

Bangor University

## PROFESSIONAL DOCTORATES

### Perinatal Mental Health: An Exploration of Different Dimensions of Perinatal Psychopathology at an International and National Level

Alofs, Emma

*Award date:*  
2019

*Awarding institution:*  
Bangor University

[Link to publication](#)

#### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

#### Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

**Perinatal Mental Health: An Exploration of Different Dimensions of  
Perinatal Psychopathology at an International and National Level**

Emma Alofs

North Wales Clinical Psychology Programme



PRIFYSGOL  
**BANGOR**  
UNIVERSITY

Submitted in partial fulfilment for the degree of

Doctorate in Clinical Psychology

May 2019

## **Declaration**

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. All other sources are acknowledged by bibliographic references. This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree unless, as agreed by the University, for approved dual awards.

Signed: Emma Alofs

## **Acknowledgements**

Firstly, I would like to thank Anna Morris and Richard Jones at NHS Wales Informatics Service – I am extremely grateful for the time you invested in preparing the data for my project and especially to Anna for being so friendly and approachable, even though we never met in person.

A heartfelt thank you to Dr Mike Jackson, for your research support and especially for your encouragement, genuineness and calming influence as my training co-ordinator during the course of my training. I will never forget your kindness at the times I needed it the most.

To my cohort – thank you for all the laughs, for helping to wipe away the tears and for being great friends as well as colleagues. I am glad I got to experience this with you all.

Most importantly, I would like to thank my family. To my Mum, Pauline, for doing the school runs and cooking the supper, for taking us in and letting us stay (a lot) longer than planned. You have been my secure base and I could not have done this without you by my side, keeping me on track and helping me balance being a trainee with being a mum. To my daughters, Ellie and Izzy – my motivation to keep going even at the times when I doubted myself. I cannot put into words how proud I am to be your mum. And to Dan, for your understanding, patience and unwavering belief in me.

Finally, to Dr Chris Saville. Thank you for supporting me to pursue my own research interests at a time when I also needed certainty and stability. For the hours of statistical support, your enthusiasm, and especially your patience. Without you this work would not have been possible.

Thank you.

## **Dedication**

I dedicate this thesis to the memory of my wonderful Grandma, Kathleen Cutting.

Nobody would have been prouder than you.

## Table of Contents

<b>Title Page .....</b>	<b>1</b>
<b>Declaration.....</b>	<b>2</b>
<b>Acknowledgements .....</b>	<b>3</b>
<b>Dedication .....</b>	<b>4</b>
<b>Table of Contents .....</b>	<b>5</b>
<b>Thesis Abstract.....</b>	<b>7</b>
<b>Chapter 1: Literature Review .....</b>	<b>8-45</b>
Title Page.....	9
Abstract .....	10
Highlights .....	11
Introduction .....	12
Method .....	15
Results .....	19
Discussion .....	31
References .....	38
<b>Chapter 2: Empirical Paper.....</b>	<b>46-74</b>
Title Page.....	47
Highlights .....	48
Abstract .....	49
Introduction .....	50
Method .....	53
Results .....	57
Discussion .....	65
References .....	71

<b>Chapter 3: Contributions to Theory and Clinical Practice .....</b>	<b>75-100</b>
Abstract .....	76
Summary of Thesis Findings.....	77
Implications for Future Research and Theory Development .....	78
Implications for Clinical Practice.....	85
Reflections.....	90
Conclusion.....	92
References .....	94
<b>Appendices.....</b>	<b>101</b>
1. Bangor University School of Psychology Ethical Approval.....	102
2. NHS REC Approval Letter.....	103
3. HCRW Approval/Management Permission .....	109
4. Word Count Statement .....	111

## **Thesis Abstract**

This thesis explores different dimensions of perinatal psychopathology across three individual papers with the aim of furthering our understanding of psychological distress experienced by women around the time of childbirth.

