (2015) 18–25, doi:http://dx.doi.org/10.1016/j.jad.2015.07.012 Available from:.
[52] P.M. McEvoy, A.E.J. Mahoney, M.L. Moulds, Are worry, rumination, and post-event processing one and the same?. Development of the repetitive thinking questionnaire, J. Anxiety Disord. 24 (2010) 509–519.
[53] P.M. McEvoy, M.A. Thibodeau, G.J.G. Asmundson, Trait repetitive negative thinking: a brief transdiagnostic assessment, J. Exp. Psychopathol. [Internet] 5 (2014) 1–17, doi:http://dx.doi.org/10.5127/jep.037813 [cited 2020 Aug 3] Available from:.
[54] G.D. Zimet, N.W. Dahlem, S.G. Zimet, et al., The multidimensional scale of perceived social support, J. Pers. Assess. [Internet] 52 (1988) 30–41. [cited 2020 Aug 3]Available from: https://www.tandfonline.com/doi/abs/10.1207/s15327752jpa5201_2.
[55] G.D. Zimet, S.S. Powell, G.K. Farley, et al., Psychometric characteristics of the multidimensional scale of perceived social support, J. Pers. Assess. [Internet] 55 (1990) 610–617. [cited 2020 Aug 3]Available from: https://pubmed.ncbi.nlm.nih.gov/2280326/.
[56] J.D.J. Gierveld, T.Van Tilburg, A 6-Item scale for overall, emotional, and social loneliness, Res. Aging [Internet] 28 (2006) 582–598. [cited 2020 Aug 3] Available from: http://journals.sagepub.com/doi/10.1177/0164027506289723.
[57] A.F. Hayes, PROCESS: A Versatile Computational Tool for Observed Variable Mediation, Moderation, and Conditional Process Modeling 1 [Internet] [cited 2020 Aug 3]. Available from:, (2012) . public/process2012.pdf.
[58] R.A. Goswick, W.H. Jones, Loneliness, self-concept, and adjustment, J. Psychol. Interdiscip. Appl. [Internet] 107 (1981) 237–240, doi:http://dx.doi.org/10.1080/00223980.1981.9915228 [cited 2020 Aug 3]Available from:.
[59] P.D. Trapnell, J.D. Campbell, Private self-consciousness and the five-factor model of personality: Distinguishing rumination from reflection, J. Pers. Soc. Psychol. 76 (1999) 284–304.
[60] S. Nolen-Hoeksema, C.G. Davis, "Thanks for sharing that": ruminators and their social support networks, J. Pers. Soc. Psychol. [Internet] 77 (1999) 801–814 [cited 2020 Aug 3]Available from: /record/1999-11645-011.
[61] B. Rimé, Mental rumination, social sharing, and the recovery from emotional exposure, in: J.W. Pennebaker (Ed.), Emot Discl Heal, American Psychological Association, 2004, pp. 271–291.
[62] Y. Wu, C. Zhang, H. Liu, et al., Perinatal depressive and anxiety symptoms of pregnant women during the coronavirus disease 2019 outbreak in China, Am. J. Obstet. Gynecol. 223 (2020) 240.e1–240.e9.

[63] R.A. Caparros-Gonzalez, F. Alderdice, The COVID-19 pandemic and perinatal mental health, J. Reprod. Infant Psychol. [Internet] 38 (2020) 223–225. [cited 2020 Aug 3]Available from: https://www.tandfonline.com/action/journalInformation?journalCode=cjri20.
[64] A. Hermann, E.M. Fitelson, V. Bergink, Meeting maternal mental health needs during the COVID-19 pandemic, . JAMA psychiatry [Internet] (2020). [cited 2020 Aug 3]; Available from: http://www.ncbi.nlm.nih.gov/pubmed/32667662.
[65] S.E. Caplan, Relations among loneliness, social anxiety, and problematic internet use, Cyberpsychol. Behav. 10 (2007) 234–242, doi:http://dx.doi.org/10.1089/cpb.2006.9963 [cited 2020 Aug 3]Available from:.
[66] C. Hughes, T. Devine R, S. Foley, et al., Couples becoming parents: trajectories for psychological distress and buffering effects of social support, J. Affect. Disord. 265 (2020) 372–380.
[67] C.L. Dennis, L. Ross, Women's perceptions of partner support and conflict in the development of postpartum depressive symptoms, J. Adv. Nurs. [Internet] 56 (2006) 588–599, doi:http://dx.doi.org/10.1111/j.1365-2648.2006.04059.x [cited 2020 Nov 5]Available from:.
[68] C. Rini, C.D. Schetter, C.J. Hobel, et al., Effective Social Support: Antecedents and Consequences of Partner Support during Pregnancy [Internet], Pers. Relatsh. John Wiley & Sons, Ltd, 2006, doi:http://dx.doi.org/10.1111/j.1475-6811.2006.00114.x [cited 2020 Nov 5]. p. 207–229. Available from:.
[69] D. Moore, S. Ayers, N. Drey, A Thematic Analysis of Stigma and Disclosure for Perinatal Depression on an Online Forum, JMIR Ment. Heal [Internet] 3 (2016) e18. [cited 2019 May 29]Available from: http://mental.jmir.org/2016/2/e18/.
[70] E.E. Cameron, K.M. Joyce, C.P. Delaquis, et al., Maternal psychological distress & mental health service use during the COVID-19 pandemic, J. Affect. Disord. 276 (2020) 765–774.
[71] National Institute for Health and Care Excellence, Antenatal and Postnatal Mental Health: Clinical Management and Service Guidance. (NICE Clinical Guideline CG192 [updated 11.02.2020]) [Internet] Available from:, (2020) . https://www.nice.org.uk/guidance/cg192/resources/antenatal-and-postnatal-mental-health-clinical-management-and-service-guidance-pdf-35109869806789.
[72] K. Falah-Hassani, R. Shiri, C.L. Dennis, The Prevalence of Antenatal and Postnatal Co-morbid Anxiety and Depression: a Meta-analysis [Internet] [cited 2020 Aug 3]Available from:, Psychol. Med. Cambridge University Press, 2017, pp. 2041–2053. https://pubmed.ncbi.nlm.nih.gov/28414017/.
[73] C.R. Hirsch, C. Krahé, J. Whyte, et al., Interpretation training to target repetitive negative thinking in generalized anxiety disorder and depression, J. Consult. Clin. Psychol. [Internet] 86 (2018) 1017–1030. [cited 2020 Aug 3]Available from: https://pubmed.ncbi.nlm.nih.gov/30507227/.