



UNIVERSITY OF  
LIVERPOOL

*Women's experiences of antenatal preparation, obstetric complications and procedures, and postnatal mental health*

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Submitted in partial fulfilment of the Doctorate in Clinical Psychology,

University of Liverpool,

June 2021

## **Acknowledgements**

*I would really like to thank my research supervisors Professor Pauline Slade and Dr Charlotte Krahe for guiding me through the research process. You have both offered me such fantastic support, feedback and knowledge. I have learnt so much from you both. You have inspired me throughout this process, keeping me motivated during the most challenging of times and I will be forever grateful!*

*Professor Helen Spiby - Thank you so much for all your time and expertise, your guidance has been invaluable and so appreciated.*

*I would like to thank all the many charities and support groups that helped to advertise the project to new mums including; MumsAid, Pandal Foundation, Birthrights, the Perinatal Mental Health Midwife, Traumatic Birth Recovery, Baby & Pregnancy Club and The 'COVID-19 Baby'. A special thanks to all the women who kindly gave their time to participate in this study, as without them this research would not have been possible.*

*To all the women who gave birth during the pandemic, you are simply incredible!*

*Thank-you to my family and friends for their ongoing encouragement and support, to my lovely cohort – here's to surviving the DClin during a pandemic!*

*Finally, a thank you to my husband Mike for always supporting me no matter what, for saving me from my IT disasters and for being an amazing daddy to our little girl. To our daughter Lilah, who is my reason for doing pretty much everything, being your mummy will always be my greatest achievement. I am so looking forward to having more free time for our family time ♥*

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## **Word Count**

Total (including appendices): 24,698

Chapter One: 9493

Chapter Two: 11478

Appendices: 3,727

## **An Introductory Chapter: Thesis Overview**

Childbirth is noted to be unpredictable (Escott et al., 2009), with the national figures of women experiencing obstetric complications or procedures during childbirth increasing (Care Quality Commission, 2020; Redshaw & Henderson, 2015). While up to a fifth of women experience mental health problems during the first 12-months following the birth of a child (NICE, 2019), the impact of obstetric complications or procedures on mental health has not been established.

The National Institute for Health and Care Excellence guidance (NICE, 2019) highlights the importance of pregnant women being offered opportunities to attend participant-led antenatal classes in preparation for their upcoming labour and birth. However, the provision of antenatal classes varies amongst NHS trusts (Care Quality Commission, 2020) and it is unclear if such preparation includes information on the obstetric complications /procedures possible during childbirth. It has not previously been investigated if antenatal preparation providing information on such complications or procedures can positively impact on birth experience and postnatal mental health outcomes.

The first chapter in this thesis comprises a systematic review that aimed to narratively synthesise cross-sectional and longitudinal studies that have measured postnatal mental health within 24 months postpartum, following obstetric complications or procedures during childbirth.

The second chapter in this thesis presents an empirical paper that explored, for the first time, if there was a relationship between the content of antenatal preparation received, the experience of obstetric complications /procedures, and birth experience and postnatal mental health. Furthermore, it investigated subsequent impact on postnatal mood, anxiety, worry and rumination, whilst considering the role of perceived social support received during labour and birth. The empirical paper was prepared for submission to BMC Pregnancy and Childbirth

The findings from the review and empirical paper have potential clinical implications for future development of antenatal preparation provision and psychological interventions for postnatal mental health care.

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Escott, D., Slade, P., & Spiby, H. (2009). Preparation for pain management during childbirth: The psychological aspects of coping strategy development in antenatal education. *Clinical Psychology Review, 29*(7), 617–622.

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*Chapter One*

**Do obstetric complications or procedures during childbirth impact on womens'  
postnatal mental health? A systematic review**

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## Abstract

**Objective:** The percentages of women experiencing complications or procedures during childbirth is increasing nationally. While obstetric procedures may be deemed necessary to protect both mother and child, this may not be without serious ramifications for the mother in the postnatal period. The aim of this review was to explore if women's experiences of obstetric complications or procedures during childbirth impact negatively on their reported postnatal mental health. **Method:** Seven databases (PsycINFO, CINAHL Plus, Medline, British Nursing Index, Scopus, Web of Science and The Cochrane Library) were systematically searched for relevant studies. Studies were included if they reported quantitative data on validated measure of postnatal mental health less than 24 months postpartum, following obstetric complications or procedures during childbirth. Included studies were assessed for methodological quality using a standardised checklist. **Results:** Thirteen papers derived from 11 samples of women were included and summarised narratively. Thirteen papers highlighted an association between experience of obstetric complications or procedures and subsequent negative impact on mental health, notably PTSD or depression. **Conclusions:** Overall, while individual procedures' and complications' links with mental health outcomes may need further investigation, this review highlights that there is evidence that the experience of obstetric complications or procedures during childbirth can negatively impact on women's<sup>1</sup> postnatal mental health.

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<sup>1</sup> Women and mother are both terms used inclusively to describe anyone with the first-hand experience of giving birth.

## **Introduction**

In 2020 there were on average 52,000 live childbirths per month in England and Wales (Office for National Statistics, 2020). During childbirth, women may experience a wide range of obstetric complications or procedures, made increasingly likely if the childbirth is long and if professionals become concerned about the health of either the woman or her baby (Redshaw & Henderson, 2015).

An obstetric complication can occur during labour or delivery and may need assistance from health care professionals, possibly requiring obstetric procedures. Examples include complications involving the placenta (NHS, 2018b) and postpartum haemorrhage, that is, heavy bleeding after birth (Royal College of Obstetricians and Gynaecologists, 2016). The Intrapartum care guideline set out by National Institute for Health and Care Excellence (NICE, 2017) outlines a range of obstetric procedures and when they may be required, in some cases as a result of a complication. Examples of procedures include; induction of labour to prevent prolonged pregnancy (NICE, 2008); episiotomy to reduce perineal trauma; assisted birth (forceps, ventouse or caesarean section) if there is concern about the baby's wellbeing or a prolonged second stage; active management of the third stage due to associated lower risk of a postpartum haemorrhage, all of which should be offered and carried out if considered in the best interests for both mother and baby (NICE, 2017).

The most recent maternity survey published on women's experiences of maternity care reported that 44% of women had their labour induced (Care Quality Commission, 2020), a figure similarly noted in a previous maternity survey (Redshaw & Henderson, 2015). Thus, highlighting that procedures can occur routinely for a significant proportion of women giving birth. It is reported that induced labour may also be more painful than spontaneous labour, which could explain the survey's further findings that women who had an induction of labour were more likely to have further obstetric procedures than women who had spontaneous

births (Care Quality Commission, 2020). Thus, highlighting that experiencing an obstetric complication /procedure can lead to more being necessary for women.

The percentage of unassisted vaginal births, when no complications or procedures occurred, has decreased from 62% in 2013 to 57% in the most recent maternity survey (Care Quality Commission, 2020). Conversely, in the past five years, figures reported for assisted vaginal birth (with forceps or ventouse) have increased from 14.8% to 15%, with emergency caesareans increasing from 14.2% to 16% (Care Quality Commission, 2020; Redshaw & Henderson, 2015), highlighting that women are increasingly experiencing obstetric complications /procedures. Interestingly, evidence suggests that in the past 20 years women's attitudes towards obstetric procedures are increasingly more positive, increasing willingness to accept procedures, which may explain in part the increased numbers in assisted delivery (Green & Baston, 2007). However, while obstetric complications may be unavoidable and obstetric procedures deemed necessary to protect both mother and child in line with NICE guidance (NICE, 2017), this may not be without serious ramifications for the mother both physically and mentally in the postnatal period (NICE, 2019).

It is estimated that up to 20% of women report experiencing mental health problems during pregnancy, or in the first year following the birth of a child (NICE, 2019). Improved postnatal mental health care was outlined as a priority of the Better Births, Improving outcomes of maternity services report (National Maternity Review, 2016). As acknowledged by NICE guidance, if mental health in the postnatal period is left untreated this can have long-lasting effects on both the mother and baby (NICE, 2019). However postnatal mental health was outlined as an area requiring improvement in the most recent maternity survey (Care Quality Commission, 2020), with it recently being reported that only 15% of new mothers had a GP appointment that focused on their wellbeing (Campbell, 2021).

Obstetric complications /procedures have been reported to be significantly related to dissatisfaction with childbirth (Falk et al., 2019), with a negative birth experience reported in a previous review to possibly contribute to postnatal depression (Bell & Andersson, 2016). Obstetric emergencies were identified as one of several risk factors for developing post-traumatic stress disorder (PTSD) following childbirth (Andersen et al., 2012), with viewing childbirth as a traumatic experience noted as the key risk factor in the development of PTSD in women (Alcorn et al., 2010). The Theory of Traumatic Childbirth (Beck, 2015) highlights that experiencing an event during childbirth such as a complication/ procedure can be perceived to be traumatic by a woman, if she is stripped of her dignity, or has an actual or threatened serious injury to her or her unborn child, which can lead to the development of PTSD.

Previous reviews have also aimed to explore the possible association between obstetric complications and other more specific mental health difficulties such as bipolar disorder (Scott et al., 2006) and eating disorders (Krug et al., 2013) with limited and contradictory findings. However, there has been limited exploration focusing specifically on the impact of obstetric complications /procedures on womens' postnatal mental health more generally. While there has been limited use of the transactional theory on emotions, stress and coping model (Lazarus & Folkman, 1987) within postnatal research, Honey et al. (2003) noted that model of extends the utility of the diathesis-stress account of postnatal depression and has important implications for how this is treated.

The Emotion-focused coping outlined by the transactional theory on emotions, stress and coping model (Lazarus & Folkman, 1987) is directed at regulating emotional responses to problems and is more likely to be utilised by parents when cognitive appraisal determines little can be done to change the stressful situation, as is the case for obstetric complications/ procedures (Loewenstein et al., 2019). Thus, in line with the transactional model (Lazarus &

Folkman, 1987) obstetric complications /procedures may be appraised as posing a threat to well-being and could result in negative coping and negative emotional responses from women. Therefore, understanding the psychological impact of obstetric complications /procedures may allow for the opportunity to enhance women's coping skills following such events.

Biological, psychological and social factors are noted to intertwine and affect each other, making certain women more vulnerable to post-natal mental health difficulties following obstetric complications (Ghaedrahmati et al., 2017). Examples include insecure adult attachment (Ayers et al., 2015), individuals interpersonal relationships including experiences such as domestic violence, a number of life events and low self-esteem can all contribute in making women more vulnerable such difficulties (Ghaedrahmati et al., 2017). The effect of a history of childhood maltreatment (Seng et al., 2013) including a history of sexual abuse (Ghaedrahmati et al., 2017) are also noted to be significant factors in making women more vulnerable following obstetric complications.

The importance of routinely screening women following obstetrically complicated births to understand how they have appraised this experience has been highlighted (Davenport et al., 2020). This would allow those experiencing postnatal mental health problems to be identified so they can be offered targeted support (Davenport et al., 2020). The importance of health professionals to conducting routine assessments on coping strategies and mood has been illustrated (Doucet & Letourneau, 2009) in addition to the need for professionals to be vigilant for perinatal dissociation after intense negative emotions following such births (Haagen et al., 2015).

This review set out to examine the findings of quantitative studies investigating a range of obstetric complications /procedures and identify whether there are associations with subsequent postnatal mental health in women. We expected that there would be an

association between complications /procedures and poorer mental health outcomes. Findings will be grouped by type of complication /procedure to explore if any, the differing impacts on mental health outcomes. The review required the papers' country of origin to be a high-income country given the known inequalities that exist between high-low income countries in maternity care (Houweling et al., 2007). Papers were dated within the past 20 years to ensure findings relate to the contemporary maternity context.

## **Method**

### **Pre-registration**

The review protocol was pre-registered with the International Prospective Register of Systematic Reviews (PROSPERO) registration number CRD42020212324. This systematic review follows the guidance outlined by PRISMA (Moher et al., 2009).

### **Search strategy**

Following scoping searches, seven databases (PsycINFO, CINAHL Plus, Medline, British Nursing Index, Scopus, Web of Science and The Cochrane Library) were chosen to enable a broad search of the published literature. The databases were searched using keyword search terms and controlled vocabulary combined with Boolean operators, including (obstetric\* OR birth OR labo\*r) AND (emergency ca\*sarean section OR assisted delivery forceps OR forceps OR assisted delivery ventouse OR ventouse OR epidural OR induction OR speeding up labour OR augmentation OR episiotomy OR tear requiring sutur\* OR retained placenta OR postpartum h\*emorrhage) AND (postnatal\* OR perinatal\* OR postpartum\* OR maternal\*) AND (worr\* OR anxiety OR anxious\* OR depress\* OR ruminat\* OR stress\* OR post traumatic stress\* OR mental health OR psychological emotional wellbeing). Searches were repeated on 6<sup>th</sup> May 2021 to identify any new publications relevant to the review question.

### **Inclusion and exclusion criteria**

To be included in the review, studies had to report quantitative data on mental health outcomes in the postnatal period concerning childbirth and obstetric complications/ procedures experienced, including either primiparous or multiparous women. Articles needed to include a self-report or diagnostic validated measure of one of either; worry, anxiety or

depressive symptoms, rumination, stress or post-traumatic stress or psychological wellbeing less than or including 24 months postpartum.

Articles had to be published in English in a peer-reviewed journal. All case studies, commentaries, conference abstracts, dissertations, editorials, qualitative studies and review articles were excluded, as were articles focusing on adolescents (under 16 years of age) and complications during pregnancy but not childbirth/ labour. Maternity services vary widely based on a country's economic status (Houweling et al., 2007). Only studies from high-income countries were included to reduce the impact of disparities in care on the data. To ensure contemporary applicability given the ongoing changes in maternity care, only papers from the last 20 years were included (2001 onwards).

### **Study selection**

The titles of records identified through database searching were screened; articles that were clearly outside criteria were excluded. Abstracts were then screened by the author (HC) and articles were excluded where appropriate. Potentially relevant studies were then examined using full texts to determine inclusion in the synthesis. Consensus was sought regarding disagreements through consultation with PS. The search flow diagram is presented in Figure

1. PRISMA diagram

### **Risk of bias**

The quality of each included paper was assessed for risk of bias using a standard measure of quality assessment The Quality Assessment Tool for Quantitative Studies (QATQS; (Effective Public Health Practice Project, 2009)) (Appendix A). This allowed for all included studies to be assessed against the same criteria, which enabled the author to



consistently evaluate the strengths and weaknesses of each paper. The QATQS requires papers to be rated on six components if a criterion was not met or met but considered poor or weak, it was scored as '1', if a criterion was met and considered fair, it was scored as '2', and for any criterion met considered good, a '3' was scored. Three categories, namely 'weak' (two or more weak ratings), 'moderate' (one weak rating) or 'strong' (no weak rating), were used to note the overall global quality rating of each paper. In line with the Centre for Reviews and Dissemination guidance (Centre for Reviews and Dissemination, 2009), studies were not excluded based on the outcome of the risk of bias assessment.

### **Data extraction**

For each study, relevant demographic, methodological and summary data were extracted using a standardised data extraction form (Appendix B). Disagreement or uncertainty was resolved through discussion with the wider research team.

The following information was extracted: (i) author, (ii) year of publication, (iii) study characteristics (design, sampling method, sample number, number included in the analysis and primiparous or multiparous), (iv) participant characteristics (age, ethnicity, birth complications), (v) method of obstetric data collection, (vi) outcome of postnatal mental health measured, (vii) study aims, (viii) data collection method, (viii) data analysis and (ix) main findings, including correlates and associations between obstetric complications or procedures and postnatal mental health.

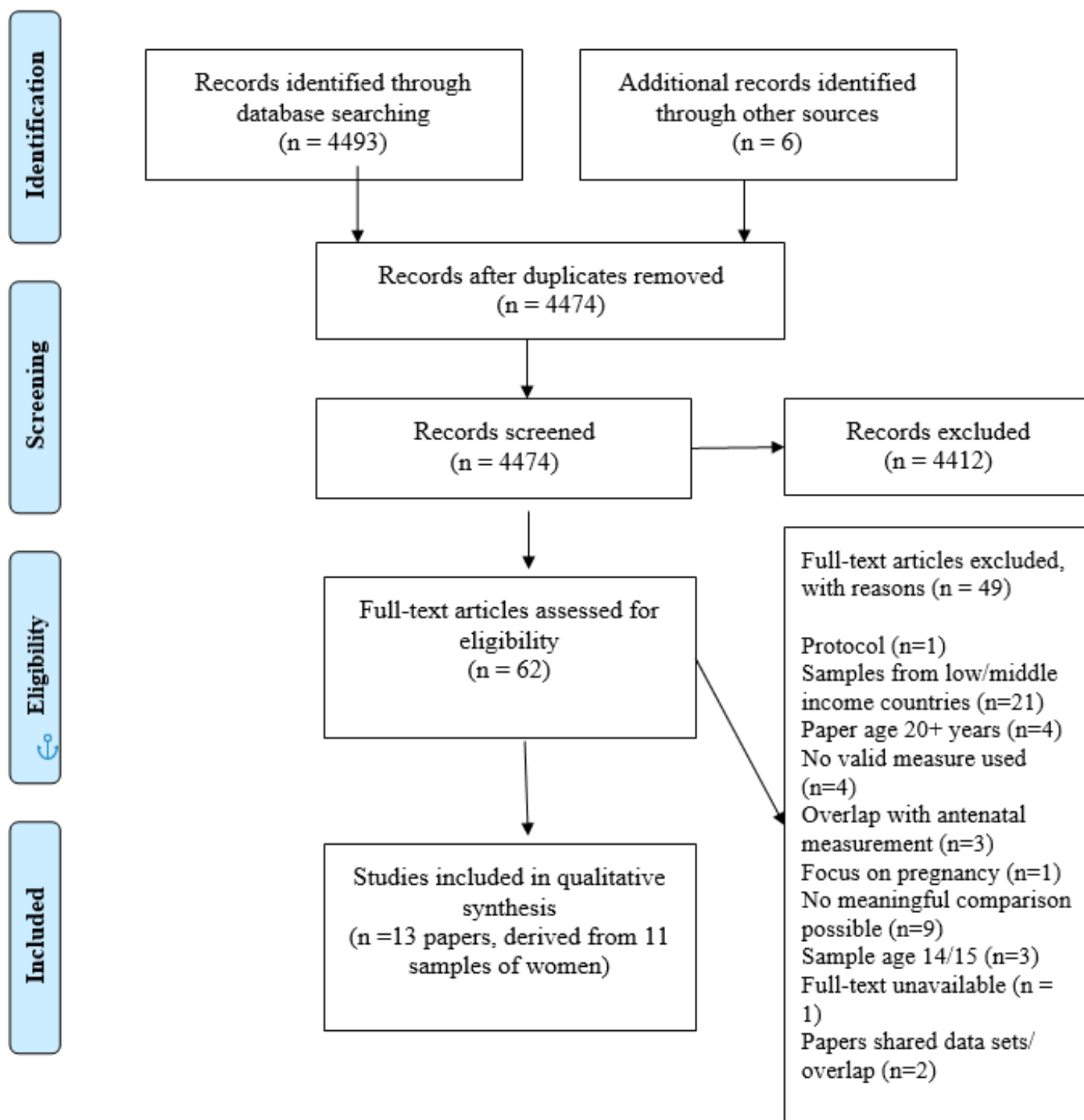
Where studies reported multiple analyses, only data relevant to the research question was extracted. Articles that reported data from the same larger database, but focused analyses on different outcomes to each other were interpreted and referred to as separate papers, with their linked status noted. Articles that reported data from the same sample study and overlapped were considered together.

## Results

The search strategy identified 4493 papers, plus 6 papers were obtained via additional sources (Figure 1). After duplicates were excluded, titles and abstracts screened, 62 potentially eligible papers remained.

Three papers (Asif et al., 2020; Eckerdal et al., 2018; Eckerdal et al., 2016) were drawn from a larger database study (Nested cohort study, Sweden), however, they focused on different variables and offer varied contributions to the review and were reported separately. Two papers were derived from the same sample (Dekel et al., 2019; Dekel et al., 2020) overlapped and were considered as one study. Dekel et al. (2019) was reported in full with the inclusion of Dekel et al. (2020)'s main findings. Two further papers were also derived from the same sample (Furuta et al., 2014, 2016) overlapped, thus were considered as one study: only Furuta et al. (2014) was reported in full with the inclusion of Furuta et al. (2016)'s main findings. Therefore, 13 papers, derived from 11 samples of women were included for review (Figure 1).

**Figure 1.** PRISMA flow diagram



## **Results of assessment of risk of bias**

The results of the quality assessment are outlined in Table 1. Overall, 12 of the papers were rated as ‘moderate’ and one as ‘weak’. All studies reported an adequate description of the selection process and study design. For the data collection methods component, all 13 papers scored as ‘strong’ for quality due to the reporting of reliability and/or validity of quantitative data collection tools.

Most papers scored moderate quality on the global quality rating due to all bar one obtaining ‘weak’ ratings on the blinding component. This was due to limited or no information being provided about the blinding of outcome assessors in the studies.

The reporting of confounders varied amongst studies, which is reflected within the rating scores. Six studies scored as ‘strong’ due to acknowledging relevant confounders within each paper, controlling for these and reporting this in detail. One paper scored ‘weak’ on the confounders component due to them not being described within the paper nor subsequent controlled in the analysis. (Baptie et al., 2020) was also rated as ‘weak’ on blinding thus creating a global weak score.

It is noted that six papers had relatively small sample sizes (Baptie et al., 2020; Dunn et al., 2015; Eckerdal et al., 2016; Johnstone et al., 2001; Kountanis et al., 2020; Tol et al., 2019), with under 500 participants or fewer (Table 2). Therefore, analyses may be under-powered in comparison to the remaining papers included which had much larger sample sizes due to having cohort samples. Thus, it is acknowledged that the results of the papers with larger samples may be more generalisable to populations outside of the study sample.