A systematic review in chapter one examined the prevalence of eating disorders in women during the perinatal period. The review synthesised findings from 15 studies in multiple cultural and international settings. Wide-ranging prevalence estimates were found, with studies utilising self-report questionnaires reporting the highest prevalence estimates. Studies utilising more stringent diagnostic criteria in the context of clinical interviews yielded more conservative estimates. Collectively, the results suggested that the perinatal period can be a time of vulnerability for experiencing difficulties associated with disordered eating. Areas for further research are discussed and recommendations are made for routinely screening women for eating disorders as part of a mental health assessment in pregnancy and after birth.

An empirical study in chapter two explored the characteristics of mothers admitted to psychiatric units in Wales within the first postpartum year using data covering an 18 year period. The principal aim was to investigate associations between postpartum psychiatric admissions and socioeconomic deprivation. Using multilevel modelling methodology, results indicated that socioeconomic deprivation, measured at the area-level, was significantly associated with psychiatric admissions after birth. This relationship was found to be significantly stronger for mothers age 40 and over. The implications and limitations of this research are discussed.

The third chapter considers the theoretical, research and clinical implications that arose from the first two papers, in addition to a short reflective summary to conclude.



## **Chapter 1**

### **Systematic Review**

# **Prevalence of Eating Disorders in Women during the Perinatal Period:**

## **A Systematic Review**

Emma K. S. Alofs<sup>a,b</sup>, Dr Mike Jackson<sup>a,b</sup> and Dr Christopher W. N. Saville<sup>a</sup>

<sup>a</sup> North Wales Clinical Psychology Programme, Bangor University, Bangor, UK

<sup>b</sup> Betsi Cadwaladr University Health Board, NHS Wales, UK

**Corresponding Author:** Emma Alofs, North Wales Clinical Psychology Programme, School of Psychology, Brigantia Building, Bangor University, Bangor, LL57 2AS. E-mail: emma.alofs@yahoo.co.uk

**Conflict of interest:** none

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

---

This paper will be submitted to *European Eating Disorders Review* and will follow submission guidelines for the journal:

<https://onlinelibrary.wiley.com/page/journal/10990968/homepage/forauthors.html>

## **Abstract**

*Objective:* To systematically review the literature reporting on the prevalence of eating disorders in women during the perinatal period.

*Method:* Three databases (Web of Science, PsycINFO and CINAHL) were searched to identify papers published prior to January 2019 using keywords relating to eating disorders and the perinatal period. 15 studies met the inclusion criteria for the review.

*Results:* Studies provided prevalence rates for anorexia nervosa (five papers), bulimia nervosa (five papers), binge eating disorder (five papers) and eating disorder not otherwise specified (four papers), in addition to prevalence estimates for any eating disorder (14 papers). Relatively high prevalence was found in several studies; however estimates varied considerably, with estimates ranging from 0.2% to 27.8% for any eating disorder. Complexities in reviewing this literature included significant heterogeneity in study methodology.

*Conclusions:* Eating disorders appear to be relatively common in perinatal women. Assessment of mental health difficulties during the perinatal period should include assessment of disordered eating, which could be facilitated by the development of appropriate perinatal screening tools. There remains considerable heterogeneity in study design and future studies should aim to adopt a consistent diagnostic threshold in line with current classification systems.

*Highlights:*

- Eating disorders more common in perinatal period than historically thought
- Wide-ranging prevalence estimates of 0.2-27.8% for any eating disorder
- Assessment of mental health in perinatal period should include screening for eating disorders

*Key words:* Perinatal period; eating disorders; anorexia nervosa; bulimia nervosa; systematic review.

## **Introduction**

Eating disorders (ED) are characterised by abnormal eating behaviours and related thoughts and emotions that significantly impair health and psychosocial functioning (Bye et al., 2018). The main types of ED are anorexia nervosa (AN), bulimia nervosa (BN) and binge eating disorder (BED). AN is characterised by a state of self-starvation and self-worth that is judged on appearance, shape and weight. Individuals with AN maintain a significantly low weight due to an intense fear of weight gain. BN and BED both involve episodes of uncontrolled over-eating, and in BN binge eating is followed by compensatory behaviours such as self-induced vomiting or use of laxatives (American Psychiatric Association, 2013). ED can lead to serious physical health complications and are associated with comorbidity and high mortality rates (Hudson, Hiripi, Pope & Kessler, 2007).

Epidemiological studies of ED in general populations have shown that ED typically affect women of childbearing age (Hudson et al., 2007). It was historically believed that pregnancy was a rare occurrence for women with ED due to associated physical health consequences including amenorrhea, coupled with psychological and psychosocial difficulties (Hoffman, Zerwas & Bulik, 2012). However, in recent years a growing body of research has disputed this assumption, indicating that not only do women with ED become pregnant, but that it may be more common than once thought (Easter et al., 2013; Cardwell, 2013; Fogarty, Elmir, Hay & Schmied, 2018).

The perinatal period refers to pregnancy and the postpartum period, from conception up to one year after birth. Pregnancy and the transition to motherhood is a time of significant physical, social and emotional change and adjustment (Redshaw & Martin, 2011). The perinatal period is therefore considered to be a time of increased vulnerability to psychological distress (Vesga-Lopez et al., 2008). In addition to a change in identity and role,

pregnancy is also a time of significant body transformation (Redshaw & Martin, 2011). Although dissatisfaction with shape and weight can affect pregnant women with or without ED, women with a history of ED are more vulnerable to experiencing heightened concerns relating to changes in shape and weight, over which they have no control (Fogarty et al., 2018). Studies examining the course of ED during the perinatal period show that women tend to experience a decrease in the severity of their symptoms during pregnancy (Blais et al., 2000; Rocco et al., 2005). This suggests that the prevalence of ED during pregnancy is likely to be lower than general population estimates. However, findings have been mixed, as there is evidence that symptoms persist, and women often experience postpartum relapse (Crow et al., 2008). Existing research has noted that antenatal care should include questions about eating practices, attitudes and methods of weight control during pregnancy as pregnancy and the postpartum may represent a period of vulnerability for the precipitation, re-emergence or exacerbation of ED symptoms (Bannatyne et al., 2017). Identifying and addressing ED during pregnancy is of particular importance as links have been highlighted between ED and increased risk of adverse maternal and infant outcomes including miscarriage, birth complications, postpartum depression, infant feeding difficulties, poor infant attachment and maternal bonding (Franko & Spurrell, 2000; Ward, 2008).

The presence of ED in women during the perinatal period has received increasing attention in the literature and yet still appears to be poorly understood (Watson et al., 2013). Despite a growth in research investigating the prevalence of ED psychopathology within the perinatal period, prevalence estimates have varied considerably, and there has been little effort to synthesise findings. This may be partly due to the difficulties in combining a diverse literature with considerable inconsistency in the way ED are defined, operationalised and measured. Nevertheless, a review would provide valuable information when developing detection and intervention strategies for women with ED during pregnancy and after birth. In

addition, critically appraising the methodology of existing studies may inform how future studies are designed and conducted.

The purpose of this review is to provide a comprehensive, systematic evaluation of the literature reporting on the prevalence of ED psychopathology in pregnant and postpartum women. ED included in this review are AN, BN, BED and Eating Disorders Not Otherwise Specified (EDNOS). Although the authors acknowledge that EDNOS was recently replaced by Other Specified Feeding or Eating Disorder (OSFED) in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; American Psychiatric Association, 2013), many of the studies included in this review predate the changes introduced in the DSM-5, and include EDNOS in prevalence estimates. Studies investigating Pica and Avoidant/Restrictive Food Intake Disorder were not included.