**Table 1.** *Quality Assessment*

Study Design	Author	Selection Bias	Study Design	Confounders	Blinding	Data Collection Methods	Withdrawals and dropouts	Global rating
Cohort *	Asif et al. (2020)	M	M	S	W	S	N/A	M
Case Control Cohort	Baptie et al. (2020)	W	M	W	W	S	N/A	W
Case Control †	Blom et al. (2010)	M	M	M	W	S	S	M
Cohort ‡	Dekel et al. (2019)	M	M	M	W	S	NA	M
Case Control †	Dunn et al. (2015)	M	M	S	W	S	S	M
Cohort *	Eckerdal et al. (2016)	M	M	M	W	S	N/A	M
Cohort *	Eckerdal et al. (2018)	M	M	S	W	S	N/A	M
Cohort ‡	Furuta et al. (2014)	M	M	S	W	S	N/A	M
Case Control	Hernandez-Martinez et al. (2019)	M	M	M	W	S	N/A	M
Case Control Cohort	Johnstone et al. (2001)	M	M	S	W	S	A	M
Cohort	Kountanis et al. (2020)	M	M	S	M	S	S	M
Cohort	Rauh et al. (2012)	M	M	M	W	S	S	M
Controlled Clinical Trial	Tol et al. (2019)	M	S	M	W	S	N/A	M

EPHPP, Effective Public Health Practice Project; S strong; M medium; W weak.

\* Shares sample

### **Study characteristics (See Table 2)**

For ten of the papers, from eight samples, the study design was longitudinal with the length of time for the outcome of postnatal mental health data collection ranging from 1 week (Dunn et al., 2015) to up to four years (Tol et al., 2019). Three papers utilised cross-sectional designs, measuring self-reports of obstetric complications /procedures at the same time point as postnatal mental health outcome (Baptie et al., 2020; Dekel et al., 2019; Hernández et al., 2019). The mix of cross-sectional and longitudinal designs within the review emphasises the possible correlational and causal conclusions that may be drawn from results.

The reporting of age varied between papers with seven reporting a mean age, the lowest mean age reported was 28.0 years (Johnstone et al., 2001) and the highest being 32.8 years (Rauh et al., 2012). Ten papers did not report the ethnicity of participants, with one paper reporting if participants identified as White, Black, Asian or Other (Kountanis et al., 2020). Of the 14 papers, 12 reported participants being a mix of primiparous or multiparous, the highest percentage of primiparous sample was 63.1% (Baptie et al., 2020) and the lowest 41.1% (Eckerdal et al., 2018). Three papers did not report on this characteristic (Dunn et al., 2015; Furuta et al., 2014; Tol et al., 2019).

For birth complications, three papers reported on the numbers of participants experiencing varying degrees of tear's/lacerations (Asif et al., 2020; Dunn et al., 2015; Hernández et al., 2019). Two papers reported on the numbers involved with placental complications (Hernández et al., 2019; Tol et al., 2019). For four papers, mode of birth was the complication reported (Blom et al., 2010; Dekel et al., 2019; Eckerdal et al., 2018; Rauh et al., 2012) the highest percentage of emergency caesarean section was 16.6% (Dekel et al., 2019). Two papers did not report birth complications in any detail (Johnstone et al., 2001;

Kountanis et al., 2020). One paper reported using a measure of the total level of obstetric intervention, 'The Intrapartum Intervention Score (IIS)', but the details on this measure were not reported (Baptie et al., 2020). Another paper used a measure of Severe maternal morbidity (at least one episode of - major obstetric haemorrhage, severe pre-eclampsia/eclampsia, HELLP syndrome, or ICU/HDU admission) (Furuta et al., 2014). Given the range of different complications /procedures considered within this review, these will be reported on individually.

Four papers relied solely on participants self-report of obstetric complications /procedures, three were cross-sectional (Baptie et al., 2020; Dekel et al., 2019; Hernández et al., 2019) and one longitudinal (Rauh et al., 2012). This suggests a limitation of these studies as the participants self-reportings may be subject to memory bias and were not verified by medical records. Although it is acknowledged that reporting's of emergency caesarean section are more likely to be accurately recalled (Dekel et al., 2019) than other complications /procedures such as the specifics of assisted births (Baptie et al., 2020; Hernández et al., 2019; Rauh et al., 2012). For the subsequent nine papers that obtained data regarding obstetric complications, or verified this, by checking participants' medical records this further highlights the validity of the data collection methods for these papers.

Nine of the papers utilised the Edinburgh Postnatal Depression Scale (EPDS) as their outcome measure for postnatal mental health (Asif et al., 2020; Baptie et al., 2020; Blom et al., 2010; Dunn et al., 2015; Eckerdal et al., 2018; Eckerdal et al., 2016; Johnstone et al., 2001; Kountanis et al., 2020; Rauh et al., 2012). Two papers utilised different versions of the Impact of Events Scale (IES) (Furuta et al., 2014; Tol et al., 2019) and one paper used the outcome measure Perinatal Post-traumatic Stress Disorder Questionnaire (PPQ) (Hernández

et al., 2019) both measures of PTSD. One paper used the Brief Symptom Inventory (BSI) (Dekel et al., 2019) which covers nine symptom dimensions including Depression and Anxiety. Three of the papers reported symptoms of postnatal mental health (Baptie et al., 2020; Dunn et al., 2015; Rauh et al., 2012) with the other ten papers reporting cut-off figures within their studies as an indication of clinical caseness for mental health difficulties. Thus, of the included papers, the majority focused on the impact of complications or procedures on maternal depression or PTSD.



**Table 2.** *Characteristics of included studies*

Study Characteristics					Participant Characteristics						
Author	Year	Country	Design	Sampling Method	Participants & Sample Size (recruited) completed	Primiparous or multiparous n, (%)	Age (years) (SD) <i>Unless otherwise stated</i>	Ethnicity n, (%)	Birth complications n, (%)	Obstetric complication data collection	Outcome of postnatal mental health measured; Timing; Symptoms indicated by S, Caseness indicated by C
Asif et al. *	2020	Sweden	Longitudinal Nested cohort study	Purposive	6478 (2990) Department of Obstetrics and Gynaecology, University Hospital, Sweden	Primiparous 1415 (47.3%)	≤35 years: 2311 (77.3%)  >35 years: 678 (22.7%)	Not reported	First-degree 786 (26.3) Second-degree 461 (15.4) Third-degree 69 (2.3) Fourth-degree lacerations 9 (0.3)	Extracted from medical records.	Edinburgh Postnatal Depression Scale (EPDS); 6 weeks postpartum (PP); C (Cut off 12-points)
Baptie et al.	2020	UK	Cross-sectional	Opportunistic	222 Advertised on social media forums	Primiparous 140, (63.1%)	18-24 years: 41, (18.5%) 25-34 years: 142, (64%) 35-44 years: 39, (17.6%)	Not reported	The Intrapartum Intervention Score (IIS) measure of total level of obstetric intervention N Not reported	Self-report	Traumatic Event Scale (TES-B) - S; EPDS - S; GAD-7 - S; Within 12-months PP;
Blom et al.	2010	Netherlands	Longitudinal Cohort study.	Purposive	7295 (4941) Generation R cohort Study	Primiparous 2819 (57.9%)  Some missing data	M = 31.0 (SD 4.8)	Dutch 1954 (62.9) Other Western 172 (18.7) Non-Western 167 (18.4) Some missing data	Spontaneous delivery 3131 (63.4) Assisted delivery 797 (16.1) Elective CS 225 (4.6) Emergency CS 322 (6.5) Some missing data	Obtained from the midwife and hospital registries or by questionnaire.	EPDS; 2 months PP; - C (Scores over 12)

Author	Year	Country	Design	Sampling Method	Participants & Sample Size (recruited) completed	Primiparous or multiparous n, (%)	Age (years) (SD) <i>Unless otherwise stated</i>	Ethnicity n, (%)	Birth complications n, (%)	Obstetric complication data collection	Outcome of postnatal mental health measured; Timing; Symptoms indicated by S, Caseness indicated by C
Dekel et al. †	2019	USA	Cross-sectional cohort study	Opportunistic	846 (685) Online websites including postpartum-related sites	Primiparous 383 (56)	M= 31 (SD 4.80)	Not reported	Natural delivery 152 (22.2) Vaginal delivery 238 (34.7) Assisted Vaginal delivery 49 (7.2) Planned CS 132 (19.3) Unplanned CS 114 (16.6)	Self-report, single items on questionnaire	Brief Symptom Inventory (BSI) – C (Scores over 9); Childbirth-related PTSD checklist C (cut off scores reported); Within 6-months PP;
Dunn et al.	2015	USA	Longitudinal Repeated measures design	Purposive	201 (155) Advertised and recruited from university prenatal clinics	Not reported	M= 28.8 (SD= 5.1)	Caucasian 119 (76.8)	Perineal Laceration 99 (63.9)	Clinical records retrieved to verify the self-reports.	EPDS - S; Perceived Stress Scale (PSS) - S; 32-36 weeks pregnant, 1-week, 2-weeks, 1-month, 2-months, 3-months, 6- months PP;
Eckerdal et al. *	2016	Sweden	Longitudinal Nested cohort study	Purposive	446 Department of Obstetrics and Gynaecology, University Hospital, Sweden	Primiparous 210 (47)	M= 31.1 (SD 4.4)	Not reported	Postpartum haemorrhage (PPH) (Bleeding 1000 mL or more) within 24 hours of Delivery 196 (43.9)	Medical records checked	EPDS; 6-weeks PP; C (scores above 12 cut off)

Author	Year	Country	Design	Sampling Method	Participants & Sample Size (recruited) completed	Primiparas or multiparas n, (%)	Age (years) (SD) Unless otherwise stated	Ethnicity n, (%)	Birth complications n, (%)	Obstetric complication data collection	Outcome of postnatal mental health measured; Timing; Symptoms indicated by S, Caseness indicated by C
Eckerdal et al.*	2018	Sweden	Longitudinal Nested cohort study	Purposive	3888 Department of Obstetrics and Gynaecology, University Hospital, Sweden	Primiparas 1598 (41.1)	32 median age	Not reported	Spontaneous delivery 2872 (74), Vacuum extraction 324 (8), Elective CS 346 (9) Emergency CS 346 (9)	Information from the medical records. A small number of women (n = 349) self-reported	EPDS; 6-weeks, 6-months PP; C (scores above 12 cut off)
Furuta et al. ‡	2014	UK	Longitudinal Cohort study	Purposive	3533 (1824) Inner-city Maternity units in England	Not reported	Not reported	Not reported	Severe maternal morbidity (at least one episode of – major obstetric haemorrhage, severe pre-eclampsia/eclampsia, HELLP syndrome, or ICU/HDU admission)	Extracted from maternity records.	Impact of Event Scale (IES) intrusion and avoidance subscales; 6-8-weeks PP; C (scores of 20+ cut off )
Hernandez-Martinez et al.	2019	Spain	Cross-sectional	Opportunistic	2990 An online <i>ad hoc</i> questionnaire was used,	Primiparas 1487, (49.7)	<35 years: 1449 (48.5%) ≥35 years: 1541 (51.5%)	Spanish 2886 (96.5); Not Spanish 104 (3.5)	147 (8.1) Episiotomy 1089 (36.4); Severe tears 125 (4.2); Manual removal of the placenta 413 (13.8)	Self-report obstetric results	Perinatal Post-traumatic Stress Disorder Questionnaire (PPQ); 6-8-weeks PP; C (Scores of 19+ cut off)

Author	Year	Country	Design	Sampling Method	Participants & Sample Sizes or (recruited) completed	Primiparous or multiparous n, (%)	Age (years) (SD) Unless otherwise stated	Ethnicity n, (%)	Birth complications n, (%)	Obstetric complication data collection	Outcome of postnatal mental health measured; Timing; Symptoms indicated by S, Caseness indicated by C
Johnstone et al.	2001	Australia	Longitudinal	Purposive	504 (490) Four hospitals in New South Wales recruited antenatally	Primiparous 204 (41.6%)	M = 28.0 (SD 5.2)	Not reported	Not reported	Obtained from clinical records	EPDS; 8 weeks PP; C (scores above 12 cut off)
Kountanis et al.	2020	USA	Prospective longitudinal observational study	Purposive	600 (390) at 6 weeks PP	Primiparous 177 (45.4%)	18-24 years: 35 (9%); 25-34 years: 274 (70.2%); >35 years: 81 (20.8%)	White 327 (83.9%) Black 41 (10.5%) Asian 22 (5.6%) Other 10 (2.6%) Values do not tally to 100% since some women identified with multiple races.	Not reported	Medical records reviewed to verify patient history	EPDS C (scores 10+ cut off); Primary Care Post Traumatic Stress Disorder screening (PC-PTSD) C (scores 19+ cut off); 28-weeks' Gestation, 6-weeks PP, 3-months PP;
Rauh et al.	2012	Germany	Longitudinal, prospective cohort study	Purposive	1,100 (753) Outpatient Department, University Perinatal Center	Primiparous 354 (47%)	M= 32.8 (SD 4.5)	Not reported	Spontaneous deliveries 368 (48.9), Caesarean section 322 (42.8), Assisted vaginal 63 (8.3)	Self-report, structured questionnaires	EPDS; 30-weeks' Gestation, 48-72 hours PP, 6-8 months PP; S (Continuous EPDS values used)
Tol et al.	2019	UK	Longitudinal	Purposive	218 (69) UK obstetric unit.	Not reported	Not reported	Not reported	AIP 17 Uncomplicated caesarean 14 Clinic + CD 16 EPH/ PPH 22	Clinical notes/hospital notes checked	Impact of events scale-revised (IES-R); Up to 4 years PP; C (Cut off scores reported)

\* Shares sample

†Overlap with Dekel et al. (2020)

‡Overlap with Furuta et al. (2016)

## **Main Findings**

### **Emergency caesarean section (ECS)**

Six studies reported findings indicating the impact of emergency caesarean section on women's postnatal mental health. The two cross-sectional studies considered the impact of ECS on women's experiences of PTSD. One study reported that ECS was found to be associated with PTSD at 6-8-weeks postnatally (Hernández et al., 2019). The other study noted that ECS was significantly associated with higher PTSD symptom levels (higher somatization, obsessive-compulsive, depression, and anxiety symptoms) at 6 months postnatally compared to women who had a natural or vaginal delivery, but excluding those with assisted delivery (Dekel et al., 2019). Similarly, the longitudinal study considering women's experiences of PTSD found ECS to be more associated with avoidance symptoms compared to spontaneous vaginal birth (Furuta et al., 2016).

For the longitudinal studies that reported on depression and ECS, two found women to be at higher risk of developing depression at 6 weeks postpartum (Eckerdal et al., 2018; Kountanis et al., 2020), with higher levels of depression noted at 2 months postnatally by another study (Blom et al., 2010), with this increased risk also reported in one study at 3 months postnatally (Kountanis et al., 2020). It is noted that two of these studies (Eckerdal et al., 2018; Kountanis et al., 2020) were found to be strong in the quality assessment criteria in controlling for confounders, thus further highlighting the strong association between ECS and women's experiences of depression, with one (Eckerdal et al., 2018) having a larger sample size suggesting generalisability of these findings.

Another study found no significant risk of developing postnatal depression following an ECS (Johnstone et al., 2001). It is noted that while this study was strong in controlling for confounders the sample size may not have been adequate in sufficiently powering the analysis to detect significant results.

Overall, the findings of both the cross-sectional and high-quality longitudinal papers suggest correlational and causal links between ECS and poorer mental health outcomes for women.

### **Assisted birth**

Six studies considered the impact of assisted birth, which includes procedures such as vacuum extraction, forceps delivery and artificial rupture of membrane, on women's postnatal mental health. One cross-sectional study explored the impact of assisted birth on women's post-traumatic stress symptoms, reporting that assisted birth significantly associated with a greater likelihood for meeting PTSD criteria 6-8-weeks postnatally (Hernández et al., 2019). Similarly, one longitudinal study found women who had an assisted vaginal birth experienced significantly higher avoidance PTSD symptoms compared to those who had a spontaneous vaginal birth (Furuta et al., 2016).

Another longitudinal study reported that women who had an assisted vaginal delivery were significantly more likely to experience depressive symptoms compared to those who had a spontaneous vaginal delivery at 48-72 hours postnatally but this was not found to be significant at 6-8 months postnatally (Rauh et al., 2012). It is noted that this study relied on the self-report of obstetric procedures and may be subject to memory bias of participants. However, another longitudinal study found women were at risk of developing depression 6 weeks postpartum following a vacuum delivery, and at both 6 weeks and 3 months following a forceps delivery (Kountanis et al., 2020).

One longitudinal study found no significant relationship between postnatal depression following either artificial rupture of membrane or forceps delivery when measured at 8 weeks

postnatally (Johnstone et al., 2001). However, again the possible limitations of the smaller sample size of this study are noted. Another longitudinal study found no direct association between vacuum extraction birth and depression at 6 weeks postnatally, but undergoing a vacuum extraction procedure was found to be associated with a negative birth experience, which put women at higher risk of postpartum depression (Eckerdal et al., 2018). Thus suggesting, vacuum extraction may be indirectly associated with increased risk of postpartum depression (Eckerdal et al., 2018)

These results suggest both correlational and causal links between experiencing an assisted birth and poorer PTSD symptom outcomes, with mixed results for the relationship with postnatal depression and symptoms. Overall, similarly to those relating to ESC, these findings further indicate that experiencing obstetric procedures may be associated with poorer mental health.

### **Perineal tear's**

Four papers considered the impact of perineal tear's on women's postnatal mental health. One cross-sectional study reported that experiencing perineal tear's, 3<sup>rd</sup> or 4<sup>th</sup> degree in severity, were significantly associated with women developing PTSD at 6-8 weeks postnatally (Hernández et al., 2019).

Of the longitudinal studies, one found no significant relationship between postnatal depression and experiencing a third-degree tear at 8 weeks postpartum (Johnstone et al., 2001) however, the smaller sample size and the non-significance found across categories of obstetric complications and procedures in this paper is noted. Another study (Asif et al., 2020) also found no significant association between severe obstetric perineal lacerations and

postpartum depression at 6 weeks postpartum. However, a significant association was found between severe perineal tears and postpartum depression in women with low resilience which remained after controlling for confounders (Asif et al., 2020).

Another longitudinal study (Dunn et al., 2015) reported a significant relationship between women having a 2<sup>nd</sup> degree or higher perineal tear and experiencing symptoms of depression at 1 month and 3 months postpartum. The limitations of this study having a small sample size are noted, however, the quality assessment highlighted a strength in this study controlling for confounders.

Overall, the findings of both the cross-sectional and longitudinal papers further indicate that experiencing obstetric complications may be associated with poorer mental health, namely depression and PTSD. As perineal tears can often occur alongside an assisted birth (Smith et al., 2013), the two both being linked to poorer mental health outcomes emphasises the potential negative impacts for women experiencing these complications/procedures.

### **Post-partum haemorrhage (PPH)**

Four papers considered the impact of post-partum haemorrhage on women's postnatal mental health, all of which were longitudinal. One study noted that in a sample of women who all gave birth by caesarean delivery, those experiencing a PPH were significantly more likely to report higher PTSD scores than those who had an uncomplicated caesarean section (Tol et al., 2019), although the limitation of this small sample size is acknowledged. Another study found severe maternal morbidity, a composite measure of a variety of complications



including PPH, was also associated with more frequent intrusion and avoidance PTSD symptoms at 6-8-weeks postnatally (Furuta et al., 2014).

Another study found the risk of developing PTSD within three months postpartum was reported to be increased among women who had operative management of PPH compared to women who had other types of unanticipated birth events such as ESC and assisted delivery (Kountanis et al., 2020). The fourth study found no association between PPH and depression symptoms at 6 weeks postnatally (Eckerdal et al., 2016). However, a positive association was shown between anaemia at discharge from the maternity ward and the development of depression symptoms, which remained after controlling for confounders (Eckerdal et al., 2016).

A strength of all four of these longitudinal papers is women's experiences of PPH were verified from medical record highlighting the accuracy of findings, all reported caseness cut-off scores for PTSD. Overall, the findings suggest that experiencing PPH is linked to experiencing poorer mental health outcomes, namely PTSD.

### **Complications involving the placenta**

The two studies reported on placenta-specific complications linked to PTSD following childbirth. One cross-sectional study noted that the manual removal of the placenta was found to be significantly associated with PTSD at 6-8-weeks postnatally (Hernández et al., 2019).

The other longitudinal study (Tol et al., 2019) found significantly higher PTSD scores were reported for women who had an abnormally invasive placenta compared to those undergoing an uncomplicated caesarean. The limitations of this smaller sample are again

noted, however, it is acknowledged that this study included participants with rare placental complications thus gaining larger samples of women was difficult, but this provided insightful findings relating to this uncommon complication.

These findings indicate that experiencing complications involving the placenta is linked to women experiencing PTSD symptoms. Complications involving the placenta, ESC and PPH are all noted to be likely associated experiences (Hough et al., 2021). As all were individually linked to poorer mental health outcomes, this further highlights the potential negative consequences for women experiencing two or more of these events.

### **Number of complications experienced**

Two studies investigated the impact of multiple complications, one cross-sectional and one longitudinal. In the cross-sectional study (Baptie et al., 2020), trauma symptoms showed a positive correlation with the level of obstetric intervention. However, this study reported that level of obstetric intervention was not significantly associated with either depression or anxiety

In the longitudinal study (Blom et al., 2010) the risk of postpartum depression increased with the number of perinatal complications women experienced when measured at 2 months postnatally. It is noted that this study had the largest sample of women of all the included papers and gained obstetric information from medical records, highlighting the higher quality of the study and the generalisability of the results. These findings, therefore, indicate that experiencing multiple complications or procedures is linked to poor mental health outcomes.