## Method

### *Search strategy*

This systematic review was conducted using the PRISMA guidelines and checklist (Moher et al., 2009). Electronic searches were conducted in January 2019 using the following databases: Web of Science (all databases, by title, abstract or keywords), PsycINFO (via ProQuest, by abstract) and CINAHL with Full Text (by abstract). To capture relevant publications, a combination of the following search terms were used: *(perinatal OR prenatal OR postnatal OR antenatal OR antepartum OR postpartum OR pregnan\* OR matern\*) AND (“eating disorder” OR “eating disorders” OR anorex\* OR bulim\* OR “eating disorder not otherwise specified” OR EDNOS OR “binge eating disorder” OR “other specified feeding or eating disorder” OR OSFED)*. The search was limited to peer-reviewed journal articles published in English language, and those reporting on human research.

### *Study selection*

The study selection process is shown in Figure 1. The search identified 1,514 unique articles after duplicates were removed. Titles and abstracts were initially screened. Studies were excluded if: they used qualitative methodology or they were clearly unrelated – not human research, or not related to women/mothers, the perinatal period or ED. At this stage, 1,421 articles were excluded, leaving 93 articles. The remaining articles were read in full, and were included if they met the following inclusion criteria: (1) contained a sample of expectant mothers or mothers in the first 12 months postpartum, (2) investigated the presence of active ED in women during the perinatal period, with a clear description of how the ED was categorised or diagnosed (for example, using validated eating disorder questionnaires and/or clinical interviews) (3) were an unselected general sample (i.e. not groups constrained to particular characteristics e.g. IVF or obese mothers, inpatient samples) (4) reported on



prevalence rates of ED in women during the perinatal period as an outcome. A further 81 articles were excluded based on these criteria (see Figure 1). Hand-searching of the reference lists of included papers identified three further studies which met the inclusion criteria.

Cross-sectional, cohort and case control-studies were included, in addition to studies that were conducted for purposes other than determining the prevalence of women with ED in the perinatal period but nevertheless met the inclusion criteria. The search identified several papers reporting on prevalence rates of pregnant women with a prior history of ED, for example using a lifetime diagnosis as an indicator of ED in pregnancy as opposed to investigating the presence of active disordered eating in pregnancy specifically. As this review aimed to estimate prevalence rates of women with disordered eating in pregnancy, studies that did not clearly indicate that the ED was active in pregnancy were not included. Several identified papers used the same data from longitudinal cohort studies. In order to prevent bias, studies presenting the most relevant and/or comprehensive data in terms of prevalence were selected for the review. The remaining studies using duplicate data were excluded (see Figure 1).

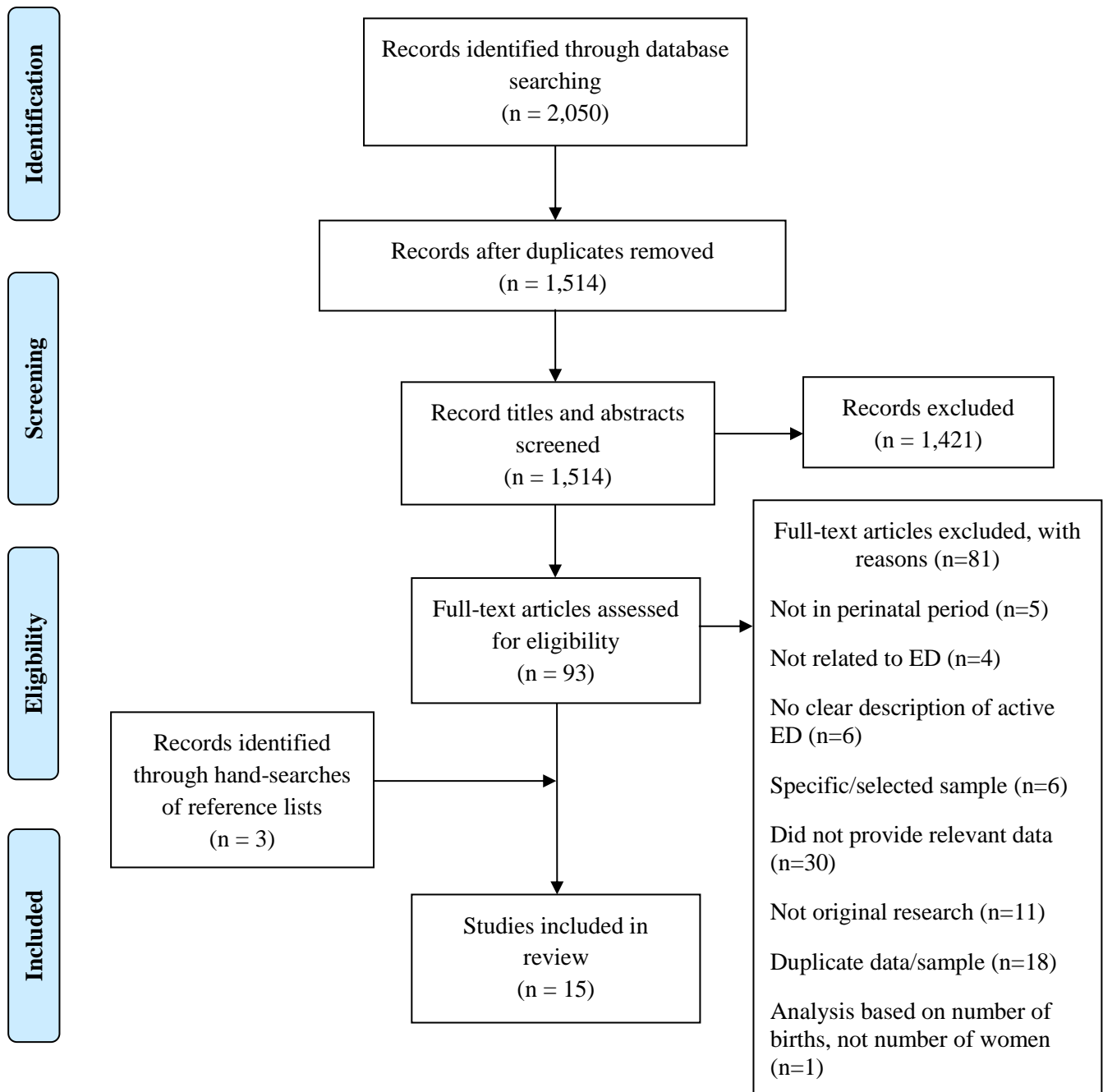


Figure 1. Flow diagram of study selection and inclusion and exclusion process.

### *Data Extraction and Analysis*

A coding spreadsheet was used to extract the relevant data from the articles. The data to be extracted included: author names, publication date and location, sample size, age of sample (mean and/or range where available), assessment time within the perinatal period, how the ED was categorised or diagnosed, study design, sample recruitment and

characteristics including exclusion/inclusion criteria, and prevalence found. Assessment of study quality was undertaken during data extraction using guidelines for evaluating prevalence studies (Boyle, 1998; Loney et al., 1998). In accordance with predefined criteria from the literature, the following data was collected and appraised: response rate, sample size and representativeness, ED assessment method/case definition (structured clinical interviews were considered methodologically superior), study limitations and bias risks.

Due to the heterogeneity of the samples and methodologies, including methods of ED assessment and categorisation, it was not appropriate to pool data for meta-analytic estimation of prevalence. A descriptive and narrative approach was used to summarise key findings.