**Table 3. Study Findings**

<b>Author, (year)</b>	<b>Aim</b>	<b>Data Collection Method</b>	<b>Data Analysis</b>	<b>Significant/ Main findings</b>
Asif et al. (2020) *	To assess the association between severe obstetric perineal lacerations and PPD	Secondary analysis using data from a prospective cohort study BASIC (Biology, Affect, Stress, Imaging and Cognition) study	Logistic regression analyses	No significant association between severe obstetric perineal lacerations and PPD at 6 weeks postpartum EPDS case definition (OR = 0.8, 95% CI 0.4–1.7; adjusted OR = 0.7, 95% CI 0.3–1.7). Significant association was found between severe lacerations and PPD in women with low resilience (OR = 4.8, 95% CI 1.2–20), persisting even after adjusting for confounding factors
Baptie et al. (2020)	To measure the relationship between obstetric intervention, perceived support in childbirth and mothers' experiences of postnatal trauma.	Researcher developed, electronic survey. Self-report.	Regression analysis Mediation analysis	Obstetric intervention (IIS) was not significantly associated with either depression or anxiety. Trauma symptoms shared a positive correlation with level of (IIS). IIS explained 4% of variance in trauma symptoms ( $\beta = .21^{**}$ ) 95% CI (0.04, 0.19).
Blom et al. (2010)	To examine whether specific pregnancy and delivery complications are risk factors for postpartum depression.	Secondary analysis using data from a prospective cohort study Researcher developed survey. Self-report.	Logistic regression analyses	Several perinatal complications were significantly associated with postpartum depression, namely: emergency caesarean section (aOR 1.53, 95% CI 1.02–2.31), suspicion of fetal distress (aOR 1.56, 95% CI 1.08–2.27), a medically indicated delivery provided by an obstetrician (aOR 2.43, 95% CI 1.56–3.78).  The risk of postpartum depression increased with the number of perinatal complications women experienced ( $P < 0.001$ ).
Dekel et al. (2019) †	To explore the association between mode of delivery and postpartum well-being	Researcher developed, electronic survey. Self-report.	Multivariate analysis of variance	Unplanned caesarean section had significantly higher PTSD symptom levels (higher somatization, obsessive compulsive, depression, and anxiety symptom levels) than women who had natural or vaginal delivery excluding those with vaginal assisted delivery  Dekel et al. (2020) regression analysis indicated childbirth stressors (obstetric complications and peritraumatic distress) in birth, predicted the likelihood of developing comorbid childbirth-related PTSD and postpartum depression, but not depression alone.
Dunn et al. (2015)	To explore the relationship between varying degrees of perineal lacerations, inflammatory cytokines,	Secondary analysis using data from a prospective cohort study	Descriptive statistics	Relationship identified between symptoms of depression and a 2nd degree or more severe perineal laceration starting at 1 month postpartum ( $P=0.04$ ) and continuing through 3 months ( $P=0.03$ ).

	postpartum stress, and depressive symptoms in women	Researcher developed survey. Self-report.	Multiple linear regressions	Regression analysis indicated that 2nd degree or more severe lacerations accounted for 5.9% of the variance in EPDS score at one month postpartum ( $P=0.024$ , $F=2.865$ , $t=2.127$ ),
Eckerdal et al. (2016) *	To explore the association between postpartum haemorrhage (PPH) and postpartum depression (PPD), taking into account the role of postpartum anaemia, delivery experience and psychiatric history	Nested cohort study derived from two population based longitudinal studies UPPSAT and BASIC	Multivariate logistic regression analysis	No association between PPH and PPD symptoms. A positive association was shown between anaemia at discharge from the maternity ward and the development of PPD symptoms, even after controlling for plausible confounders (OR = 2.29, 95% CI = 1.15-4.58).
Eckerdal et al. (2018) *	To explore the association between mode of delivery and postpartum depression, considering the potentially mediating or confounding role of several covariates	Secondary analysis using data from a prospective cohort study BASIC (Biology, Affect, Stress, Imaging and Cognition) study	Pearson Chi square Kruskal–Wallis tests  Logistic regression	Compared with spontaneous vaginal delivery, women who delivered by emergency caesarean section were at higher risk for postpartum depression 6 weeks after delivery (OR 1.45, 95% CI 1.04–2.01)  Path analysis revealed that emergency caesarean section and vacuum extraction were indirectly associated with increased risk of postpartum depression
Furuta et al. (2014) ‡	To assess the relationship between severe maternal morbidity (ie. major obstetric haemorrhage, severe hypertensive disorders or intensive care unit/obstetric high dependency unit admission) and postnatal psychological health symptoms, focusing on PTSD symptoms at 6–8 weeks postpartum.	Researcher developed, postal survey. Self-report.	Pearson’s chi-square tests, Fisher’s exact tests and T-test Multivariable logistic regression analysis	Higher risk of PTSD symptoms among women who experienced severe maternal morbidity compared with women who did not (adjusted OR = 2.11, 95% CI = 1.17-3.78 for intrusion; adjusted OR = 3.28, 95% CI = 2.01-5.36 for avoidance). Higher ratings of reported sense of control during labour/birth partially mediated the risk of PTSD symptoms. No statistically significant differences in the prevalence or severity of symptoms of depression
Hernandez-Martinez et al. (2019)	To determine the prevalence of PTSD at postpartum weeks 4 and 6, and its relationship with perinatal variables and quality of life	Researcher developed, 35 items electronic survey. Self-report.	Binary logistic regression	<b>Furuta et al. (2016)</b> Emergency caesarean more associated with avoidance compared to spontaneous vaginal birth ( $p = 0.02$ ), Assisted vaginal birth higher avoidance ( $p = 0.05$ ) compared to spontaneous vaginal birth Assisted birth (aOR: 2.50; 95% CI: 1.70-3.69), caesarean section (aOR: 3.79; 95% CI: 2.43-5.92), third/fourth degree perineal tears (aOR: 2.77; 95% CI: 1.71-4.49) and manual removal of the placenta (aOR: 1.41; 95% CI: 1.03 - 1.93) were found to be risk factors for PTSD

Johnstone et al. (2001)	To examine obstetric risk factors for postnatal depression in an urban and rural community sample.	Researcher developed, postal survey. Self-report.	Multivariate analysis of variance	None of the obstetric factors were associated significantly with developing PND. There was an increased, but statistically non-significant, risk of developing PND artificial rupture of membrane (OR = 1.72), forceps delivery (OR = 2.51), emergency caesarean section (OR = 1.40), and third-degree tear (OR = 1.61).
Kountanis et al. (2020)	To investigate the relationship between the birth experience and the risk of developing postpartum depression or post-traumatic stress disorder.	Researcher developed, electronic survey. Self-report.	Multivariable logistic regression	Following Unanticipated operative delivery or cesarean delivery risk of developing depression at 6 weeks (aOR 0.50, 95% CI 0.21-1.21) and 3 months (aOR 0.41, 95% CI 0.14-1.18). And following Vacuum, forceps 6 weeks (aOR 0.58, 95% CI 0.10-6.35) and 3 months (aOR 0.68, 95% CI 0.11-6.76).  Risk of developing PTSD within three months postpartum increased among patients experiencing operative management of postpartum haemorrhage (aOR 4.44, 95% CI 1.16 - 17.02).
Rauh et al. (2012)	To compare depressiveness scores, both during and after pregnancy, with the delivery mode.	Researcher developed questionnaires were structured as personal interviews	Kruskal–Wallis test Analysis of variance	Significant differences were seen between the delivery modes at T2 (P<0.0001) but not at T3.  At T2 significantly lower EPDS values in patients with spontaneous deliveries in comparison with patients with assisted vaginal and caesarean sections (P<0.001).
Tol et al. (2019)	To assess the risk of PTSD for women with Abnormally invasive placenta compared to women having an uncomplicated caesarean delivery (CD) or unexpected PPH or EPH.	Researcher developed, postal survey. Self-report.	Mann Whitney U and Fisher's exact test	Significantly higher PTSD scores for women with AIP compared to uncomplicated caesarean (P=0.001). No significant difference was seen between abnormally invasive placenta and emergency postpartum hysterectomy / postpartum haemorrhage (P=0.89).

\* Shares sample

† Shares sample with Dekel et al. (2020) main findings reported with 2019 paper

‡ Shares sample with Furuta et al. (2016) and main findings reported with 2014

## **Discussion**

This review summarised cross-sectional and longitudinal research investigating the impact of obstetric complications or procedures during childbirth on women's postnatal mental health. Thirteen papers, from 11 samples, were included and summarised narratively. A variety of obstetric complications or procedures and any respective associations with depression, anxiety or post-traumatic stress symptoms were reported.

Overall, the findings suggest support for individual complications or procedures being linked to poor mental health outcomes namely depression and PTSD. Consistent with this, associations were also found for those experiencing multiple procedures. These findings indicate that experiencing complications or procedures is generally linked to poor mental health outcomes.

### **Summary of evidence**

The evidence suggests that following any obstetric complication or procedure women may be more likely to experience a negative impact on their postnatal mental health, with results suggesting an increased risk of depression, anxiety and PTSD in the postpartum period.

Emergency caesarean section and assisted birth were focused on more than any other complication or procedure within the findings, which showed considerable support for the associations with poorer mental health. Given the increase in women requiring ECS and assisted births over the past five years (Care Quality Commission, 2020; Redshaw & Henderson, 2015) identifying when obstetric complications /procedures have been appraised as a threat by women and subsequently impacted on their well-being is crucial, in line with the transactional theory on emotions, stress and coping (Lazarus & Folkman, 1987), so that

psychological support can promote positive coping and emotional responses following such events. Understanding the psychological impact of obstetric complications /procedures may allow for the opportunity to enhance women's coping skills during antenatal preparation, before the possibility of such events occurring. This is particularly important given the recently highlighted improvements needed in perinatal provision (Care Quality Commission, 2020) and the known consequences of women not receiving adequate psychological support (NICE, 2019).

Perineal tears are noted to be common after vaginal birth, with surgical interventions noted to cause discomfort and mental health implications for women postnatally (CENTRAL, 2021). The degree of perineal tear's impacting on postnatal mental health differed in the current findings, however interestingly 2<sup>nd</sup> degree tears (and above i.e 3<sup>rd</sup> and 4<sup>th</sup> degree tears) were reported to be associated with depression (Dunn et al., 2015), whereas women were only found to be at risk of PTSD if they experienced more severe 3<sup>rd</sup> or 4<sup>th</sup>-degree tears (Hernández et al., 2019). Perhaps suggesting the higher degree of severity of the tear, the more likely women are to experience comorbidities in their postnatal mental health. Perineal tears, particularly those classified as 4<sup>th</sup> degree in nature can have long-lasting impacts on women including severe pain and faecal incontinence, which may require multiple corrective surgeries and subsequently be detrimental to women's mental health (Beck, 2021). While perineal tears may be unavoidable in some cases, it may be possible to minimise the subsequent negative impact of them, such as offering women virtual reality during repair of tears to reduce the anxiety and pain experienced (CENTRAL, 2021).

Both PPH and placenta complications are considered more serious obstetric problems and have the potential to be life-threatening, with placenta complications making the chance of PPH more likely (NHS, 2018b; Northern Lincolnshire and Goole NHS Foundation Trust, 2016; Royal College of Obstetricians and Gynaecologists, 2016). Women who have a PPH

are noted to be at high risk of stillbirth, ESC, further complications, and maternal death (Hough et al., 2021) suggesting the potential impacts of a PPH on a woman and her family could be considerable. While maternal deaths as a result of PPH have decreased in the past 15 years, there is still a concerning number, most commonly occurring after caesarean sections (Morau et al., 2021). Guidance supports the active management of the third stage of labour to actively reduce the risk of a postpartum haemorrhage (NICE, 2017), highlighting professionals' aim to avoid such a risky complication. Both childbirth experiences and serious health problems are considered events that can cause PTSD (NHS, 2018a). The current findings suggest that the more serious obstetric events experienced by women such as post-partum haemorrhage, ESC and placental complications increases the risk of them developing PTSD symptoms.

The experience of some obstetric procedures or complications increases the likelihood of women requiring further obstetric intervention, meaning women can often experience multiple interventions during their childbirth (Care Quality Commission, 2020). The current findings highlight that just as individual complications /procedures are linked to more negative mental health experiences, as are multiple complications /procedures. Some findings note the more complications /procedures experienced the more severe the link to poorer mental health outcomes. However as only two studies focused on multiple complications /procedures, one of which had a small sample size, this warrants further investigation. However, there is evidence to suggest that women can experience psychological growth following childbirth, with the highest levels of appreciation for life reported by those experiencing stressors in labour such as obstetric complications /procedures (Berman et al., 2021). Although it is acknowledged that psychological growth can be hindered in women with acute PTSD symptoms (Berman et al., 2021), further highlighting the severity of such



symptoms and the importance of them being recognised in women, so they can be offered psychological support.

### **Methodological limitations**

While the review identified several significant findings, several limitations should be taken into consideration. Due to the ongoing impact of the Covid-19 pandemic, it has not been possible to obtain second ratings of the quality assessment or have 50% of the sample independently screened by a second-rater for inter-rater reliability, as originally intended. However, the inclusion of the final sample has been checked with the wider research team.

It is acknowledged that the QATQS used to assess the risk of bias contains a blinding component that informs the overall global rating of the paper (Effective Public Health Practice Project, 2009), however as all the included studies are observational, women participating can never be blinded, meaning double-blinding is not possible. While raters within studies could be single-blinded it is not a crucial element within these papers however, it is acknowledged that without the blinding component papers may have a stronger rating globally on the QATQS.

Only papers written in English and from high-income countries were considered for inclusion in the final review sample, which may have resulted in a language, or cultural bias.

Findings were categorised by type of complication /procedure to explore if any, the differing impacts on mental health outcomes. However, it is noted that this resulted in some categories such as ‘number of complications experienced’ containing fewer papers than

others such as 'ECS', which may limit the strength of conclusions that can be drawn from different categories.

The methodological quality across the studies was moderate, indicating that the studies are acceptable. All the papers had clear research questions and adequate descriptions of the data collection and analysis methodology. However, three of the papers were cross-sectional, of which direction of causality of results cannot be assumed which is a further limitation. It is acknowledged that ten papers reported cut-off scores when describing cases of depression or PTSD instead of utilising clinical interviews which is a limitation.

Furthermore, it was noted that the variance explained by the statistical analysis was low for several the papers with little reference to more sophisticated analyses of potential mediating factors in the studies which is a limitation. This therefore limits the strength of the conclusions that can be drawn in regard to potential relational variables such as sense of control (Furuta et al., 2014).

It was also noted that the ethnicity of samples was poorly reported on within papers, with two reporting on the nationality of women (Blom et al., 2010; Hernández et al., 2019) as opposed to their ethnicity. Therefore, it cannot be concluded how ethnically diverse sample populations were. In addition, several papers had missing data or did not report figures on items such as women's primiparous or multiparous status, age or birth complications. Thus, this limited the strength of conclusions that can be drawn and is a limitation.

### **Implications for research**

The findings of this review support the link between obstetric complications or procedures during childbirth and a negative impact on a woman's postnatal mental health. The final sample of this review predominately reported validated measures of depression and PTSD. Therefore, further research may be needed to explore the impact of obstetric

complications or procedures on other validated measures of postnatal mental health such as anxiety, worry and rumination.

The limited reporting of sample ethnicity could be improved with future research. In the UK alone one in four births is to foreign-born women (Office of National Statistics, 2014) with maternal mortality disproportionately higher for some immigrant women in the UK (Higginbottom et al., 2019). Black African women have been reported in a maternity survey to be more likely to deliver by ECS (Henderson et al., 2013). Of Black, Asian and minority ethnic (BAME) women surveyed, 5% experienced forceps delivery, 5% ventouse and 22.8% Caesarean Section (Jomeen & Redshaw, 2013), with women from all minority ethnic groups reporting a poorer experience of maternity services than white women (Henderson et al., 2013). Thus, suggesting the importance of including women of all ethnicities when exploring the impact of obstetric complications or procedures on postnatal mental health in future research and reporting on these findings.

In addition, further research would benefit from following women prospectively, from pregnancy to 12 months postnatally. Capturing women's mental health experiences in pregnancy, the specific obstetric complications or procedures experienced during childbirth and the subsequent experiences of postnatal mental health will allow for causal relationships to be established. Understanding the psychological processes that drive the association between complications/procedures and multiple procedures and the development of postnatal mental health difficulties will allow more conclusive conclusions to be drawn and inform practice. All additional future research completed should aim to do so with minimum risk of bias so that results can be generalised to all women in high-income countries.

## **Clinical Implications**

Of the 13 papers, 12 highlighted an association between experience of obstetric complications or procedures and the subsequent negative impact on mental health. However, as the papers included focused on a variety of complications or procedures and utilised several outcome measures of mental health, it is difficult to draw direct conclusions about how specific obstetric events precisely impact on postnatal mental health. However, the general associations noted by the review are helpful clinically and indicate women who have these birth experiences may be likely to require additional psychological support for their mental health in the postnatal period.

Obstetric complications or procedures, such as PPH, placenta complications, emergency caesarean section and assisted births, found to be associated with women's experiences of PTSD in the postnatal period, may require a period of watchful waiting by health care professionals (NHS, 2018a). Symptoms of PTSD can be severe and persistent enough to significantly impact a women's quality of life following birth. Professionals should actively monitor women following a complication or procedure focusing on their mental health (Beck, 2021).

Problems during childbirth that cause distress are noted to be of importance to focus on due to the longer-term impacts this can have on newborn babies' development (National Collaborating Centre for Mental Health, 2018). Childbirth related PTSD was consistently found to be associated with lower levels of maternal-infant bonding up to 12 months postnatally (Kjerulff et al., 2021), highlighting the importance of women being able to access support following labour to promote both their wellbeing and that of their child. However, another study reported that while PTSD symptoms may cause difficulties, they may not be

associated with bonding difficulties, highlighting more research is needed in this area. Thus, suggesting that any intervention should focus on a mother's general PTSD and depression symptoms (Handelzalts et al., 2021).

The effect of women experiencing poor mental health during the postnatal period can be profound, particularly during a time when they face competing demands including looking after a young infant (National Collaborating Centre for Mental Health, 2018). Thus, NICE guidance supports the use of offering psychologically informed therapeutic interventions to support women in the postnatal period (National Collaborating Centre for Mental Health, 2018; NHS, 2018a).

### **Conclusion**

Overall, while the association between individual obstetric complications or procedures and specific mental health outcomes may need further investigation, this review highlights there is evidence that the experience of such obstetric events during childbirth can negatively impact a women's postnatal mental health. This has implications for the subsequent care and support women should be offered in the postnatal period.

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*Chapter Two*

**Does the focus and content of antenatal preparation interact with obstetric complications and procedures to impact on birth experience and postnatal mental health?**

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Declaration of interests: Not applicable

For submission to the *BMC Pregnancy and Childbirth* (author guidelines in Appendix C)



## Abstract

**Background:** The current literature does not offer a consensus on the content and focus of antenatal preparation, nor any impact this has on women's subsequent birth experience or postnatal mental health. There is evidence to suggest the impact of the experience of birth can be profound on a mother's postnatal well-being, which may ultimately have ramifications for her child. This study aimed to explore if there is a relationship between the content of antenatal preparation received, the experience of obstetric complications /procedures, and birth experience. Furthermore, it was important to explore the subsequent impact on postnatal mood, anxiety, worry and rumination, whilst considering the role of perceived social support received during birth. **Method:** In total, 253 first-time mothers completed a cross-sectional survey online measuring demographic and clinical factors; antenatal preparation content including normality-focused, broader-focused and total preparation, obstetric complications and procedures experienced, experience of childbirth, Postnatal Mental Health (depression, anxiety, worry and rumination), Perceived Support and information on how the COVID-19 pandemic had impacted on birth experience. **Results:** Regression analyses showed that women receiving more information about normality-focused or broader-focused information during antenatal preparation appeared to have a better birth experience and overall emotional experience. Broader-focused preparation was associated with an improved birth experience irrespective of the number of complications experienced, while still beneficial, greater normality-focused preparation was less effective in the context of higher levels of complications /procedures. There was limited support for the links between the content of antenatal preparation and mental health outcomes depression, anxiety, worry and rumination. Women feeling supported by their birth partner experienced a more positive birth and improved postnatal mental health outcomes. **Conclusions:** The results highlight that antenatal preparation including both normality and broader-focused

information is likely to be of benefit to women's birth experience, irrespective of their experience of complications /procedures. This antenatal preparation may have positive implications for depressive symptoms postnatally and should be freely available and easily accessible.

**Keywords:** Antenatal preparation, birth experience, complications, procedures, postnatal mental health

## Background

In 2020, there were approximately 624,000 live births in England and Wales [1], with an estimated 43% of women having a caesarean or instrumental birth in 2019 [2], highlighting the proportion of women that experience obstetric complications /procedures each year. Understanding how women experience childbirth is important as this can have serious implications for their postnatal mental health [3]. The impact of postnatal mental health difficulties on both mother and baby are known to be profound [4], resulting in the Five-Year Forward View for Mental Health committing to improving specialist mental health care for women during the postnatal period [5].