## Results

### *Study Characteristics*

The literature search identified 15 studies that fulfilled the inclusion criteria. Table 1 presents characteristics of the included papers. All studies were published between 1996 and 2017. A diversity of populations were represented, with studies being conducted in a variety of countries including the UK (n=4), USA (n=2), Sweden (n=2), Norway (n=2), Brazil (n=2), China (n=1), Denmark (n=1) and Spain (n=1). Included participants ranged in ethnic and cultural backgrounds, educational levels and socioeconomic status. One study (Watson et al., 2013) validated findings from Bulik et al. (2007) using data from a longitudinal cohort study (MoBa; Magnus et al., 2016). Each paper used a separate sample of participants, therefore both studies were included. Study designs varied and were predominantly cross-sectional (n=8), with others being longitudinal (n=2), retrospective (n=1) or population-based cohort studies (n=4).

### *Sample Size and Recruitment*

Table 1 shows sample sizes ranging from 54 to 80,660, with the prospective cohort studies accounting for the largest sample sizes. Response rates were reported by most studies (n=12) and ranged between 38.5% and 98.4%, with cohort studies reporting the lowest. The majority of samples were recruited from hospital or community-based perinatal care settings including routine antenatal/postnatal clinics, and represented both clinical and community samples. Most studies used consecutive sampling of routine clinical cases, with one study reporting random sampling and the cohort studies obtaining population-based samples.

**Table 1.** Summary of prevalence studies included in review

Author, Year, Country	N	Age (Years)	Assessment Period	How ED was Diagnosed/Identified	Design	Sample	Prevalence	Comments
Andersson et al. (2003) <b>Sweden</b>	1556	29.4±4.6	Pregnancy (second trimester; 16-17 weeks)	PRIME-MD Patient Health Questionnaire (self-report), then screen-positive women administered the PRIME-MD Clinician Evaluation Guide for DSM-IV by telephone.	Cross-sectional	Routine clinical case sample of pregnant women recruited consecutively whilst attending second-trimester routine ultrasound screening at two hospitals in Sweden. Excluded women with foetal malformation or detection of miscarriage during ultrasound examination.	Any ED: 0.2%	Large population-based sample. 1734/1795 eligible women screened (96.6%). 766/815 screen-positive women (94%) completed interview. Women who refused interview had a higher prevalence of positive screens.
Broussard (2012) <b>USA</b>	54	M=32.1 (SD=5.2)	Pregnancy (all trimesters; retrospectively assessed)	EDI-3 (self-report questionnaire) and medical records reviewed for history of ED. A preface and postscript was added to the EDI-3 to retrospectively assess experiences 3 months prior to pregnancy and during first, second and third trimester of pregnancy.	Retrospective descriptive design	Convenience sample of English-speaking postpartum women from a large urban hospital. Sample limited to live births.	Any ED: 27.8% (had scores suggestive of an ED)	54% response/return rate. A review of medical records indicated that 1 of 54 women (1.84%) had a documented history of ED. Presence of ED in sample identified by healthcare providers was 6.7%, indicating that 93.3% of likely ED went undetected. Limitation: Small sample.
Bulik et al. (2007) <b>Norway</b>	41157	<24:12.4% 25-29:34.3% 3-034: 37.4% 35+:16%  From Watson paper – M=29.9 (SD=4.6)	Pregnancy (second trimester; median = 18 weeks) and retrospectively (6 months before pregnancy)	Self-report questionnaire used in previous epidemiological studies of ED in Norway. Included items on ED and behaviours. Questionnaire developed in accordance with DSM-IV criteria to assess and categorise symptoms of broadly defined ED.	Prospective population-based pregnancy cohort study	Pregnant women recruited through postal invitation after registering for a routine prenatal ultrasound at approximately 18 weeks gestation. Sample recruited from 1999 -2006. Sample limited to mothers with singleton live births. Only the first pregnancy was included for women who had multiple pregnancies during the study period.	Any ED: 4.8% BN: 0.2% BED: 4.8% EDNOS-P: 0.1%	Data collection conducted as part of the MoBa study. 42% response rate. AN not assessed in pregnancy due to difficulties determining low weight in the presence of pregnancy-related weight gain (consistent with DSM-IV diagnostic criteria for AN). The overall prevalence rate of any ED during pregnancy was a conservative estimate given that AN was not captured within this estimate.