It is noted that childbirth can be unpredictable with the possibility of both obstetric complications and procedures [6]. An obstetric complication is an event occurring during labour-delivery that requires assistance from health care professionals that may require subsequent obstetric procedures. Examples include complications involving the placenta at the onset of labour and during [7] and postpartum haemorrhage, heavy bleeding after birth [8]. Obstetric procedures can be used for several reasons, often as a result of professionals becoming concerned about the welfare of either mother or baby [9]. Examples include preventing a prolonged pregnancy by inducing labour [10], episiotomy to reduce perineal trauma during birth and active management of the placenta following birth to reduce the risk of a postpartum haemorrhage. Therefore, as both complications /procedures are inextricably linked within maternity care, both may influence birth experience and so need to be considered together.

There is evidence that women have come to view obstetric procedures more positively, and as the willingness to accept procedures has increased, so has the likelihood of an instrumental delivery [11]. First-time mothers are more likely to have obstetric procedures

such as forceps, ventouse or an unplanned caesarean section than women who have given birth before [12].

Before labour, women can access antenatal preparation, often in the form of classes, to give them information and help prepare them for the upcoming birth of their baby. Classes are free when provided by the National Health Service [13]. More normality-focused preparation includes information about the onset of labour, the normal stages of labour and birth, and breastfeeding, which are topics routinely covered by most antenatal preparation provisions. Some antenatal preparation may also cover broader-focused topics, which includes information on obstetric complications /procedures possible during childbirth [13]. However, it is unclear if the content of current antenatal preparation reflects the national increase in obstetric procedures, moreover the definition of antenatal education varies significantly within the literature [14, 15]. Within UK maternity services professionals may be mindful not to raise women's anxiety unnecessarily, meaning they are less likely to discuss the possibility of birth not proceeding straightforwardly, nor the potential for obstetric complications /procedures [16]. Whilst guidance outlined by the National Institute for Health and Care Excellence [17] state that pregnant women should be offered opportunities to attend antenatal preparation classes, the content and number of classes offered is at the discretion of individual NHS Trusts [2].

Birth is reported to be less distressing for those women who attended antenatal classes [18], however antenatal preparation was highlighted as an area requiring improvement in a recent UK maternity survey [2]. Interestingly, 71% of women reported being offered NHS antenatal preparation classes [2], an increase on the 65% of women previously noted [9], however only 30% of women surveyed attended such birth preparation [2, 9]. It was previously noted by Redshaw and Henderson [9] that 14% of women attended non-NHS

privately funded antenatal preparation classes. The current study consequently included mothers that attended NHS and/or privately funded antenatal preparation.

Women attending midwife-led care clinics identified that antenatal education could be improved in relation to labour [19]. Antenatal education is important to help women develop coping strategies for childbirth, but the unpredictability of obstetric complications /procedures may impact women's abilities to utilise such strategies [6]. Brixval, Axelsen [14] found insufficient evidence to determine whether antenatal education classes were effective in improving obstetric and psychological outcomes.

The transactional theory on emotions, stress and coping proposed by Lazarus and Folkman [20] highlights that information known by an individual is appraised to consider the implications of that information on their well-being. An individual's coping and emotional response to information depends on their appraisal of the perceived harm, threat or challenge to their well-being, particularly if the appraisal is accompanied by anxiety [20]. In line with this model, it is suggested that antenatal preparation which has not provided information on the potential threat/challenge of obstetric complications /procedures during childbirth would lead to a higher appraisal of perceived threat, negative coping and negative emotional response from new mothers in such events. This could consequently have long-lasting negative effects on both mother and baby in the postnatal period [5].

Studies identifying the impact of information provided on the outcomes of general medical procedures have found additional information helped reduce chemotherapy patients' pre-treatment anxiety, enhance their satisfaction and confidence in coping with treatment when compared to controls [21]. Mott [22] found a significant difference existed between the pre- and post-procedure anxiety scores overall within a cardiac catheterisation sample. Anxiety scores were lower in parents of children in a paediatric intensive care unit when

provided with information preparing them for their child's ward transfer [23]. These studies support the idea that preparing individuals for a potentially distressing procedure, has a positive impact on their experience, satisfaction and experienced anxiety. This could also be true for women facing obstetric complications /procedures during childbirth, this has not previously been explored within research.

A Cochrane review that aimed to investigate if the impact of obstetric complications was moderated by antenatal education could not go ahead due to the lack of randomised controlled trials in this field [24]. However, it is suggested that appropriate antenatal education may empower women and lessen the distress associated with complications and procedures [24]. For women undergoing elective caesarean section, satisfaction was associated with more information provided about their procedure and with greater perceived emotional support during birth [25]. This suggests that broader-focused information about a procedure helps to improve outcomes for women and that social support plays a role within this association.

Social, emotional support is suggested to promote a more positive childbirth experience and reduce the risk of postpartum depression [26]. Bäckström, Larsson [26] highlighted that antenatal classes allow first-time mothers to connect with other expectant parents increasing their opportunity for social support. Support from family was also found to moderate the negative effects of birth complications on perinatal stress symptoms [27].

A trend between exposure to obstetric complications and the subsequent development of mental health problems, including bipolar disorder, depression and psychosis has been noted [28]. Furthermore, obstetric complications are also a risk factor for women developing eating disorders [29]. Women who were not given adequate information about birth methods and subsequently required procedures during childbirth were at increased risk of developing

postpartum depression [30]. Additionally, women who reported feeling unprepared for birth when experiencing a discrepancy between their expectations and the actual experience were more likely to report a traumatic birth experience [31]. A traumatic birth experience can result in women developing postnatal post-traumatic stress disorder, particularly in instances when women experience an unexpected and potentially harrowing obstetric complication or procedure [32]. Molyneux, Fowler [33] suggested obstetric procedures, such as episiotomy during childbirth are associated with a more negative childbirth experience, which can cause physical harm and disruption to women postnatally during a time when they are trying to bond with their new-born [34]. This highlights the seriousness of understanding the impact of obstetric complications /procedures on women's birth experience and subsequent mental health.

An instrumental birth was associated with looking back negatively on the birth up to three years later, suggesting higher rumination and worry and lower birth satisfaction in those experiencing obstetric complications /procedures [35]. Rumination was associated with depressive mood and mothers' parenting abilities during the **postnatal** period [36] and is suggested to be a feature of postnatal depression [37]. This indicates the importance of understanding the impact of obstetric complications /procedures on postnatal worry and rumination.

The current literature does not offer a consensus on recommendations or guidelines concerning the content and focus of antenatal preparation, nor the impact this has on women's subsequent birth experience or postnatal mental health, suggesting a knowledge gap. There is evidence to suggest the experience of birth can have a profound impact on a mother's postnatal well-being. Understanding whether information on possible obstetric complications /procedures provided during antenatal preparation and the nature of subsequent

experience then relates to how birth is experienced and postnatal mental health, could offer significant implications for future research and inform antenatal clinical practice.

Therefore, this study aimed to explore if there is a relationship between the content of antenatal preparation received, the experience of obstetric complications /procedures and birth experience. Furthermore, it is important to explore the subsequent impact on postnatal mood, anxiety, worry and rumination, whilst considering the role of perceived social support received during the birth. It was hypothesised that:

(1) Birth experience is influenced by the experience of obstetric complications /procedures and the type and amount of antenatal preparation. More specifically, in the context of greater experience of obstetric complications /procedures (as defined by number weighted by severity), receiving more extensive broader focus preparation will be associated with a more positive birth experience.

(2) Greater experience of obstetric complications /procedures (as defined by number weighted by severity) in the context of more ‘normality’ focused preparation will be related to greater postnatal anxiety, worry, rumination and lower mood, while in the context of more ‘broader’ preparation, experiencing more obstetric complications /procedures will not be related to greater postnatal anxiety, worry, rumination and lower mood.

(3) Greater perceived social support from birth partner during birth will be associated with a more positive birth experience, reduced postnatal anxiety, worry, rumination, and more positive mood, irrespective of birth complications /procedures and focus and content of antenatal preparation.

(4) Greater perceived social support from birth partner will still be associated with a more positive birth experience once birth complications/procedures and amount of antenatal preparation have been taken into account.



## **Method**

### **Design**

A quantitative approach was used in this cross-sectional study with information collected via standardised outcome measures. For the first hypothesis birth experience was measured in two ways using the Childbirth Experience Questionnaire (CEQ; [38]) and overall emotional experience [39] as dependant variables with the predictor variables; complications /procedures (OCPS), normality-focused preparation, broader-focused preparation and any interactions. For the second hypothesis mental health outcomes were measured; The Patient Health Questionnaire measure of depression (PHQ-9;[40], The Generalised Anxiety Disorder Assessment measure of anxiety (GAD-7; [41]), The Penn State Worry Questionnaire measure of worry (PSWQ;[42]) and The Ruminative Responses Scale measure of rumination (RRS;[43]). The predictor variables; complications /procedures, normality-focused preparation, broader-focused preparation and any interactions. For the third hypothesis correlations between the variables The Significant Other Scale measure of birth partner social support (SOS; [44]), CEQ, PHQ-9, GAD-7, PSWQ and RRS were explored. For the fourth hypothesis birth experience CEQ was measured with the predictors; OCPS, total preparation and SOS. The study was approved by the University of Liverpool Research Ethics Committee (Appendix D).

### **Participants**

First time mothers (aged  $\geq 18$  years of age) who were able to understand English, with babies born 37+ weeks, were invited to participate 4-12 weeks postnatally. Women were eligible if they had attended at least 1 antenatal class in person or virtually, either NHS or privately funded. Excluded were women who had a planned caesarean section, had a

stillbirth, gave birth to more than one baby or whose baby required more than 48 hours in special care.

In total 329 participants provided a full set of completed measures, 76 (23.1%) were found to be outside the study postnatal criteria and were excluded. Consequently, 253 participants were included in the final sample.

### **Power calculation**

To determine sample size estimation, a priori power analysis was calculated. Initially, an ANOVA analysis was planned, with an alpha ( $\alpha$ ) = .05 and power = .95, the projected sample size needed with this effect size was approximately  $N = 210$  (GPower 3.1). However, the analysis was subsequently changed to multiple regression analysis, with an alpha ( $\alpha$ ) = .05 and power = .95 the projected sample size needed for a medium effect size  $f = 0.15$  ( $R^2 = .13$ ) was approximately  $N = 130$  (GPower 3.1).

### **Measures (Appendix E)**

Demographic information included; age, marital status, level of education, ethnicity and current employment status, in addition to labour related questions.

### **Antenatal Preparation Scale**

To measure antenatal preparation information, a list was created to cover the focus and full range of potential content of antenatal preparation, including both normality- and broader-focused items. Broader-focused items incorporated information about potential complications and procedures. Input, approval and confirmation that the list was comprehensive was gained from a Professor in Midwifery, an expert in antenatal preparation

in the UK, who had published in a survey of national provision. Better Births Together<sup>2</sup> were also contacted to recruit service user advisors from a mother and baby group to check the terminology of the list. Finally, four mothers provided feedback on the questions regarding antenatal preparation on 5<sup>th</sup> August 2019 (Appendix F) and amendments to the list were subsequently made.

This measure asked women to indicate which elements were covered within their attended preparation including information on normal processes of birth such as signs of labour starting, the three stages of labour, pain relief, breastfeeding and their wellbeing. In addition, women were asked whether information on possible obstetric procedures/ complications was provided (broader-focused items). Women were asked to indicate if they had received 'No information', 'Some limited information' or 'Detailed information' for each item. Women could attend more than one set of antenatal preparation; therefore, it was important to capture their highest score of information received. Thus, a composite scale was created for those who had attended two or more classes, so that their highest scores for each item of both normality-and broader-focused information was used in the analysis. Internal consistency was high for the normality-focused scale ( $\alpha = .92$ ) (scores ranging from 18-54), broader-focused scale ( $\alpha = .95$ ) (scores ranging from 22-66) and Total preparation scale ( $\alpha = .96$ ) (scores ranging from 40-120).

### **Obstetric Complications and Procedures Scale (OCPS)**

To measure experience of obstetric complications /procedures a list was created, with input from Prof Helen Spiby, external collaborator to the study, to cover the complications and/or procedures experienced by mothers, corresponding to the antenatal information

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<sup>2</sup> A service working in partnership with maternity services across Lancashire and South Cumbria aimed at improving maternity services for women, their babies and their families.

measure. As a composite measure of complications was required, further input was received from nine midwives who rated the complication/ procedure items on how 'Severe and Sudden' they believed each individual item to be, with 1 being 'Not at all Severe and Sudden, to 5 being Extremely Severe and Sudden' (Appendix G). The means of these scores were used to weight each individual item to create the continuous scale utilised in the analysis (Table 1). Scale scores ranged from 0-42. Intraclass correlation coefficients (ICC) were computed to check interrater reliability. A 2-way random-effects model was chosen to allow reliability results of midwife ratings to be generalised to the midwifery population (Koo & Mae, 2015). In terms of process, it was important for raters to provide scores that were similar in absolute value and so absolute agreement was selected [45]. ICC estimates and their 95% confidence intervals were calculated using SPSS v.25. Based on a mean-rating (k = 9), Two-Way Random, absolute ICC = 0.87, indicative of good interrater reliability for this variable [46].

**Table 1.** *Midwife ratings to create weighted continuous obstetric procedures/ complications scale*

Items	Raters									Mean score	Item weighting
	1	2	3	4	5	6	7	8	9		
Rupturing membranes artificially	1	1	3	4	1	3	2	2	3	2.22	2
Waters breaking prolonged period before going labour or contractions	1	1	2	2	1	3	2	5	4	2.33	2
Membrane sweep(s)	1	1	3	2	2	3	2	2	1	1.89	2
Use of vaginal gel or pessary	1	1	3	3	2	3	3	1	3	2.22	2
Oxytocin drip	1	1	4	4	2	4	3	3	5	3.00	3
Augmentation	1	1	4	5	2	4	3	2	5	3.00	3
Forceps	2	3	5	5	5	5	4	5	5	4.33	4
Ventouse	2	3	5	5	4	5	4	5	5	4.22	4
Episiotomy	2	4	5	5	5	5	4	5	5	4.44	4
1 <sup>st</sup> / 2 <sup>nd</sup> degree perineal tear	2	2	4	3	4	5	3	3	4	3.33	3
3 <sup>rd</sup> / 4 <sup>th</sup> degree perineal tear	4	4	5	5	5	5	4	5	5	4.67	5
Breech	2	4	4	1	2	5	3	4	4	3.22	3
Nuchal cord	1	1	2	4	3	3	2	3	3	2.44	2
Baby distressed during labour	3	3	5	5	4	5	4	3	5	4.11	4
Electronic monitoring of baby throughout labour	1	1	3	4	1	3	1	2	4	2.22	2
Emergency Caesarean section	3	3	5	5	5	5	4	5	5	4.44	4
Active management placenta	1	1	3	3	1	2	1	2	4	2.00	2
Retained placenta	3	3	4	5	2	4	4	3	4	3.56	4
The need for special care baby unit	4	3	5	5	4	5	4	4	5	4.33	4
Excessive blood loss after birth	3	4	5	5	5	5	4	5	5	4.56	5
Extended stay in hospital 3+ days mother	2	2	4	5	1	4	4	3	4	3.22	3

## **Experience of Childbirth**

The Childbirth Experience Questionnaire (CEQ; [38]) was used to assess General Experience of birth. The CEQ consists of 19 questions and items are scored on a four-point scale, with options ranging from 1 totally disagree-4 totally agree. Four items were reversed, then the following subscales summed; own capacity, professional support, perceived safety and participation, example item 'I felt capable during labour and birth'. Higher ratings reflect more positive experiences (total ranging from 19 to 76). Permission has been granted from the author for use in this research. The CEQ total had good levels of internal consistency in this study (Cronbach's  $\alpha = .91$ ).

## **Overall Emotional Experience**

Section A of Expectations, Experiences and Satisfaction with Labour [39] was used to assess the emotional experience of birth. This contains 10 questions about emotions during labour, five positive (Exciting, Enjoyable, Satisfying, Pleasant, Exhilarating) and five negative (Anxiety provoking, Frightening, Embarrassing, Exhausting, Difficult). Items are scored on a four-point scale, with options ranging from 1-4. The positive emotions scale ( $\alpha = .9$ ) and the emotions negative scale ( $\alpha = .77$ ) had good levels of internal consistency in this study. As the two were highly inversely correlated,  $r = -.60^{**}$ , an overall emotional experience scale was created by reversing the negative emotion scores which were added to the positive scores (ranging from 10 to 40), with high scores indicating an overall more positive experience. This also demonstrated good levels of internal consistency ( $\alpha = .89$ ).

## **Measures of Postnatal Mental Health**

The Generalised Anxiety Disorder Assessment (GAD-7; [41]) was used to assess anxiety. The GAD-7 contains 7 questions and is used in clinical services. Items are scored on

a four-point scale, with options ranging from 0 (not at all) -3 (nearly every day), an example item 'Feeling nervous, anxious or on edge'. Scores are summed to produce a total scale score (ranging from 0 to 21), with higher scores reflecting higher levels of anxiety. The scores represent 0-5 mild anxiety, 6-10 moderate anxiety, 11-15 moderately severe anxiety and 15-21 severe anxiety. The GAD-7 total had good levels of internal consistency in this study scale ( $\alpha = .92$ ).

The Patient Health Questionnaire measure of Depression (PHQ-9;[40]) was used to assess mood. The PHQ-9 contains 9 questions, validated on clinical samples. Items are scored on a four-point scale, with options ranging from 0 (not at all) -3 (nearly every day), an example item 'Feeling down, depressed, or hopeless'. Scores are summed to produce a total scale score (ranging from 0 to 27), with higher scores reflecting higher levels of depression. The scores represent 0-5 mild depression, 6-10 moderate depression, 11-15 moderately severe depression and 16-20+ severe depression. The PHQ-9 total had good levels of internal consistency in this study scale ( $\alpha = .88$ ).

The Ruminative Responses Scale (RRS;[43]) was used to assess rumination. The RRS contains 22 items asking respondents to indicate how often they engage in ruminative thoughts or behaviours when they feel sad, blue, or depressed. Items are scored on a four-point scale, with options ranging from 1 almost never-4 almost always, an example item 'How often do you think about how passive and unmotivated you feel'. Scores are summed to produce a total scale score (ranging from 22 to 88) with higher scores reflecting higher levels of rumination. The RRS total had good levels of internal consistency in this study scale ( $\alpha = .96$ ).

The Penn State Worry Questionnaire (PSWQ; [42]) was used to assess worry. The PSWQ contains 16 items measure of frequency and intensity of worry. Items are scored on a five-point scale, with options ranging from 1 Not at all typical of me- 5 Very typical of me, an example item 'Many situations make me worry'. Five items are reversed, then scores summed to produce a total scale score (ranging from 16 to 80) with higher scores reflecting higher levels of worry. The PSWQ total had good levels of internal consistency in this study ( $\alpha = .95$ ).

### **Measure of Perceived Support**

The Significant Other Scale (SOS; [44]) was used to assess the support participants had perceived to receive from their birth partner. As a result of the COVID-19 pandemic restrictions, two participants (0.8%) reported being unable to have a birth partner with them during labour. The SOS contains 10 questions exploring the practical and emotional support of birth partner (includes partner/mother/friend), an example item 'To what extent did you get practical help from your birth partner'. Items are scored on a seven-point scale, with options ranging from 1-7. Scores are summed to produce a total scale score (ranging from 10 to 70) with higher scores reflecting higher perceived social support. The SOS total had good levels of internal consistency in this study ( $\alpha = .9$ ).

### **Impact of the COVID-19 pandemic**

Four additional questions were added at the end of the questionnaire to explore the impact of the COVID-19 pandemic on participants' birth experience. These were 'Did this impact on what antenatal preparation you were able to access?', 'Were you able to have ALL the people you had planned to be with you in labour and birth?', 'If someone was with you for the birth, were they able to be there for all the time you had planned?' and 'Was your



birth experience affected in any other way by the COVID-19 pandemic?'. All required a 'Yes/No' response with participants offered to provide further detailed information on each question if they felt their birth experience had been impacted by the COVID-19 pandemic.

### **Procedure**

The study was advertised across social media platforms for perinatal women including Facebook and Twitter feeds (Appendix H). The survey was completed online (via Qualtrics) following provision of the information sheet (Appendix I) and completion of the consent form (Appendix J). Participants completed a series of measures anonymously including; demographic information, antenatal preparation information, OCPS, CEQ, overall emotional experience, SOS, GAD-7, PHQ-9, PSWQ and RRS which took approximately 20-30 minutes. On completion of the survey, participants were provided with a debrief sheet (Appendix K). Participants were also asked to indicate if they wished to enter a prize draw to win one of ten £25 retail vouchers upon completion of the measures.

### **Data Analysis**

Data analysis was performed using SPSS v.25. Demographic information was collated using descriptive statistics. Only participants fully completing the questionnaires were included in the analysis. No individual missing data occurred.

To test Hypothesis 1, a hierarchical regression analysis was run in order to explore predictors and any interactions between antenatal preparation content (separately for normality, broader and total) and the experience of obstetric complications/ procedures, and whether this impacted women's birth experience (CEQ). The same predictors were also explored in a hierarchical regression analysis, with overall emotional experience as the dependant variable.

To test Hypothesis 2, a hierarchical regression analysis was run in order to explore predictors and any interactions between antenatal preparation content (separately for normality and broader) and the experience of obstetric complications/ procedures and whether this impacted on women's postnatal mental health variables. Depression, anxiety, worry and rumination were explored as the dependant variable in separate analyses.

To test Hypothesis 3, Correlations were used to explore if social support was positively associated with birth experience, but negatively associated with depressive symptoms, anxiety, worry and rumination.

To test Hypothesis 4, a further hierarchical regression analysis was used to explore if perceived social support was associated with more positive birth experience (CEQ) after controlling for complications/procedures and total antenatal preparation. For every regression analysis complications /procedures were entered first in the model, then antenatal preparation and the interaction term or further predictors.

For the four questions exploring the impact of the **COVID-19** pandemic on participants birth experience, a content analysis was conducted to summarise the brief additional information provided. To determine trends and patterns of words used to describe COVID-19 specific impacts and their frequency, this was deemed the most appropriate method [47]. Reoccurring words within the responses were noted and then grouped into themes. These themes were then reviewed for patterns and trends, then grouped into generic umbrella themes identified.

## Results

### Sample characteristics

Table 2 outlines the sample characteristics. Of the participants who completed the survey, the majority (59.7%) were within the ages of 25-31, with birth dates of babies ranging in an 8-month period from 06.04.2020 to 23.11.2020. A total of 194 (76.68%) of the sample attended one set of antenatal preparation, with 55 (21.74%) attending two sets and 4 (1.58%) attending three. A total of 88 (34.78%) women reported gaining their antenatal preparation from NHS provision only, with 123 (48.62%) accessing private only provision and 32 (12.65%) accessing both NHS and private provision. The average normality preparation score was 38.87 (with scores ranging from 18-54; Table 4), 65.60% of women reported having at least some limited information or more on average for all questions. In comparison the average broader-focused preparation score was 38.95 (with scores ranging from 22-66), with 28.10% of women reported having at least some limited information or more on average for all questions. Thus, suggesting on average women reported receiving more information on normality-focused than broader-focused preparation.

**Table 2. Characteristics**

<b>Demographic</b>	<b>N (%)</b>
<i>Age</i>	
18-24	36 (14.23)
25-31	151 (59.68)
32-38	63 (24.90)
39-45	3 (1.19)
<i>Marital Status</i>	
Single	15 (5.93)
Married	127 (50.20)
Cohabiting	109 (43.08)
Prefer not to say	2 (0.79)
<i>Highest Level of Education</i>	
GCSE	16 (6.32)
A level	24 (9.49)
Vocational Qualification	21 (8.30)
Degree	120 (47.43)
Postgraduate degree	65 (25.69)
Prefer not to say/ other	7 (2.77)
<i>Employment status pre-maternity leave</i>	
Employed full time 37.5 + hours	203 (80.24)
Employed part-time less than 37.5 hours	23 (9.09)
Unemployed	7 (2.77)
Self-employed	3 (1.19)
Home maker	8 (3.16)
Student	7 (2.76)
Prefer not to say	2 (0.79)
<i>Ethnicity (no information for 3 participants)</i>	
White British and other	245 (96.84)
Mixed/ Multiple ethnic groups	3 (1.19)
Black/ African/ Caribbean/ Black British	1 (0.40)
Prefer not to say	1 (0.40)
<i>Number sets of antenatal preparation</i>	
One set	194 (76.68)
Two sets	55 (21.74)
Three sets	4 (1.58)
<i>Type of antenatal preparation</i>	
NHS provision only	88 (34.78)
Private only provision	123 (48.62)
Both NHS and private provision	32 (12.65)

Of the sample, 119 (47.04%) experienced an unassisted vaginal birth. For the remaining the most frequent complication /procedure reported was ‘*Electronic monitoring of baby throughout labour*’ 185 (73.12%), followed by ‘*Active management placenta*’ 155 (61.26%) and ‘*Membrane sweep*’ 123 (48.62%) (Table 3). The average number of complications /procedures experienced by women was 5.93.

**Table 3.** *Obstetric complications/ procedures*

	N (%)
Breaking waters artificially	106 (41.90)
Waters breaking a prolonged period before labour or contractions	66 (26.09)
Membrane sweep(s)	123 (48.62)
Gel or pessary	94 (37.15)
Oxytocin drip	85 (33.60)
Augmentation	44 (17.39)
Forceps	42 (16.60)
Ventouse	34 (13.44)
Episiotomy	80 (31.62)
1 <sup>st</sup> or 2 <sup>nd</sup> degree perineal tear	102 (40.32)
3 <sup>rd</sup> or 4 <sup>th</sup> degree perineal tear	14 (5.53)
Breech	8 (3.16)
Nuchal cord	38 (15.02)
Baby distressed during labour	114 (45.06)
Electronic monitoring of baby throughout labour	185 (73.12)
Emergency Caesarean section	71 (28.06)
Active management placenta	155 (61.26)
Retained placenta	8 (3.16)
Need for special care baby unit	19 (7.51)
Excessive blood loss after birth	66 (26.09)
Extended stay in hospital for mother 3+ days	45 (17.79)

Data were screened for normality of distribution which indicated skewness and kurtosis assumptions were met, as well as the examination of histograms, P-plots and scatterplots. Standardised Residuals, Cook’s distance and Durbin-Watson tests were all within appropriate ranges.

## **Bivariate Correlations**

Intercorrelations and descriptive statistics for independent variables and dependent variables are presented in Table 4. The CEQ measure of birth experience was found to be significantly negatively correlated with the OCPS ( $r = -.39, p < .01$ ), meaning that a more positive birth was associated with fewer obstetric complications /procedures. The CEQ was significantly positively correlated with a degree of both normality-focused preparation ( $r = .20, p < .01$ ), broader-focused preparation ( $r = .19, p < .01$ ), and preparation ( $r = .20, p < .01$ ), meaning that a more positive birth was associated with receiving antenatal preparation.

Similarly, the overall emotional experience scale created was found to be significantly correlated with all other variables including negatively with complications /procedures ( $r = -.39, p < .01$ ), and positively correlated with normality-focused preparation ( $r = .20, p < .01$ ), broader-focused preparation ( $r = .22, p < .01$ ), and total preparation ( $r = .22, p < .01$ ). Together, this indicates that increased antenatal preparation of any focus is associated with more positive birth experiences.

**Table 4.** *Correlations among variables (n=253)*

Variable	1 Comp/ Pro	2 CEQ	3 Norm Prep	4 Broad Prep	5 Total Prep	6 Depressi on	7 Anxiety	8 Worry	9 RRS	10 SOS	11 Total Emotion	M	SD
1 Comp/ Pro	--											5.93	2.82
2 CEQ	-.39 **	--										11.47	2.46
3 Norm Prep	-.07	.20 **	--									38.87	8.38
4 Broad Prep	-.05	.19 **	.80 **	--								38.95	10.58
5 Total Prep	-.06	.20 **	.94 **	.96 **	--							77.81	17.99
6 Depression	.17 **	-.36 **	-.16 **	-.08	-.13 *	--						6.85	5.70
7 Anxiety	.16 **	-.35 **	-.13*	-.08	-.11	.77 **	--					6.51	5.57
8 Worry	.09	-.26 **	-.09	-.04	-.06	.57 **	.69 **	--				55.12	14.47
9 RRS	.11	-.36 **	-.10	-.03	-.07	.80**	.75 **	.66 **	--			38.03	13.93
10 SOS	.01	.13*	.10	.09	.10	-.26 **	-.30 **	-.21 **	-.30 **	--		64.00	7.60
11 Total Emotion	-.39 **	.76**	.20**	.22**	.22**	-.42 **	-.39 **	-.35 **	-.37 **	.17**	--	22.67	7.01

*Note:* Comp/ Pro = complications/ procedures experienced, CEQ =birth experience, Norm Prep = Normality-focused preparation, Broad Prep= Broader-focused preparation, Total Prep = Total antenatal preparation, RRS = Rumination, SOS = Perceived Support, \* $p < .05$ , \*\*  $p < .01$ , (2-tailed).

The mean and SD presented for Comp/ Pro is for the total number of complications experienced by participants and not the weighted Comp/ Pro variable .

## **Hierarchical regression analysis**

### **Hypothesis 1**

It was hypothesised that birth experience would be influenced by an experience of obstetric complications /procedures and the type and amount of antenatal preparation. More specifically, it was predicted that in the context of higher levels of obstetric complications /procedures receiving more broader focus preparation would be associated with a more positive birth experience. The regression analyses testing hypothesis 1 is outlined below (Table 5).

In the first model complications /procedures were entered at Step 1 and complications /procedures and normality-focused preparation at Step 2, both variables entered at Step 2 were significant; fewer complications /procedures ( $\beta = -.37, p < .001$ ) and more normality-focused preparation ( $\beta = .18, p < .01$ ) were associated with more positive birth experience (CEQ). Adding the interaction between the two at Step 3, the model accounted for 19% of variance in birth experience and revealed a significant interaction effect ( $\beta = -.55, p < .05$ ). When plotted (Figure 1), the interaction effect showed that greater normality-focused preparation was most beneficial in the context of lower levels of complications /procedures. While still beneficial greater normality-focused preparation was less effective in the context of higher levels of complications /procedures.

In the second model containing broader-focused preparation complications /procedures were entered at Step 1 and complications /procedures and broader-focused preparation at Step 2, both variables entered at Step 2 were significant; fewer complications /procedures ( $\beta = -.38, p < .001$ ) and greater broader-focused preparation ( $\beta = .17, p < .01$ ) was associated with a more positive birth experience. However, the interaction between the two at



Step 3 was not significant, which suggests broader-focused preparation is associated with an improved birth experience irrespective of the number of complications experienced, and that higher levels of complications /procedures are associated with lower birth experienced irrespective of the amount of broader-focused preparation received. The model at Step 3 accounted for 18% of variance in *birth experience* (CEQ). As both normality-focused preparation and broader-focused preparation were highly correlated, an overall measure of total preparation was also explored which provided similar affirmative results (Appendix L).

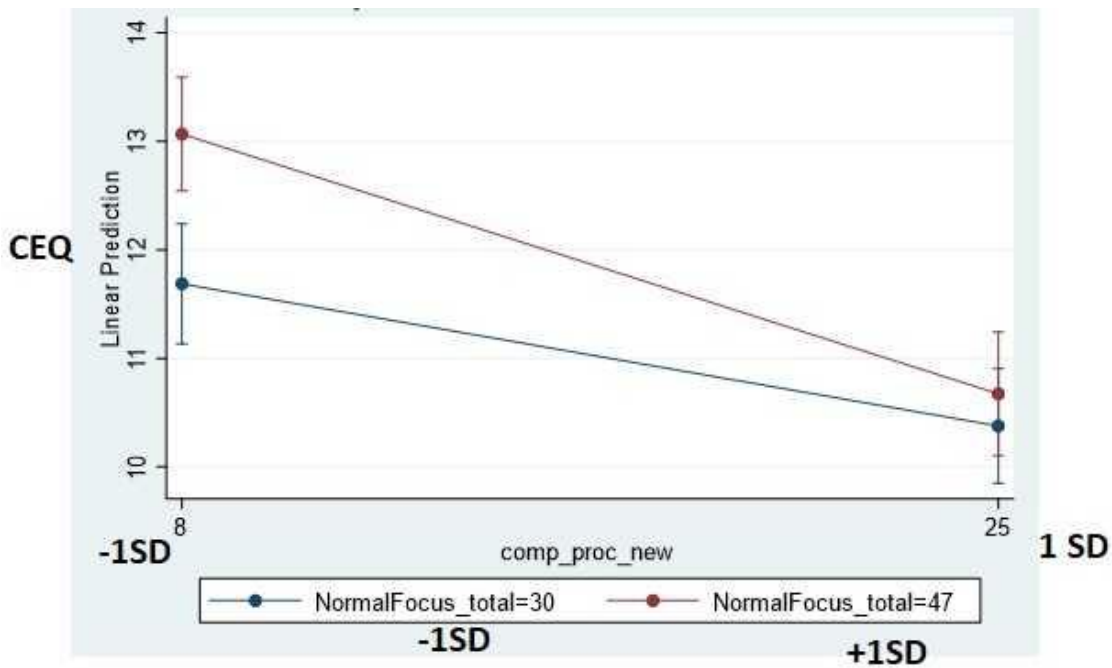
The first model for *birth experience* (CEQ) highlights normality-focused preparation was beneficial at all levels of complication /procedures but more strongly when these were lower. The second model for *birth experience* (CEQ) highlights broader-focused preparation was beneficial at all levels of complications /procedures. Thus, hypothesis 1 was not supported.

**Table 5. Summary of the Birth Experience models of hierarchical regression**

Birth Experience/ Normality-Focused				Birth Experience / Broader-Focused			
Variable	B	SE B	$\beta$	Variable	B	SE B	$\beta$
Step 1				Step 1			
Constant	13.35	.32		Constant	13.35	.32	
Com/ Pro	-.11	.02	-	Com/ Pro	-.11	.02	-
			.39**				.39***
			*				
Step 2				Step 2			
Constant	11.30	.75		Constant	11.79	.62	
Com/ Pro	-.11	.02	-	Com/ Pro	-.11	.02	-
			.37**				.38***
			*				
Normality Prep	.05	.02	.18**	Broader Prep	.04	.01	.17**
Step 3				Step 3			
Constant	8.85	1.39		Constant	11.06	1.12	
Com/ Pro	.04	.07	.13	Com/ Pro	-.06	.06	-.22
Normality Prep	.11	.03	.39**	Broader Prep	.06	.03	.25*
Com/ Pro *	-.00	.00	-.55*	Com/ Pro * Broader	-.00	.00	-.18
Normality Interaction				Interaction			
R <sup>2</sup> = .15 for step 1 ( <i>p</i> < .001), $\Delta R^2$ = .03 for step 2, $\Delta R^2$ = .01 for step 3				R <sup>2</sup> = .15 for step 1 ( <i>p</i> < .001), $\Delta R^2$ = .03 for step 2, $\Delta R^2$ = .00 for step 3			

Note. Com/ Pro= Complications /Procedures. \*\*\* *p* < .001; \*\* *p* < .01; \* *p* < .05, Change in *R*<sup>2</sup> (denoted as  $\Delta R^2$ )

**Figure 1.** Interaction between complications /procedures and normality-focused preparation at Step 3, plotted at +1SD and -1SD of the scores



The models with the dependent variable *overall emotional experience* (Table 6), also highlighted a similar pattern to that found by the *birth experience* models, which was anticipated given that *overall emotional experience* and the CEQ are both different dimensions exploring the experience of birth. Step 2 highlights that *overall emotional experience* during birth were significantly more positive for women experiencing fewer complications /procedures ( $\beta = -.38, p < .001$ ) and more normality-focused preparation ( $\beta = .18, p < .01$ ). Similarly, emotions during birth were significantly more positive when complications /procedures were less ( $\beta = -.39, p < .001$ ) and with greater broader-focused preparation ( $\beta = .20, p < .01$ ). The analysis completed exploring the impact of total preparation and complications /procedures on emotions during birth also highlighted a similar pattern (Appendix L). However, Step 3 interactions were not significant in the context of normality or broader preparation.

Therefore, the models for *overall emotional experience* demonstrate that greater antenatal preparation whatever its focus and lower levels of complications /procedures were

associated with a more positive emotional experience of birth, thus Hypothesis 1 was again not supported.

**Table 6.** Summary of the Overall Emotional Experience models of hierarchical regression

Overall Emotional Experience / Normality				Overall Emotional Experience / Broader			
Variable	B	SE B	$\beta$	Variable	B	SE B	$\beta$
Step 1				Step 1			
Constant	28.13	.90		Constant	28.13	.90	
Com/ Pro	-.33	.05	-.39***	Com/ Pro	-.33	.05	-.39***
Step 2				Step 2			
Constant	22.18	2.11		Constant	22.92	1.74	
Com/ Pro	-.32	.05	-.38***	Com/ Pro	-.32	.05	-.39***
Normality Prep	.15	.05	.18**	Broader Prep	.13	.04	.20**
Step 3				Step 3			
Constant	22.48	3.97		Constant	25.87	3.15	
Com/ Pro	-.33	.21	-.40	Com/ Pro	-.50	.17	-.61**
Normality Prep	.14	.10	.17	Broader Prep	.06	.08	.09
Com/ Pro *	.00	.01	.02	Com/ Pro * Broader	.01	.00	.26
Normality Interaction				Interaction			
R <sup>2</sup> = .16 for step 1 ( $p < .001$ ), $\Delta R^2 = .03$ for step 2, $\Delta R^2 = .00$ for step 3				R <sup>2</sup> = .16 for step 1 ( $p < .001$ ), $\Delta R^2 = .04$ for step 2, $\Delta R^2 = .00$ for step 3			

Note. Com/ Pro= Complications /Procedures. \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ , Change in  $R^2$  (denoted as  $\Delta R^2$ )

## Hypothesis 2

Hierarchical regression analyses were carried out to explore the relationships between preparation, complications / procedures and mental health outcomes concerning depression, anxiety, worry and rumination, in line with hypothesis 2. For each a three-step model was tested; however, none of the interaction variables were significant in the context of either normality-focused or broader-focused preparation (Table 7), therefore the two step models are discussed.

*Depressive symptoms* were significantly associated with less normality-focused preparation ( $\beta = -.15, p < .05$ ) and greater complications /procedures ( $\beta = .16, p < .05$ ). The model while significant accounted for only 5% of variance in depression scores. *Depressive symptoms* were associated significantly with greater complications /procedures ( $\beta = .17, p <$

.01), but degree of broader-focused preparation was not significant. The variables in Step 2 accounted for 4% of variance in depression scores.

*Anxiety symptoms* were significantly associated with higher complications /procedures ( $\beta = .16, p < .05$ ), but were not significantly associated with a degree of normality-focused preparation. For Step 2, the variables accounted for 4% of variance in anxiety scores. For broader-focused preparation this was not significantly associated with *anxiety symptoms* and complications /procedures ( $\beta = .16, p < .05$ ) were significantly positively associated with anxiety symptoms. For Step 2, the variables accounted for 3% of variance in anxiety scores.

There were no significant findings within any of the *worry* and *ruminatio*n models. The *depression* model demonstrates that more obstetric complications /procedures in the context of less normality-focused preparation is related to greater depressive symptoms, while in the context of greater broader-focused preparation, experiencing more obstetric complications /procedures was not significantly associated with depressive symptoms. Therefore, only the Model for depression supports Hypothesis 2, not anxiety, worry or rumination.

**Table 7.** Summary of the depression, anxiety, worry and rumination models of hierarchical regression.

Variable	Depression/ Normality			Variable	Depression/ Broader		
	B	SE B	$\beta$		B	SE B	$\beta$
Step 1				Step 1			
Constant	4.92	.79		Constant	4.92	.79	
Com/ Pro	.12	.04	.17**	Com/ Pro	.12	.04	.17**
Step 2				Step 2			
Constant	9.09	1.85		Constant	6.54	1.55	
Com/ Pro	.11	.04	.16*	Com/ Pro	.11	.04	.17**
Normality Prep	-.10	.04	-.15*	Broader Preparation	-.04	.03	-.08
Step 3				Step 3			
Constant	11.73	3.48		Constant	6.90	2.81	
Com/ Pro	-.05	.18	-.08	Com/ Pro	.09	.15	.13
Normality Prep	-.17	.09	-.25*	Broader Prep	-.05	.07	-.09
Com/ Pro *	.00	.01	.26	Com/ Pro * Broader	.00	.00	.04
Normality Interaction				Interaction			
R <sup>2</sup> = .03 for step 1 ( $p < .01$ ), $\Delta R^2 = .02$ for step 2, $\Delta R^2 = .01$ for step 3				R <sup>2</sup> = .03 for step 1 ( $p < .01$ ), $\Delta R^2 = .01$ for step 2, $\Delta R^2 = .00$ for step 3			

Anxiety/ Normality				Anxiety/ Broader			
Variable	B	SE B	$\beta$	Variable	B	SE B	$\beta$
Step 1				Step 1	4.70	.77	
Constant	4.70	.77		Constant	.11	.04	.16**
Com/ Pro	.11	.04	.16**	Com/ Pro			
Step 2				Step 2			
Constant	7.92	1.82		Constant	6.21	1.52	
Com/ Pro	.10	.04	.16*	Com/ Pro	.11	.04	.16*
Normality Prep	-.08	.04	-.12	Broader Prep	-.04	.03	-.07
Step 3				Step 3			
Constant	12.36	3.41		Constant	6.07	2.75	
Com/ Pro	-.17	.18	-.25	Com/ Pro	.11	.15	.17
Normality Prep	-.19	.09	-.29*	Broader Prep	-.03	.07	-.07
Com/ Pro *	.01	.004	.441	Com/ Pro * Broader	.00	.00	-.02
Normality Interaction				Interaction			
R <sup>2</sup> = .03 for step 1 ( $p < .01$ ), $\Delta R^2 = .01$ for step 2, $\Delta R^2 = .01$ for step 3				R <sup>2</sup> = .03 for step 1 ( $p < .01$ ), $\Delta R^2 = .00$ for step 2, $\Delta R^2 = .00$ for step 3			
Worry/ Normality				Worry / Broader			
Variable	B	SE B	$\beta$	Variable	B	SE B	$\beta$
Step 1				Step 1			
Constant	52.65	2.02		Constant	52.65	2.02	
Com/ Pro	.15	.11	.09	Com/ Pro	.15	.11	.09
Step 2				Step 2			
Constant	58.68	4.79		Constant	54.33	3.99	
Com/ Pro	.14	.11	.08	Com/ Pro	.15	.11	.09
Normality Prep	-.15	.11	-.09	Broader Prep	-.04	.09	-.03
Step 3				Step 3			
Constant	70.47	8.98		Constant	54.25	7.22	
Com/ Pro	-.57	.47	-.34	Com/ Pro	.15	.39	.09
Normality Prep	-.45	.22	-.26*	Broader Prep	-.04	.17	-.03
Com/ Pro *	.02	.01	.45	Com/ Pro * Broader	.00	.01	-.00
Normality Interaction				Interaction			
R <sup>2</sup> = .01 for step, $\Delta R^2 = .01$ for step 2, $\Delta R^2 = .00$ for step 3				R <sup>2</sup> = .01 for step 1, $\Delta R^2 = .00$ for step 2, $\Delta R^2 = .00$ for step 3			
Rumination/ Normality				Rumination/ Broader			
Variable	B	SE B	$\beta$	Variable	B	SE B	$\beta$
Step 1				Step 1			
Constant	35.06	1.94		Constant	35.06	1.94	
Com/ Pro	.18	.10	.11	Com/ Pro	.18	.10	.11
Step 2				Step 2			
Constant	41.50	4.60		Constant	36.36	3.83	
Com/ Pro	.17	.10	.10	Com/ Pro	.18	.10	.11
Normality Prep	-.16	.10	-.10	Broader Prep	-.03	.08	-.03
Step 3				Step 3			
Constant	50.16	8.63		Constant	35.69	6.94	
Com/ Pro	-.36	.45	-.22	Com/ Pro	.22	.38	.13
Normality Prep	-.38	.21	-.23	Broader Prep	-.02	.17	-.01
Com/ Pro *	.01	.01	.35	Com/ Pro * Broader	-.001	.01	-.03
Normality Interaction				Interaction			
R <sup>2</sup> = .01 for step 1, $\Delta R^2 = .01$ for step 2, $\Delta R^2 = .01$ for step 3				R <sup>2</sup> = .01 for step 1, $\Delta R^2 = .00$ for step 2, $\Delta R^2 = .00$ for step 3			

Note. Com/ Pro= Complications /Procedures. \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ , Change in  $R^2$  (denoted as  $\Delta R^2$ )

### Hypothesis 3

Social support was found to be significantly positively correlated with CEQ ( $r = .13$ ,  $p < .05$ ), and significantly negatively correlated with anxiety ( $r = -.30$ ,  $p < .01$ ), worry ( $r = -.21$ ,  $p < .01$ ), rumination ( $r = -.30$ ,  $p < .01$ ) and depression ( $r = -.26$ ,  $p < .01$ ) (Table 4). Therefore, reporting higher perceived social support during birth was associated with a more positive birth experience, lower postnatal anxiety, worry, rumination and a more positive mood, supporting Hypothesis 3.