dos Santos et al. (2017) <b>Brazil</b>	913	18-47; Median 30 for ED, 29 for non ED	Pregnancy (second and third trimester)	Structured interviews using the SCID-I for DSM-IV with additional information collected to allow for further classification of ED according to DSM-V.	Cross-sectional prospective study	Pregnant women waiting for an obstetrics outpatient appointment in a tertiary hospital in Sao Paolo. Pregnancies considered high risk. Sample limited to live births.	Any ED: 1.9% AN: 0.1% BN: 0.7% BED: 1.1%	HADS also used to assess anxiety and depression. Presence of ED in sample was associated with symptoms of depression and anxiety.
Easter et al. (2013) <b>UK</b>	739	M=30.5 (SD=5.8)	Pregnancy (first trimester) and retrospectively (6-12 months before pregnancy)	EDDS (self-report questionnaire; anonymous completion); slightly adapted to assess current ED symptoms, behaviours and diagnoses during pregnancy and retrospectively prior to pregnancy.	Cross-sectional	Random sample of pregnant women attending an antenatal clinic in a large inner-city hospital. No exclusion criteria reported.	Any ED: 7.5% AN: 0.5% BN: 0.1% BED: 1.8% EDNOS: 5.0%	94% response rate. Presence of Purging Disorder (PD) also assessed; prevalence of PD: 0.1%. Presence of ED in 6-12 months prior to pregnancy was also assessed retrospectively and were as follows: AN: 0.4%, BN: 0.1%, BED: 1.2%, PD: 1.4%, EDNOS: 6.1%, any ED: 9.2%. Limited sociodemographic information.
Kelly, Zatzick & Anders (2001) <b>USA</b>	186	Sample with psychiatric disorders: M=26.3 (SD=6.2) Sample without psychiatric disorders: M=26.4 (SD=6.0)	Pregnancy (any time)	PRIME-MD Patient Health Questionnaire (self-report) and review of obstetric records to assess the presence of psychiatric disorders and associated symptoms in pregnant women including BN and BED.	Cross-sectional	Pregnant women who were receiving prenatal care in a university-based obstetrics clinic serving low-income minority women. Sample limited to English speaking participants.	Any ED: 5% BN: 2% BED: 4%	98.4% response rate. Ethnically diverse sample (37% Caucasian, 18% African American, 16% Hispanic, 10% Asian, 2% Native American, and 18% mixed race or other). Review of medical records identified that only 1 of the 10 pregnant women screened positive for ED symptoms had symptoms recorded in their obstetric notes.