### Hypothesis 4

The role of social support from a birth partner during birth was considered (Table 8). The three-step model was significant with greater social support was related to a better birth experience, fewer complications /procedures ( $\beta = -.37$ ,  $p < .001$ ) and more total preparation ( $\beta = .17$ ,  $p < .01$ ) being associated with a more positive birth experience. However, whilst this supports hypothesis 4, social support added only an additional 1.0% of the variance in birth experience over and above variables complications /procedures and total preparation.

**Table 8.** Summary of the social support model of hierarchical regression

Variable	Birth Experience – Complications /procedures, Total preparation, Social support		
	B	SE B	$\beta$
Step 1			
Constant	13.35	.32	
Com/ Pro	-.11	.02	-.38***
Step 2			
Constant	11.37	.71	
Com/ Pro	-.11	.02	-.37***
Total Preparation	.03	.01	.18**
Step 3			
Constant	9.07	1.33	
Com/ Pro	-.11	.02	-.37***
Total Preparation	.02	.01	.17**
Social Support	.04	.02	.12*

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$R^2 = .15$  for step 1 ( $p < .001$ ),  $\Delta R^2 = .03$  for step 2,  $\Delta R^2 = .01$  for step 3

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*Note.* Com/ Pro= Complications /Procedures. \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ , Change in  $R^2$  (denoted as  $\Delta R^2$ )

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### **Impact of the COVID-19 pandemic**

The summary of the themes reported by women on the impact of the pandemic on birth experience are presented in Table 9. For the first question, 251 women responded, with 226 (90%) stating the pandemic had impacted the antenatal preparation they were able to access. The most prominent theme was the cancellation of classes or classes not running, reported by 107 participants. For the second question, 249 responded, with 115 of them (46.2%) stating they were not able to have all the people they had planned to be with them in labour and birth. The most prominent theme was only being able to have one birth partner present, reported by 62 participants.

There were 249 women who responded to question three, with 150 (60.2%) stating they were not able to have someone with them for all the time they had planned during birth. The most prominent theme reported by 54 participants was their partner only being allowed to be present during active labour. Question four was answered by 249 women, of which 170 (68.3%) stated their birth experience was affected in other ways by the COVID pandemic. The most prominent theme was not being able to have visitors or visitors being heavily restricted, reported by 82 participants.

**Table 9.** Summary of the themes reported by women on the impact of the pandemic on birth experience

Question	Themes observed (N)
1. Did this impact on what antenatal preparation you were able to access?	<p>Classes cancelled / not running (107) - 8 of whom said they had to pay for private classes instead as their local NHS classes were not running, 3 stating Classes were not available/ not offered.</p> <p>Changes to antenatal appointments (55) - with 33 reporting attending antenatal appointments alone meant their partner missing out on the experience, and not being able to access the same information. 19 reported antenatal appointments were limited or reduced, meaning women reported less access to information during their appointments, limited time to ask questions, in some cases felt rushed. 4 reported antenatal appointments were over the phone not face to face.</p> <p>Online classes only (47) – with 9 stating this limited or gave no opportunity to socialise with other expectant mothers, and 6 stating the online classes provided limited information.</p> <p>Changes to classes (23) –13 reported Reduced classes, time and number of classes reduced, limited information provided and limited opportunity to ask questions. 10 referenced changing from face to face to online classes.</p> <p>Not able to go on a tour of the maternity unit as originally planned (7)</p>
2. Were you able to have ALL the people you had planned to be with you in labour and birth?	<p>Only one birth partner allowed (62)</p> <p>Unable to have mother present (50)</p> <p>Unable to have sister present (9)</p> <p>Unable to have other (4) - Doula (2), Mother-in-law (1), No Birth partners (1)</p> <p>Unable to have partner present (3)</p>
3.If someone was with you for the birth were they able to be there for all the time you had planned?	<p>Partner only allowed to be present for Active labour only (54) - established labour with reports of some birth partners only being allowed into the hospital when birth was imminent.</p> <p>Partner had to leave after birth (51) - varied from straight away, 10 mins, 2 hours to 4 hours, this was often reported because birth partner were not permitted on the postnatal wards due to COVID-19 restrictions.</p> <p>Induced alone (29) - due to visiting being heavily restricted.</p> <p>Partner only allowed to be present once a certain threshold of cervical dilation was met (21) - this varied in number between 4cm/ 5cm/ 6cm/ 7cm.</p> <p>Partner waiting in the car park/outside (5) - due to visiting being heavily restricted.</p>
4.Was your birth experience affected in any other way by	<p>No visitors/ heavily restricted visitors (82) - this included no other visitors allowed and birth partner visit often limited to active stage of labour and having leave a short time after the birth. - With many women noting their partners or they were unable to leave hospital during labour for food/ drink/ fresh air.</p>



the COVID pandemic?

Feeling unsupported (30) and alone (20) -7 of which overlapped with women reporting themes of feeling unsupported by staff and feeling alone.

Extra use of PPE/ covid measures (26) - Including those suspected to be covid positive, having to take covid tests, staff wearing PPE, partner wearing PPE and in some cases mothers wearing masks in the early stages or immediately after giving birth.

Partners not able to attend antenatal appointments (20) - including scans etc, having to go alone – including no or limited No antenatal preparation.

Feeling mental health and wellbeing had been impacted (6) - with reports of low mood (3), worry (1), or anxiety (1) due to impacted experiences.

Birth choices limited (6) – including unable to have a home birth or unable to have a water birth.

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*Note.* Multiple themes may have noted within single responses; therefore, numbers do not add up to sample size

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## Discussion

To the best of the researcher's knowledge, this is the first study to explore the relationship between the focus and content of antenatal preparation and the experience of obstetric complications /procedures and how they impact birth experience and postnatal mental health.

It was hypothesised that birth experience would be influenced by an experience of obstetric complications /procedures and the type and amount of antenatal preparation. However, the findings instead clearly indicate that women receiving more information during antenatal preparation whatever its focus in content appeared to have a better birth experience both on the CEQ (which covers experiences of own capacity, professional support, perceived safety and participation) and overall emotional experience. It was found that more normality-focused preparation was of the greatest benefit to birth experience in the context of low complications /procedures but notably not detrimental when complications /procedures were higher. Additionally, receiving broader-focused information, details on possible obstetric complications /procedures, whether these were later experienced or not, was associated with a more positive birth experience. Receiving information about obstetric complications /procedures antenatally was found in no way to be detrimental to women's experience of birth. This is in line with the National Maternity Review [3] that found women want to be able to access information and be better informed about any risks when pregnant to help empower them in their decision-making during childbirth. This is the first time the benefits of antenatal preparation have been demonstrated regardless of women's experiences of complications /procedures, to the best of the researcher's knowledge.

Consistent with the transactional theory on emotions, stress and coping [20], the current study highlights one process by which antenatal preparation might impact birth

experience is by women being provided with broader-focused information. This preparation supports them to make cognitive appraisals during labour regarding any threats/ challenges presented by obstetric complications/ procedures, in a way that positively impacts their subsequent birth experience (coping) and emotional response.

The findings linked to mental health outcomes showed limited support for the hypothesis which predicted that experiencing more obstetric complications /procedures in the context of more ‘normality’ focused preparation would be related to greater postnatal anxiety, worry, rumination and lower mood, but not in the context of more ‘broader’ preparation. Significant relationships were found only for depressive symptoms and complications /procedures in the context of normality-focused but not broader-focused preparation, nor for anxiety, worry or rumination, suggesting antenatal preparation had limited influence on postnatal mental health. It has been acknowledged that the study recruitment coincided with the COVID-19 pandemic which may have impacted on participants reporting of postnatal mental health.

Women feeling supported by their birth partner, experiencing a more positive birth and improved postnatal mental health outcome is consistent with previous research [26, 27]. Further to this the current study controlled for complications /procedures and antenatal preparation and found social support continued to help moderate the negative effects of birth, extending previous findings.

### **Demographic and clinical characteristics**

A third of women in the current sample reported gaining their antenatal preparation from NHS provision only, which is in line with the figures reported in the maternity survey over the past five years [2, 9]. Interestingly, nearly half of the sample reported attending non-

NHS privately funded antenatal preparation, much higher than the 14% previously noted [9]. However, the impact of the pandemic on NHS antenatal provision and consequently these figures is acknowledged, with many women in the current study reporting having no option but to access private provision due to cancelled NHS classes.

In the current sample, women reported receiving more information on normality-focused than broader-focused preparation. Over half the sample reported having had at least some limited information or more on average for all normality-focused items compared with less than a third of the sample who received limited information or more on average for all broader-focused items. This is in line with previous findings that suggest much antenatal education is either solely or predominantly normality-focused in content [16].

Overall, the proportions of women experiencing obstetric complications /procedures in the current sample were generally quite representative of those reported in recent large scale maternity surveys [2, 9]. However, the number of women having an unassisted vaginal birth in the current sample (47%) was lower than the figure reported in a recent UK maternity survey (57%; [2]). This may be explained by the current sample being first-time mothers, who are more likely to have obstetric procedures such as forceps, ventouse or an unplanned caesarean section than women who have given birth before [9]. Obstetric complications /procedures are also likely to have increased during the pandemic due to several factors including lack of companionship during birth [48].

### **Considering relationships between key variables**

The amount of normality-focused and broader-focused information individuals received were highly associated. Neither was associated with actual complications

/procedures experienced; however, both were positively associated with birth experience (CEQ). This suggests that either women accessed a great deal of information when pregnant about their upcoming childbirth, receiving both normality and broader-focused preparation, or very limited information at all. These findings link to the evidence suggesting individuals can either be information seekers, searching out information and focus on health threats about their upcoming labour, or they are hypothesised to be information avoiders, avoiding information if there are fears paying attention to it could cause discomfort or distress [49, 50]. Women seeking antenatal preparation may utilise this as a form of problem-focused coping [51]. In line with the transactional theory on emotions, stress and coping [20] attending antenatal preparation may be a way of coping, gaining information in an attempt to reduce any stressors linked to their pending childbirth [51].

The transactional theory on emotions, stress and coping [20] can actively inform the development and implementation of antenatal education. Falk, Nelson and Blomberg [52] highlights the need for public science education, such as antenatal education, to take a more comprehensive, equitable and person-centred approach meeting the learning needs of all that attend. The importance of subjective factors in women's childbirth experience beyond delivery method and other obstetric variables has been emphasized [53], including prenatal fear of childbirth [54]. These factors should be considered regarding developing coping strategies and problem-solving skills, in addition to the inclusion of broader focused content, in the enhancement of antenatal education.

### **Impact of the pandemic and analysis**

It is important to acknowledge the context of this research was during the COVID-19 pandemic and the significant impact this will have had on the women taking part in this study and the subsequent results. At the start of the COVID-19 pandemic, substantial changes were

made to the provision of maternity services, including reducing antenatal appointments and preparation offered, and restrictions around birth settings and birth partners [55]. This was reflected in the themes identified from additional information provided by participants about the profound impact the pandemic had on their birth experiences, with the majority (90%) noting their antenatal preparation had been negatively impacted in some way. While over three quarters of women reported having online antenatal preparation instead of face-to-face provision, they were still able to access antenatal preparation which suggests these findings will be generalisable to a post pandemic maternity system.

It is acknowledged, particularly at the beginning of the pandemic, that restrictive practices were imposed, possibly to the detriment of women to promote wider public health [56]. These restrictive practices involved denying women many choices including those around birth partners, with such restrictions suggested having resulted in increased obstetric complications /procedures [48]. It seems likely these restrictions will have affected responses to the measure of perceived support (SOS), as just under half the current sample reported they were unable to have all the people they had planned as support with them during labour. With themes identifying women experiencing severe restrictions imposed on how long their birth partner was able to be present for and how long they could stay following the delivery of their baby. The restrictions on the current sample may explain why any positive social support effects were found to be small.

The pandemic-related restrictions may have also impacted the findings relating to postnatal mental health. The impact of giving birth during the pandemic for this cohort of women and the subsequent implications on their postnatal mental health is yet to be

understood [55]. However, a previous review looking at the impact of events such as terrorist attacks and natural disasters found women being highly exposed to such events during pregnancy and the postpartum period was a major predictor of subsequent mental health difficulties [57]. Thus, suggesting the impact of the current sample being pregnant and giving birth during the pandemic could be profound, which may have increased their scores on the postnatal mental health measures. Therefore, the pandemic may have explained more of the variance beyond antenatal preparation and complications /procedures and have been a stronger predictor of postnatal mental health at this time. In addition, it is noted that these measures were completed postnatally when women did not have the same access to support such as baby groups as would usually be the case due to COVID-19 restrictions, these factors may have been more powerful and could have masked effects on mental health.

### **Study Strengths and Limitations**

Given the limited research previously exploring this area, new continuous scales were created for antenatal preparation and for complications /procedures experienced by women, which may be a limitation of the study. However, both scales yielded a Cronbach's alpha score suggesting high internal consistency. In addition, Patient and Public Involvement was sought to develop the antenatal preparation scale and expert midwife involvement gained to develop the OCPS, both of which are strengths of the study. Furthermore, the intraclass correlation coefficient completed for the nine midwives' independent ratings for the OCPS item weightings also highlighted good inter-rater reliability of the scale which is another strength. This shows encouraging results for both scales that may be utilised in future research to allow this area to be explored further, including outside the context of the pandemic.

Participants self-reported their obstetric complications /procedures, which may be subject to recall bias. Future research in this area would benefit from the inclusion of midwives recording such data or cross-checking self-report with clinical notes.

Depressive symptoms were measured using the PHQ-9 however it is acknowledged that both this and the Edinburgh Post Natal Depression Scale are supported by NICE [58] for use with postnatal populations. The PHQ-9 was selected as this has been validated for postpartum use and endorsed its brevity, sensitivity and specificity [59] and is commonly used clinically alongside GAD-7, also recommended to be used with a postnatal population [58].

In this sample, women's reporting of current mental health difficulties was highly correlated with birth experience (CEQ). As measures of mental health were not obtained antenatally due to the study being cross-sectional, current mental health difficulties could not be controlled for in the analysis and direction of causality of results cannot be assumed, which is a further limitation of this study. It is possible that mental states during pregnancy may have influenced access to antenatal preparation. Therefore, it is suggested that future research would benefit from focusing on women's mental health outcomes, prospectively from pregnancy to postnatally, outside of the pandemic context.

The sample size of the current study was acceptable, and analyses were appropriately powered; this was a strength given the context of the pandemic and the disruption to antenatal preparation which directly linked to the inclusion criteria. The limited diversity within the current sample demographics is noted, with the majority identifying as; white British and white other, having a degree or postgraduate degree, stating they were employed on a full-time basis, being married or cohabitating and being aged 25-31, which may suggest a sample



bias and thus is a limitation. However, similar majorities within sample demographics have been noted in respondent characteristics of national maternity surveys [9, 12]. It is noted that national maternity surveys include both primiparous and multiparous women and utilise random sampling, recruited by the Office for National Statistics using the birth registration records [12]. Although the sampling of the current study differed as this relied on opportunistic sampling, many characteristics are comparable with previous maternity reviews, suggesting results may be generalisable.

### **Clinical implications**

Over the past five years, the Five Year Forward View for Mental Health has emphasised increasing specialist support and services for women in the perinatal period [5]. However, findings of the most recent maternity survey suggest that this support has not been extended to antenatal preparation for women, with provisions differing noticeably across NHS trusts, and not all women being offered such preparation and even lesser numbers accessing these services [2, 16]. Interestingly, it was found for those attending antenatal preparation, the majority found classes to be beneficial [2].

The findings of the current research suggest that women accessing antenatal preparation will likely experience a more positive birth, which highlights that all pregnant women should be being actively offered this preparation in the UK. It has been noted that UK maternity services provide women with antenatal preparation that is solely or predominantly normality-focused in content, driven by concerns that providing information on complications /procedures unnecessarily may cause undue stress for women [16]. However, the current study observed that receiving more information on broader-focused topics such as complications /procedures were found to be helpful and in no way harmful whatever

women's subsequent birth experience, thus suggesting this information should be routinely incorporated into current antenatal preparation and offered widely.

Additionally, it has been observed that women who experience anxiety and depression while pregnant may fail to have regular scans and attend antenatal appointments less frequently, including antenatal preparation [60, 61]. However, a previous study found that childbirth education significantly reduced depressive symptoms in most pregnant women, although the content of this preparation was not measured [62]. This suggests that antenatal preparation can have a positive impact on women's mental health experiences antenatally as well as more positive birth experiences postnatally.

This highlights the importance of all women being offered such antenatal preparation free on the NHS within the UK and this being promoted and encouraged within services as an important component of care, which facilitates a more positive birth experience. Subsequently these findings can positively inform competency development for professionals who deliver antenatal education, acknowledging the importance of providing material about potential complexities in a non-threatening way [63]. Highlighting the importance of offering all women a provision that empowers them while meeting their individual needs [52] that it is consistent nationally, includes broader focused information and utilises understanding from psychological theoretic perspectives [20]. Women being offered more comprehensive antenatal preparation, including information on the possibilities of complications /procedures during birth, may mitigate future risks of poor birth experiences and some limited impact on postnatal mental health.

These findings also offer an opportunity to enhance the competencies of obstetric teams [63] who are in a unique position to be able to recognise when a women has experienced obstetric complications /procedures and explore if birth has been perceived as

traumatic or to have been a threat to the wellbeing of themselves or their baby. Professionals understanding the potential implications for a woman in such instances, enhances current competencies [63] and would emphasise the importance of such cases being recognised sensitively and promoting positive intervention when required.

Furthermore, this has implications for the role of perinatal clinical psychologists who will likely be the resulting professionals offering psychological support to women experiencing mental health difficulties following childbirth. With wider perinatal mental health teams, including clinical psychologists, needing to have an awareness that inadequate or inappropriate antenatal preparation may be a risk factor for women in developing postnatal mental health difficulties. Perinatal clinical psychologists are able to offer psychological understanding of such difficulties, provide support and contribute to the training of the wider perinatal mental health team to further enable their understanding, which should positively influence women's experiences of care antenatally to postnatally.

### **Future Research**

It would be beneficial for further research to test for theoretical psychological mediating factors such as women's appraisal of the perceived harm, threat or challenge during childbirth [20]. This would be completed within a pathway analysis of the antenatal to postnatal journey measured at different time points. Time point one would measure antenatally mental health symptoms and women's experiences of preparation. Time point two would capture theoretical factors such as appraisal of threat, birth experience, obstetric complications and procedures and social support, with time point three capturing postnatal mental health measures. An additional time point four, capturing further postnatal mental health measures a significant time period after time point three may also be advantageous for

future research. This would allow for further longitudinal exploration of the relationship between antenatal preparation, obstetric complications/ procedures and postnatal mental health.

Future research exploring antenatal education in further detail would be welcome, more specifically to evaluate the delivery of a more comprehensive provision, and the development of competencies of perinatal staff facilitating such provision.

The true impact of the restrictions resulting from the COVID-19 pandemic on antenatal preparation is unknown and warrants further exploration, as does the impact on women's postnatal mental health. Furthermore, it would also be beneficial to replicate the current study outside of the COVID-19 context.

### **Conclusion**

Antenatal preparation information is beneficial to birth experience, irrespective of women's experience of complications /procedures, and should be freely available and easily accessible, covering not just normality-focussed information but potential obstetric complications and procedures as well. This is likely to be of benefit to women's birth experience and may have positive implications for depressive symptoms postnatally.

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## Appendices

### Appendix A: Quality Assessment Tool

#### QUALITY ASSESSMENT TOOL FOR QUANTITATIVE STUDIES



#### COMPONENT RATINGS

##### A) SELECTION BIAS

**(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?**

- 1 Very likely
- 2 Somewhat likely
- 3 Not likely
- 4 Can't tell

**(Q2) What percentage of selected individuals agreed to participate?**

- 1 80 - 100% agreement
- 2 60 – 79% agreement
- 3 less than 60% agreement
- 4 Not applicable
- 5 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

##### B) STUDY DESIGN

**Indicate the study design**

- 1 Randomized controlled trial
- 2 Controlled clinical trial
- 3 Cohort analytic (two group pre + post)
- 4 Case-control
- 5 Cohort (one group pre + post (before and after))
- 6 Interrupted time series
- 7 Other specify \_\_\_\_\_
- 8 Can't tell

**Was the study described as randomized? If NO, go to Component C.**

No                      Yes

**If Yes, was the method of randomization described? (See dictionary)**

No                      Yes

**If Yes, was the method appropriate? (See dictionary)**

No                      Yes

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**C) CONFOUNDERS**

**(Q1) Were there important differences between groups prior to the intervention?**

- 1 Yes
- 2 No
- 3 Can't tell

**The following are examples of confounders:**

- 1 Race
- 2 Sex
- 3 Marital status/family
- 4 Age
- 5 SES (income or class)
- 6 Education
- 7 Health status
- 8 Pre-intervention score on outcome measure

**(Q2) If yes, indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?**

- 1 80 – 100% (most)
- 2 60 – 79% (some)
- 3 Less than 60% (few or none)
- 4 Can't Tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**D) BLINDING**

**(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?**

- 1 Yes
- 2 No
- 3 Can't tell

**(Q2) Were the study participants aware of the research question?**

- 1 Yes
- 2 No
- 3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**E) DATA COLLECTION METHODS**

**(Q1) Were data collection tools shown to be valid?**

- 1 Yes
- 2 No
- 3 Can't tell

**(Q2) Were data collection tools shown to be reliable?**

- 1 Yes
- 2 No
- 3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**F) WITHDRAWALS AND DROP-OUTS**

**(Q1) Were withdrawals and drop-outs reported in terms of numbers and/or reasons per group?**

- 1 Yes
- 2 No
- 3 Can't tell
- 4 Not Applicable (i.e. one time surveys or interviews)

**(Q2) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).**

- 1 80 -100%
- 2 60 - 79%
- 3 less than 60%
- 4 Can't tell
- 5 Not Applicable (i.e. Retrospective case-control)

RATE THIS SECTION	STRONG	MODERATE	WEAK	
See dictionary	1	2	3	Not Applicable

**G) INTERVENTION INTEGRITY**

**(Q1) What percentage of participants received the allocated intervention or exposure of interest?**

- 1 80 -100%
- 2 60 - 79%
- 3 less than 60%
- 4 Can't tell

**(Q2) Was the consistency of the intervention measured?**

- 1 Yes
- 2 No
- 3 Can't tell

**(Q3) Is it likely that subjects received an unintended intervention (contamination or co-intervention) that may influence the results?**

- 4 Yes
- 5 No
- 6 Can't tell

**H) ANALYSES**

**(Q1) Indicate the unit of allocation (circle one)**

community    organization/institution    practice/office    individual

**(Q2) Indicate the unit of analysis (circle one)**

community    organization/institution    practice/office    individual

**(Q3) Are the statistical methods appropriate for the study design?**

- 1 Yes
- 2 No
- 3 Can't tell

**(Q4) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?**

- 1 Yes
- 2 No
- 3 Can't tell

**GLOBAL RATING****COMPONENT RATINGS**

Please transcribe the information from the gray boxes on pages 1-4 onto this page. See dictionary on how to rate this section.

<b>A</b>	<b>SELECTION BIAS</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>B</b>	<b>STUDY DESIGN</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>C</b>	<b>CONFOUNDERS</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>D</b>	<b>BLINDING</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>E</b>	<b>DATA COLLECTION METHOD</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>F</b>	<b>WITHDRAWALS AND DROPOUTS</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
				Not Applicable

**GLOBAL RATING FOR THIS PAPER (circle one):**

- |   |          |                            |
|---|----------|----------------------------|
| 1 | STRONG   | (no WEAK ratings)          |
| 2 | MODERATE | (one WEAK rating)          |
| 3 | WEAK     | (two or more WEAK ratings) |

With both reviewers discussing the ratings:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

No      Yes

If yes, indicate the reason for the discrepancy

- |   |   |
|---|---|
| 1 | Oversight                                 |
| 2 | Differences in interpretation of criteria |
| 3 | Differences in interpretation of study    |

**Final decision of both reviewers (circle one):**

- |          |                 |
|----------|-----------------|
| <b>1</b> | <b>STRONG</b>   |
| <b>2</b> | <b>MODERATE</b> |
| <b>3</b> | <b>WEAK</b>     |



**Appendix B. Data extraction form**

<b>Author:</b>						
<b>Year of publication:</b>						
<b>Title:</b>						
<b>Location:</b>						
<b>Study Characteristics</b>	Cross-sectional:					
	Longitudinal:			Follow-up length		
	Sampling method					
	Sample number					
	Sample number in analyses					
	<b>Participant characteristics:</b>	Primiparous or Multiparous:	Age :	Ethnicity :	Birth complications :	Obstetric complication data collection:
<b>Aim:</b>						
<b>Data Collection Method:</b>						
<b>Data Analysis:</b>						
<b>Significant/ Main findings:</b>						

## **Appendix C: BMC Pregnancy and Childbirth author guidelines**

Essential information provided. Please see link for full details:

<https://bmcpregnancychildbirth.biomedcentral.com/submission-guidelines/preparing-your-manuscript/research-article>

Research articles should be arranged as follows;

### **Format**

No word limit. Double spaced. Include line and page numbering. Tables to be numbered.

### **Title page**

### **Abstract**

Max. 350 words. Include **Background**; methods; results; conclusions.

### **Keywords**

3 – 10 words

### **Background**

Include the research question and purpose of the study.

### **Methods**

- the aim, design and setting of the study
- the characteristics of participants or description of materials
- a clear description of all processes, interventions and comparisons. Generic drug names should generally be used. When proprietary brands are used in research, include the brand names in parentheses

- the type of statistical analysis used, including a power calculation if appropriate

## **Results**

Acknowledge any bias

## **Discussion**

This section should discuss the implications of the findings in context of existing research and highlight limitations of the study..

## **Conclusion**

This should state clearly the main conclusions and provide an explanation of the importance and relevance of the study reported

## **References**

Vancouver format.

## Appendix D: University of Liverpool Research Ethics Committee



Central University Research Ethics Committee A

7 May 2020

Dear Prof Slade,

I am pleased to inform you that the amendment to your study has been approved. Amendment details and conditions of approval can be found below. If applicable, Appendix A contains a list of documents approved by the Committee.

### **Amendment details**

Reference: 5657 (amendment)  
Project Title: Does information provided in antenatal preparation affect birth experience and postnatal mental health?  
Principal Investigator: Prof Pauline Slade  
Co-Investigator(s): Mrs Hannah Cross, Dr Charlotte Krahe  
Student Investigator(s): -  
Department: Psychological Sciences  
Approval Date: 07/05/2020

The amendment was **APPROVED** subject to the following conditions:

### **Conditions of approval**

Please note: this approval is subject to the restrictions laid out in the [Policy on research involving human participants in response to COVID-19](#). Therefore all face-to-face contact with human participants for the purpose of research should be halted until further notice; unless the study qualifies as one of the exceptions specified in the Policy and has been discussed with Research Ethics and Integrity team.

- All serious adverse events must be reported to the Committee ([ethics@liv.ac.uk](mailto:ethics@liv.ac.uk)) in accordance with the procedure for reporting adverse events.
- If it is proposed to make further amendments to the study, please create and submit an amendment form within the research ethics system.
- It is the responsibility of the Principal Investigator or Supervisor to inform all the investigators of the terms of the approval.

Kind regards,

Central University Research Ethics Committee A

[ethics@liverpool.ac.uk](mailto:ethics@liverpool.ac.uk)

CURECA

### **Appendix - Approved documents**

If applicable, the final document set reviewed and approved by the committee is listed below:

Document Type	File Name	Date	Version
Default	Advert V3	04/05/2020	V3
Default	Participant information V3	04/05/2020	V3
Default	All proposed scales V3	04/05/2020	V3
Default	Consent form V3	04/05/2020	V3

## Appendix E: Measures

### Demographic questions

- Age (18-24/ 25-31/ 32-38/ 39-45)
- Marital status (Single/ Married/ Widowed/ Cohabiting/ Divorced/ Separated/ Prefer not to say)
- Level of education (No Qualification /GCSE/A levels/Vocational Qualification/ Degree/ postgraduate degree/ prefer not to say)
- Current employment status (Employed full time 37.5+ hours/ Employed part-time less than 37.5 hours/ Unemployed/ Self-employed/ Home maker/ Student/ Unable to work/ Prefer not to say)
- Ethnicity (White, Mixed /Multiple ethnic groups, Asian /Asian British, Black /African /Caribbean /Black British/ Other ethnic group/ Prefer not to say)
- Location/Geographical – (drop down list of UK counties to choose from)
- Are you currently receiving any care for mental health difficulties Yes/No (\*If yes who provides that care – please tick all that apply: GP, counsellor, psychologist, mental health nurse, psychiatrist)
- Have you ever received treatment for mental health difficulties in the past Yes /No (\*If yes how long ago was the last time (In last year/ in last 1-5 years/ in the last 6-10 years/ More than 10 years ago) and (who provided that care? please tick all that apply: GP, counsellor, psychologist, mental health nurse, psychiatrist)
- Do you have any long-term physical health conditions which affect your general wellbeing? (No/ Yes/ Prefer not to say) (\*If yes, please state this in the box below)
- What date did you give birth?
- How did you give birth? (Unassisted Vaginal/ Assisted birth using Forceps/ Assisted birth using Ventouse (vacuum device)/ Emergency caesarean section)

- Did you have a birth partner present with you at the birth? (Yes/ No). (\*If yes what was their relationship to you ie partner, friend etc? How long was this for was this for: the whole of labour and birth, most of labour and birth or some of labour and birth?)
- Did you receive support from a midwife/ midwives during your labour? (Yes/ No). (\*If yes was this for: the whole of labour, most of labour and birth, some of labour and birth or none of labour and birth)

### Antenatal Preparation Scale

The following questionnaire asks a series of questions about any antenatal preparation classes you attended, either face-to-face or online and the information provided. This will include NHS classes, any paid for classes or any other source of antenatal preparation. If you attended multiple classes, either face-to-face or online, please ensure that when you are answering about each type of class, for example NHS or private, that you only tick if the information was provided by that specific class. For example, NHS classes may have covered different information regarding labour and birth than private classes so it is important this is reflected in your answers

How many different sets of antenatal preparation classes did you go to? (Options 1/2/3/4)			
Please list what these antenatal preparation classes were (e.g. NHS, NCT, etc):			
1.....			
(2).....			
(3).....			
(4).....			
Thinking about the first set of classes you attended Who provided this? .....			
Thinking about the first set of classes you attended How much time did you spend in these classes, please state in your own words e.g. 3 x2 hour sessions ..... ..... .....			
Thinking about the first set of classes you attended were they carried out face-to-face or via an online resource? Face-to-face/ Online ( <i>Please select</i> )			
Did you have to pay for these classes      Yes / No ( <i>Please Tick</i> )			
If yes, how much did you pay? ..... .....			
If you attended classes before giving birth to your baby, how much information were you provided with during your antenatal preparation classes on the following: <b style="text-align: center;">Please tick either choice 1, 2 or 3 for each question</b>			
	1. No information	2. Some limited information	3. Detailed information

Before birth <i>Health in pregnancy including; healthy diet, pelvic floor exercises and signposted to exercise groups/ relaxation classes</i>			
<i>Emotions and feelings during pregnancy</i>			
<i>The Signs of labour starting</i>			
<i>What to do if waters break before going into labour</i>			
<i>Stages of labour</i> <u>First stage of labour</u> , cervix gradually open up (dilating), When to contact your midwives, Monitoring your baby in labour			
<u>Second stage of labour</u> ; Finding a position to give birth in, pushing your baby out, what happens when your baby is born			
<u>Third stage of labour</u> ; <i>after birth management in the delivery of the placenta, active management (when you have treatment to speed things up) and/or physiological management (when you have no treatment and this stage happens naturally)</i>			
<i>Positions of birth</i>			
<i>Coping with pain in labour coping methods; Relaxation techniques, Breathing techniques, Use of aromatherapy, use of massage and Use of water</i>			
<i>The use of Gas and Air – keep normality</i>			
Pain relief by injection (pethidine and morphine) – broader focused			
<b>Breaking waters, rupturing membranes artificially</b>			
<i>Waters breaking (naturally or artificially) a prolonged period before going into labour or having contractions</i>			
<b>Induction of labour, membrane sweep(s)</b>			
<b>Induction of labour, use of vaginal gel or pessary</b>			
<b>Induction of labour, use of oxytocin drip</b>			
<b>Speeding up labour/ Augmentation</b>			
<b>Types of birth; Unassisted Vaginal</b>			
<b>Assisted birth using Forceps</b>			
<b>Assisted birth using ventouse (method of assisting delivery of a baby using a vacuum device)</b>			
<b>Planned Caesarean section</b>			
<b>Emergency Caesarean section</b>			

<b>Water birth – normality focused</b>			
<b>During Birth - broader focused</b> <b>Use of an epidural and the process</b>			
<i>Episiotomy (surgical cut in the perineum to enlarge the opening for the baby to come out) - broader focused</i>			
<i>First- or second-degree perineal tears of the skin and other soft tissue around the vagina. - broader focused</i>			
<i>Third- or fourth-degree perineal tear (deeper tears of the skin around the vagina extending to the muscle that controls the anus (the anal sphincter)).</i>			
<i>Baby presenting by breech (bottom first)</i>			
<i>Nuchal cord (cord round babies' neck)</i>			
<i>Potential for baby to be distressed during labour</i>			
<i>Monitoring of baby throughout labour – normality focused</i>			
<i>Bleeding during delivery</i>	-----	-----	-----
<i>Emotions and feelings during birth</i>			
<i>After the birth</i>			
<i>Retained placenta, the placenta not coming away without help to remove it</i>			
<i>The possibility of the need for special care baby unit</i>			
<i>Excessive blood loss after birth</i>			
<i>The possibility of the need for an extended stay in hospital for you following labour</i>			
<i>Your health after the birth including pelvic floor exercises</i>			
<i>Breastfeeding</i>			
<i>Bottle feeding</i>			
<i>Emotions and feelings after birth</i>			

The same set of questions repeated for each antenatal class identified

Were you offered antenatal preparation from any other source? Yes / No (Please tick)
--



**Final question** - Which of your antenatal classes if any did you find most beneficial? Please state and give further information

.....  
.....  
.....

### Obstetric Complications and Procedures Scale (OCPS)

During the birth of your baby did you experience any of the following complications or procedures? Please tick all that apply	
<i>Breaking waters, rupturing membranes artificially</i>	<input type="checkbox"/>
<i>Waters breaking (naturally or artificially) a prolonged period before going into labour or having contractions</i>	<input type="checkbox"/>
<i>Starting labour/ Induction of labour by membrane sweep(s)</i>	<input type="checkbox"/>
<i>Starting labour/ Induction of labour by use of vaginal gel or pessary</i>	<input type="checkbox"/>
<i>Starting labour/ Induction of labour by use of oxytocin drip</i>	<input type="checkbox"/>
<i>Speeding up labour/ Augmentation</i>	<input type="checkbox"/>
<i>Birth assisted by forceps</i>	<input type="checkbox"/>
<i>Birth assisted by ventouse (method of assisting delivery of your baby using a vacuum device)</i>	<input type="checkbox"/>
<i>Episiotomy (surgical incision of the perineum to enlarge the opening for the baby)</i>	<input type="checkbox"/>
<i>First- or second-degree perineal tear (tears of the skin and other soft tissue around the vagina)</i>	<input type="checkbox"/>
<i>Third- or fourth-degree perineal tear (deeper tears of the skin around the vagina that extend to the muscle that controls the anus (the anal sphincter)).</i>	<input type="checkbox"/>
<i>Baby presenting by breech (bottom first)</i>	<input type="checkbox"/>
<i>Nuchal cord (cord round baby's neck)</i>	<input type="checkbox"/>
<i>Baby distressed during labour</i>	<input type="checkbox"/>
<i>Electronic monitoring of baby throughout labour</i>	<input type="checkbox"/>
<i>Bleeding during delivery/ Labour</i>	<input type="checkbox"/>
<i>Emergency Caesarean section (When due to an unexpected medical problem, your baby is born through a cut in your lower abdomen to your womb)</i>	<input type="checkbox"/>
<i>Active management to speed up the delivery of the placenta using an injection</i>	<input type="checkbox"/>
<i>Retained placenta (The placenta having not been pushed out within an hour of birth, believed to be 'retained' and help is required to remove it)</i>	<input type="checkbox"/>
<i>The need for special care baby unit</i>	<input type="checkbox"/>
<i>Excessive blood loss after birth</i>	<input type="checkbox"/>
<i>The need for an extended stay in hospital longer than 3 days following labour for you</i>	<input type="checkbox"/>

### The Childbirth Experience Questionnaire (CEQ; [38])

The following questionnaire asks about your experience of labour and childbirth. Please respond to each statement by ticking the appropriate box

1. Labour and birth went as I had expected.

Totally agree	Mostly agree	Mostly disagree	Totally disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. I felt strong during labour and birth.

Totally agree	Mostly agree	Mostly disagree	Totally disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. I felt scared during labour and birth.

Totally agree	Mostly agree	Mostly disagree	Totally disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. I felt capable during labour and birth.

Totally agree	Mostly agree	Mostly disagree	Totally disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. I was tired during labour and birth.

Totally agree	Mostly agree	Mostly disagree	Totally disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. I felt happy during labour and birth.

Totally agree	Mostly agree	Mostly disagree	Totally disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. I have many positive memories from childbirth.

Totally agree      Mostly agree      Mostly disagree      Totally disagree  
                                                                 

**8.** I have many negative memories from childbirth.

Totally agree      Mostly agree      Mostly disagree      Totally disagree  
                                                                 

**9.** Some of my memories from childbirth make me feel depressed.

Totally agree      Mostly agree      Mostly disagree      Totally disagree  
                                                                 

**10.** I felt I could have a say whether I could be up and about or lie down (during labour)

Totally agree      Mostly agree      Mostly disagree      Totally disagree  
                                                                 

**11.** I felt I could have a say in deciding my birthing position.

Totally agree      Mostly agree      Mostly disagree      Totally disagree  
                                                                 

**12.** I felt I could have a say in the choice of pain relief.

Totally agree      Mostly agree      Mostly disagree      Totally disagree  
                                                                 

**13.** My midwife devoted enough time to me.

Totally agree      Mostly agree      Mostly disagree      Totally disagree  
                                                                 

**14.** My midwife devoted enough time to my partner.

Totally agree      Mostly agree      Mostly disagree      Totally disagree

**15.** My midwife kept me informed about what was happening during labour and birth.

Totally agree      Mostly agree      Mostly disagree      Totally disagree

**16.** My midwife understood my needs.

Totally agree      Mostly agree      Mostly disagree      Totally disagree

**17.** I felt very well cared for by my midwife.

Totally agree      Mostly agree      Mostly disagree      Totally disagree

**18.** My impression of the team's medical skills made me feel secure.

Totally agree      Mostly agree      Mostly disagree      Totally disagree

**19.** I felt that I handled the situation well.

Totally agree      Mostly agree      Mostly disagree      Totally disagree

**Overall emotional experience - Section A of Expectations, Experiences and Satisfaction with Labour [39]**

The following questionnaire asks about your experience of emotions labour and childbirth. Please respond to each statement by ticking the appropriate box

Emotional

(Positive descriptors, not at all – extremely) Did you feel your labour was:

Exciting

Not at all Exciting <input type="checkbox"/>	Minimally Exciting <input type="checkbox"/>	Somewhat Exciting <input type="checkbox"/>	Extremely Exciting <input type="checkbox"/>
--	---	---	--

Enjoyable

Not at all Enjoyable <input type="checkbox"/>	Minimally Enjoyable <input type="checkbox"/>	Somewhat Enjoyable <input type="checkbox"/>	Extremely Enjoyable <input type="checkbox"/>
---	--	--	---

Satisfying

Not at all Satisfying <input type="checkbox"/>	Minimally Satisfying <input type="checkbox"/>	Somewhat Satisfying <input type="checkbox"/>	Extremely Satisfying <input type="checkbox"/>
--	---	---	--

Pleasant

Not at all Pleasant <input type="checkbox"/>	Minimally Pleasant <input type="checkbox"/>	Somewhat Pleasant <input type="checkbox"/>	Extremely Pleasant <input type="checkbox"/>
--	---	---	--

Exhilarating

Not at all Exhilarating <input type="checkbox"/>	Minimally Exhilarating <input type="checkbox"/>	Somewhat Exhilarating <input type="checkbox"/>	Extremely Exhilarating <input type="checkbox"/>
--	---	--	---

(Negative descriptors, not at all – extremely):

Anxiety provoking

Not at all Anxiety provoking <input type="checkbox"/>	Minimally Anxiety provoking <input type="checkbox"/>	Somewhat Anxiety provoking <input type="checkbox"/>	Extremely Anxiety provoking <input type="checkbox"/>
---	--	---	--

Frightening

Not at all Frightening <input type="checkbox"/>	Minimally Frightening <input type="checkbox"/>	Somewhat Frightening <input type="checkbox"/>	Extremely Frightening <input type="checkbox"/>
---	--	---	--

Embarrassing

Not at all Embarrassing <input type="checkbox"/>	Minimally Embarrassing <input type="checkbox"/>	Somewhat Embarrassing <input type="checkbox"/>	Extremely Embarrassing <input type="checkbox"/>
--	---	--	---

Exhausting

Not at all Exhausting <input type="checkbox"/>	Minimally Exhausting <input type="checkbox"/>	Somewhat Exhausting <input type="checkbox"/>	Extremely Exhausting <input type="checkbox"/>
--	---	--	---

Difficult

Not at all Difficult <input type="checkbox"/>	Minimally Difficult <input type="checkbox"/>	Somewhat Difficult <input type="checkbox"/>	Extremely Difficult <input type="checkbox"/>
---	--	---	--

### Measures of Postnatal Mental Health

<b>The Patient Health Questionnaire measure of Depression (PHQ-9);[40]</b>				
Over the last 2 weeks, how often have you been bothered by any of the following problems? Please tick one of the following to indicate your answer				
	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things				
2. Feeling down, depressed, or hopeless				
3. Trouble falling/staying asleep, sleeping too much				
4. Feeling tired or having little energy				
5. Poor appetite or overeating				
6. Feeling bad about yourself or that you are a failure or have let yourself or your family down				
7. Trouble concentrating on things, such as reading the newspaper or watching television.				
8. Moving or speaking so slowly that other people could have noticed. Or the opposite; being so fidgety or restless that you have been moving around a lot more than usual.				
9. Thoughts that you would be better off dead or of hurting yourself in some way.				



**The Generalised Anxiety Disorder Assessment (GAD-7; [41])**

Over the last 2 weeks, how often have you been bothered by any of the following problems?

Please tick one of the following to indicate your answer

	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge				
2. Not being able to stop or control worrying				
3. Worrying too much about different things				
4. Trouble relaxing				
5. Being so restless that it is hard to sit still				
6. Becoming easily annoyed or irritable				
7. Feeling afraid as if something awful might happen				

**Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991)**

The following questionnaire asks about how you have been thinking generally. Please read each of the items and indicate whether you almost never, sometimes, often, or almost always think or do each one when you feel down, sad, or depressed. Please indicate what you generally do, not what you think you should do.

	1 almost never	2 someti mes	3 often	4 almost always
1. think about how alone you feel				
2. think "I won't be able to do my job if I don't snap out of this"				
3. think about your feelings of fatigue and achiness				
4. think about how hard it is to concentrate				
5. think "What am I doing to deserve this?"				
6. think about how passive and unmotivated you feel.				
7. analyze recent events to try to understand why you are depressed				
8. think about how you don't seem to feel anything anymore				
9. think "Why can't I get going?"				
10. think "Why do I always react this way?"				
11. go away by yourself and think about why you feel this way				
12. write down what you are thinking about and analyze it				
13. think about a recent situation, wishing it had gone better				
14. think "I won't be able to concentrate if I keep feeling this way."				
15. think "Why do I have problems other people don't have?"				
16. think "Why can't I handle things better?"				
17. think about how sad you feel.				
18. think about all your shortcomings, failings, faults, mistakes				
19. think about how you don't feel up to doing anything				
20. analyze your personality to try to understand why you are depressed				
21. go someplace alone to think about your feelings				
22. think about how angry you are with yourself				

**The Penn State Worry Questionnaire (PSWQ;[42])**

Please rate each of the following statements on a scale of 1 ("not at all typical of me") to 5 ("very typical of me"), tick one of the following to indicate your answer

	Not at all typical of me				Very typical of me
	1	2	3	4	5
1. If I do not have enough time to do everything, I do not worry about it	1	2	3	4	5
2. My worries overwhelm me.	1	2	3	4	5
3. I do not tend to worry about things.	1	2	3	4	5
4. Many situations make me worry.	1	2	3	4	5
5. I know I should not worry about things, but I just cannot help it.	1	2	3	4	5
6. When I am under pressure I worry a lot.	1	2	3	4	5
7. I am always worrying about something	1	2	3	4	5
8. I find it easy to dismiss worrisome thoughts.	1	2	3	4	5
9. As soon as I finish one task, I start to worry about everything else I have to do.	1	2	3	4	5
10. I never worry about anything.	1	2	3	4	5
11. When there is nothing more I can do about a concern; I do not worry about it anymore.	1	2	3	4	5
12. I have been a worrier all my life.	1	2	3	4	5
13. I notice that I have been worrying about things.	1	2	3	4	5
14. Once I start worrying, I cannot stop.	1	2	3	4	5
15. I worry all the time.	1	2	3	4	5
16. I worry about projects until they are all done.	1	2	3	4	5

### The Significant Other Scale (SOS; [44])

The following questionnaire asks about your birth partner(s). Please state their relationship to you and not their name. If you had more than one birth partner (ie spouse and friend) please complete a scale for each of them. For each person you list, please tick a number from 1 to 7 to show how well they provide the type of help listed during your labour.

Did you have more than one birthing partner yes/ No

If Yes how many birth partners did you have 2/3/4?

<b>Relationship:</b>	<b>Never</b>		<b>Sometimes</b>			<b>Always</b>	
To what extent did you . . . ?	1	2	3	4	5	6	7
1. talk to frankly and share feelings with	1	2	3	4	5	6	7
2. lean on and turn to in times of difficulty	1	2	3	4	5	6	7
3. get interest, reassurance and a good feeling about yourself	1	2	3	4	5	6	7
4. get physical comfort	1	2	3	4	5	6	7
5. resolve unpleasant disagreements if they occur	1	2	3	4	5	6	7
6. get practical help	1	2	3	4	5	6	7
7. get suggestions, advice and feedback	1	2	3	4	5	6	7
8. visit them or spend time with socially	1	2	3	4	5	6	7
9. get help in an emergency	1	2	3	4	5	6	7
10. share interests and have fun with.	1	2	3	4	5	6	7

## Impact of the COVID-19 pandemic

In relation to the coronavirus outbreak (COVID-19)

- 1) Did this impact on what antenatal preparation you were able to access? Yes/No  
(\*If Yes please explain below how this was affected)
- 2) Were you able to have ALL the people you had planned to be with you in labour and birth? Yes /No (\*If No please explain)
- 3) If someone was with you for the birth were they able to be there for all the time you had planned? Yes/No (\*If No please explain)
- 4) 4 Was your birth experience affected in any other way by the COVID pandemic?  
Yes/No  
(\*If Yes please explain below how your birth experience was affected)

**Appendix F:** Blank Feedback Form completed by attendees of a mother and baby group

Feedback on questions – Group forum 5<sup>th</sup> August 2019

<i>Please circle Yes or No and provide information if possible</i>	
Do you think there is anything missing from these lists?	<p>Yes / No</p> <p>If yes please state what is missing.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
Do you think the questions are clear to understand?	<p>Yes / No</p> <p>If no please state what could be better.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
Do you think any changes are needed?	<p>Yes / No</p> <p>If yes please suggest changes .....</p> <p>.....</p> <p>.....</p> <p>.....</p>
Would you have felt ok to complete these questions yourself?	<p>Yes / No</p> <p>If no please give details .....</p> <p>.....</p> <p>.....</p> <p>.....</p>
Is there anything that would have made it easier to complete these questions?	<p>Yes / No</p> <p>If yes please suggest changes .....</p> <p>.....</p> <p>.....</p> <p>.....</p>

**Appendix G:** Blank Feedback Form completed by Midwives to rate complications /procedures

Dear Midwife,

Below is a list of Complications/ Procedures experienced by women during labour. While we are not asking you to participate in research, we would appreciate your support in the scoring of the items.

Please rate each item using the scale below on how **Severe and Sudden** you believe each individual item to be, with 1 being Not at all Severe and Sudden to 5 being Extremely Severe and Sudden.

Not at all Severe and Sudden 1	Slightly Severe and Sudden 2	Somewhat Severe and Sudden 3	Moderately Severe and Sudden 4	Extremely Severe and Sudden 5
<p><b>Please write the scale number you feel corresponds most with the item in each box</b></p>				

Breaking waters, rupturing membranes artificially	
Waters breaking (naturally or artificially) a prolonged period before going into labour or having contractions	
Starting labour/ Induction of labour by membrane sweep(s)	
Starting labour/ Induction of labour by use of vaginal gel or pessary	
Starting labour/ Induction of labour by use of oxytocin drip	
Speeding up labour/ Augmentation	
Birth assisted by forceps	
Birth assisted by ventouse	
Episiotomy	
First- or second-degree perineal tear	
Third- or fourth-degree perineal tear	
Baby presenting by breech (bottom first)	
Nuchal cord (cord round baby's neck)	
Baby distressed during labour	
Electronic monitoring of baby throughout labour	
Emergency Caesarean section	
Active management to speed up the delivery of the placenta using an injection	
Retained placenta	
The need for special care baby unit	
Excessive blood loss after birth	
The need for an extended stay in hospital longer than 3 days following labour for you	

Thank-you so much for your input on this, it is much appreciated!

## Appendix H: Study Advert



### **Are you a first-time mum and was your baby born in the last 4-12 weeks?**

We are interested to find out how well antenatal preparation matches birth experience and if this affects how women feel emotionally after the birth. This research will help to inform the best ways to prepare women for their birth experience.

- **We are looking for mothers in the UK**
  - **over the age of 18**
  - **who attended at least one antenatal class before their baby was born (either face-to-face or online class)**
  - **who had a single birth, with their baby born live from 37 weeks onwards, and whose baby required no more than 48hrs in special care**
  - **with sufficient English language to complete the anonymous online questionnaire.**

This research will help our understanding about what kind of antenatal preparation women may need to prepare them for their birth experiences and to help postnatal mental health.

Please contact us if you are interested in taking part or would like more information:  
Hannah Cross (Doctoral student investigator): [h.cross@liverpool.ac.uk](mailto:h.cross@liverpool.ac.uk)



## Appendix I: Information Sheet



*You are being invited to take part in the research study 'Does information provided in antenatal preparation affect birth experience and postnatal mental health?'. Before you decide whether to take part, it is important for you to understand why the research is being done and what it will involve. Please read the following information carefully and ask us if you would like more information or if there is anything that you do not understand. Please feel free to discuss this with your friends, relatives and GP if you wish. We would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.*

*Thank you for reading this.*

### **Does the focus and content of antenatal preparation interact with obstetric procedures and complications to impact on birth experience and postnatal mental health?**

#### **Participant information sheet**

##### **Why are we doing this study**

The aim is to find out how well antenatal preparation matches actual birth experience and if this affects how women feel emotionally after the birth. This research will help to inform knowledge on the best ways to prepare women for their birth experience.

##### **Who is undertaking the research**

Hannah Cross is undertaking this research as part of her Doctorate in Clinical Psychology training, in the Department of Psychological Sciences at the University of Liverpool

##### **Who can take part?**

We are looking for new mums in the UK to take part. If you can answer yes to all the points below you will be able to take part:

- First-time mum whose baby was born between 4 -12 weeks ago
- Age 18 or over
- Had a baby born live after 37 weeks+ of pregnancy
- Had one baby (didn't have twins or triplets)
- Whose baby lives with them and did not need more than 48hrs in special care
- Have the English language skills they need to complete the online questions
- Did not have a planned (elective) caesarean section.
- Went to at least 1 antenatal session, either NHS or privately funded during pregnancy – This could be a face-to-face session or an online one

### Do I have to take part?

Your participation is voluntary, and you are free to withdraw at any time, without explanation, or incurring a disadvantage.

### What will happen if I take part?

You will be asked to complete online questionnaires, these will take approximately 25 minutes time and can be done on a computer, tablet or smartphone. The questions will ask about your experience of antenatal preparation, birth experience and your experiences of any procedures or complications during labour. Questions will also ask about your experiences of social support during labour and about how you have been feeling, your mental and physical health. This is all anonymous.

If you would like to be entered in a prize draw to win gift vouchers you can add your email details. These will only be used for the purpose of the prize draw and entering this is voluntary.

### How will my data be used?

The University processes personal data as part of its research and teaching activities in accordance with the lawful basis of 'public task', and in accordance with the University's purpose of "advancing education, learning and research for the public benefit.

Under UK data protection legislation, the University acts as the Data Controller for personal data collected as part of the University's research. The Principal Supervisor acts as the Data Processor for this study, and any queries relating to the handling of your personal data can be sent to Prof Pauline Slade, ps1ps@liverpool.ac.uk

Further information on how your data will be used can be found in the table below

How will my data be collected?	Online via Qualtrics, a secure password protected data management platform, linked to the University of Liverpool, designed to allow the gathering of data using online questionnaires.
How will my data be stored?	Data will be stored securely in accordance with the University's Research Data Management policy and will remain the responsibility of the trainee until completion of the doctoral program. Following this, the data custodian (Prof Pauline Slade) will be responsible for the data for 10 years.
How long will my data be stored for?	For 10 years.
What measures are in place to protect the security and confidentiality of my data?	Data will be stored securely and confidentially on the University of Liverpool servers which are virus protected, backed up, and password protected.

Will my data be anonymised?	Names and other identifiable information will not be collected with the data which will allow this to be anonymous.
How will my data be used?	Your data will be analysed along with other data from the study and anonymous results will be published in an academic journal.
Who will have access to my data?	Only the researcher team will have access to your anonymous data
Will my data be archived for use in other research projects in the future?	No
How will my data be destroyed?	Data will be destroyed in accordance with the University's Research Data Management policy. After 10 years this secure data will be confidentiality and securely deleted from the server databases.

#### **Are there any risks in taking part?**

As some questions are about how you feel, your birth experience and your experiences of any procedures or complications during labour there is a chance that some may highlight any existing distress. At the end of the study a debrief sheet is available containing contact details for national support, which are also included below.

#### **Are there any benefits in taking part?**

By taking part in this research you are helping our understanding about what antenatal preparation women may need to prepare them for their birth experiences and to help postnatal mental health.

#### **What will happen to the results of the study?**

The results will be published in an academic journal. You will not be identifiable from the results. If you are interested in seeing the future published results you can access them by contacting the researcher.

#### **What will happen if I want to stop taking part?**

Your participation is voluntary, and you are free to stop taking part at any point during completing the questionnaires. We cannot identify your answers so you will not be able to withdraw your information after submitting your questionnaire.

#### **What if I am unhappy or if there is a problem?**

If you are unhappy, or if there is a problem, please feel free to let us know by contacting Professor Pauline Slade, [ps1ps@liverpool.ac.uk](mailto:ps1ps@liverpool.ac.uk) and we will try to help. If you remain unhappy or have a complaint which you feel you cannot come to us with then you should contact the Research Ethics and Integrity Office at [ethics@liv.ac.uk](mailto:ethics@liv.ac.uk). When contacting the Research Ethics and Integrity Office, please provide details of the name or description of the study (so that it can be identified), the researchers involved, and the details of the complaint you wish to make.

The University strives to maintain the highest standards of rigour in the processing of your data. However, if you have any concerns about the way in which the University processes your



personal data, it is important that you are aware of your right to lodge a complaint with the Information Commissioner's Office by calling 0303 123 1113

**Who can I contact if I have further questions?**

If you have further questions you can contact Hannah Cross, [h.cross@liverpool.ac.uk](mailto:h.cross@liverpool.ac.uk)

If you are currently experiencing difficulties with your mental health please reach out for support. Your GP will be able to support you and sign post you to local support services.

Below is also a list of national support available that others have found helpful

**PANDAS foundation** offer a range of support for mothers experiencing difficulties with their mental health and also following a traumatic birth

**Website:** <http://www.pandasfoundation.org.uk/>

**Email:** [info@pandasfoundation.org.uk](mailto:info@pandasfoundation.org.uk)

**Phoneline:** 0808 196 1776 (9am – 8pm)

**NCT** offer support for new parents

**Email:** <https://www.nct.org.uk/>

**Helpline:** 0300 330 0700 (8am to midnight, Monday to Sunday)

**APNI** Association for Postnatal illness

**Website:** <https://apni.org/>

**Email:** [info@apni.org](mailto:info@apni.org)

**Phoneline:** 0207 386 0868 (10am – 2pm Monday to Friday)

**Mind**, the mental health charity

**Website:** <https://www.mind.org.uk/>

**Email:** [info@mind.org.uk](mailto:info@mind.org.uk)

**Infoline:** on 0300 123 3393 (9am to 6pm, Monday to Friday)

**Maternal Mental Health Alliance** website allows you to search for local support groups and find details of national telephone or email support lines

**Website:** <https://maternalmentalhealthalliance.org/campaign/>

**Family lives**

**Website:** <https://www.familylives.org.uk/>

**Email:** [askus@familylives.org.uk](mailto:askus@familylives.org.uk)

**Helpline:** 0808 800 2222 (9am – 9pm, Monday to Friday and 10am – 3pm Saturday and Sunday)

**The Samaritans** ([24 hour helpline](https://www.samaritans.org/) 0845 790 9090)

## Appendix J: Consent Form



### Does the focus and content of antenatal preparation interact with obstetric procedures and complications to impact on birth experience and postnatal mental health?

#### Consent form

Please tick the box if you agree with these statements

1. I confirm that I have read and have understood the information sheet for the above study. I have had the opportunity to consider the information, ask questions if I want to and have had these answered satisfactorily.
2. I am aged 18 or over
3. I am a first-time mum
4. My baby was born between 4 -12 weeks ago.
5. My baby was born live after 37 weeks+ of pregnancy
6. My baby lives with me and did not need more than 48hrs in special care
7. I feel I have the English language skills I need to complete the online questions
8. I had one baby (I didn't have twins or triplets)
9. I went to at least 1 antenatal session, either NHS or privately funded during my pregnancy - this could be a face-to-face session or an online one
10. I did not give birth to my baby by a planned (elective) caesarean section.
11. I understand that my participation is voluntary and that I am free to stop taking part at any point during completing the questionnaire.
12. I agree to take part in the above study and by ticking this box I understand I am giving my consent to take part.

**Principal Investigator**  
Prof Pauline Slade  
ps1ps@liverpool.ac.uk

**Student Investigator**  
Hannah Cross  
H.cross@liverpool.ac.uk

## Appendix K: Debrief Sheet



**Does the focus and content of antenatal preparation interact with obstetric interventions and complications to impact on birth experience and postnatal mental health?**

### Debrief

Thank-you for taking part in this study, your contribution to the research is greatly appreciated. We understand that some of the questions are associated with birth trauma and so may have highlighted difficult emotions for you. If this is the case or you feel upon answering the questions that you are currently experiencing difficulties with your mental health following the birth of your baby please reach out for support. Your GP will be able to support you and sign post you to local support services.

Below is also a list of national support available for new mums

**PANDAS foundation** offer a range of support for mothers experiencing difficulties with their mental health and also following a traumatic birth

**Website:** <http://www.pandasfoundation.org.uk/>

**Email:** [info@pandasfoundation.org.uk](mailto:info@pandasfoundation.org.uk)

**Phoneline:** 0808 196 1776 (9am – 8pm)

**NCT** offer support for new parents

**Email:** <https://www.nct.org.uk/>

**Helpline:** 0300 330 0700 (8am to midnight, Monday to Sunday)

**APNI** Association for Postnatal illness

**Website:** <https://apni.org/>

**Email:** [info@apni.org](mailto:info@apni.org)

**Phoneline:** 0207 386 0868 (10am – 2pm Monday to Friday)

**Mind**, the mental health charity

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**Email:** [info@mind.org.uk](mailto:info@mind.org.uk)

**Infoline:** on 0300 123 3393 (9am to 6pm, Monday to Friday)

**Maternal Mental Health Alliance** website allows you to search for local support groups and find details of national telephone or email support lines]

**Website:** <https://maternalmentalhealthalliance.org/campaign/>

**Family lives**

**Website:** <https://www.familylives.org.uk/>

**Email:** [askus@familylives.org.uk](mailto:askus@familylives.org.uk)

**Helpline:** 0808 800 2222 (9am – 9pm, Monday to Friday and 10am – 3pm Saturday and Sunday)

**The Samaritans** (24-hour helpline 0845 790 9090)

**Appendix L: Overall measure of Total Preparation**

Summary of the Birth Experience CEQ / Total Preparation model of hierarchical regression			
Variable	B	SE B	$\beta$
Step 1			
Constant	13.35	.32	
Complications /Procedures	-.11	.02	-.39***
Step 2			
Constant	11.38	.70	
Complications /Procedures	-.11	.02	-.38***
Total Preparation	.03	.01	.18**
Step 3			
Constant	9.82	1.29	
Complications /Procedures	-.01	.07	-.04
Total Preparation	.04	.02	.33**
Complications /Procedures * Total Preparation Interaction	-.00	.00	-.37

$R^2 = .15$  for step 1 ( $p < .001$ ),  $\Delta R^2 = .03$  for step 2,  $\Delta R^2 = .01$  for step 3

*Note.* \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ , Change in  $R^2$  (denoted as  $\Delta R^2$ )

Summary of the Overall Emotional Experience / Total Preparation model of hierarchical regression.			
Variable	B	SE B	$\beta$
Step 1			
Constant	28.13	.90	
Complications /Procedures	-.33	.05	-.39***
Step 2			
Constant	21.95	1.98	
Complications /Procedures	-.32	.05	-.38***
Total Preparation	.08	.02	.20**
Step 3			
Constant	24.03	3.66	
Complications /Procedures	-.44	.20	-.54*
Total Preparation	.05	.05	.13
Complications /Procedures * Total Preparation Interaction	.00	.00	.17

$R^2 = .16$  for step 1 ( $p < .001$ ),  $\Delta R^2 = .03$  for step 2,  $\Delta R^2 = .01$  for step 3

*Note.* \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ , Change in  $R^2$  (denoted as  $\Delta R^2$ )