Lai, Tang & Tse (2006) <b>China</b>	131	19-42 M=30 ±4.41	Pregnancy (T1) and 6 months postpartum (T2)	EDI-2 (bulimia subscale) used to assess ED psychological and behavioural traits.	Longitudinal	Routine clinical case sample of expectant mothers attending prenatal clinics in Hong Kong for routine care. 90% of sample attended public hospitals. Expectant mothers without partners were excluded (n=5).	Any ED: 8.4% disordered eating in pregnancy.  19.08% disordered eating in postpartum period.	82% response rate in pregnancy phase; attrition rate of 36% in postpartum phase. Attrition analyses revealed no significant differences between completers and non-completers. Sample representative of general population in Hong Kong; Sample reflecting Chinese culture and traditions in relation to food consumption during the perinatal period but single parents not represented in sample.
Micali, Simonoff & Treasure (2011) <b>UK</b>	10887	n.r.	Pregnancy (second trimester; 18 weeks)	EDE-Q (self-report questionnaire; shape and weight concern sub-scales) and specific questions on use of laxatives and SIV for weight loss. Women with either a score of >2 (recognised cut-off) on the shortened EDE-Q shape or weight sub-scales, or presence of pregnancy SIV/laxative use were classified as having current ED symptoms.	Prospective population-based pregnancy cohort study	All pregnant women living in geographical area of Avon, UK who were expected to deliver between 1 <sup>st</sup> April 1991 and 31 <sup>st</sup> December 1992 were recruited. Only live singleton pregnancies included.	2.2% active ED symptoms in pregnancy	Postal questionnaires used to obtain data. Women reporting any past psychiatric disorder other than ED or depression were excluded (n=457). Also measured depression and anxiety in sample; presence of active ED symptoms in pregnancy increased risk of depression and anxiety in pregnancy and postpartum period.
Micali, Stemann Larsen, Strandberg-Larsen & Nybo Andersen (2016) <b>Denmark</b>	80660	n.r.	Pregnancy (second trimester; 16-17 weeks)	Single item self-report of ED by telephone interviews and pre-pregnancy BMI.	Prospective population-based pregnancy cohort study	Women from the Danish National birth cohort. Recruited from 1996-2002 at first antenatal visit throughout Denmark. Only first singleton pregnancies included in sample. Women with gestational diabetes excluded from sample (n=1184).	AN: 0.23%	‘Active AN’ determined by pre-pregnancy BMI and recency of ED onset. No standardised ED Measure or clinical interview used as study relied on self-reporting of ED and did not assess specific ED symptoms.

Navarro et al. (2008) <b>Spain</b>	1453	18-46 M=31.7	Postpartum (6 weeks)	EPDS used as a screening tool in phase 1; in phase 2 (performed on the same day) a random sample of 405 women were then interviewed blind by a trained psychiatrist and clinical psychologist using the SCID-I for DSM-IV (nonpatient version) to establish psychiatric diagnoses.	Cross-sectional (two-phase)	Community sample of Spanish women attending their 6-week postpartum appointment at an urban hospital. Sample consecutively recruited over 1 year period. Women who had stillborn births or were not literate were excluded. Following a screening phase, a stratified random sample was selected for completion of a structured clinical interview.	Any ED: 0.8% (0.4-1.2 95% CI)	96.4% response rate in phase 1; 94.6% response rate for phase 2. Non-responders not significantly different than responders in age, education or EPDS scores but more likely to be unemployed. 30% of overall sample were selected for clinical interview assessment; 15% of women with EPDS score <7; 50% with EPDS score =7 and <10; 60% with EPDS score =10 and <13; and 100% with EPDS score =13.
Pettersson, Zandian & Clinton (2016) <b>Sweden</b>	731	M=32.5 (SD=4.6)	Pregnancy (first trimester; 10-12 weeks; N=396) and postpartum (6-8 months; N=335)	EDE-Q (self-report questionnaire) administered by midwives involved in the study. Global score of $\geq 4$ on EDE-Q was used to indicate presence of ED. Participants were given the option of completing the questionnaire anonymously.	Cross-sectional	Routine clinical case samples recruited from prenatal and postpartum public and private clinics; reflecting the sociodemographics of metropolitan Stockholm.	Pregnancy prevalence: Any ED:3% (EDE-Q standard version) ED:5.3% (EDE-Q 'optimised' version).  Postpartum prevalence: Any ED:7.2% (EDE-Q standard version) ED:12.8% (EDE-Q 'optimised' version).	92-98% response rate depending on clinic. 45% of pregnant and 40% of postpartum women chose to participate anonymously. The EDE-Q was optimised using factor analysis, resulting in items with low loadings being removed. The optimised version of the EDE-Q contained 14 items.



Soares et al. (2009) <b>Brazil</b>	712	M= 24.7 (SD=6.4)	Pregnancy (second and third trimester; 16 – 36 weeks) and retrospectively (last 28 days before pregnancy)	EDE-Q (Portuguese version; self-report questionnaire administered by trained interviewers) and food frequency questionnaire used to assess current ED symptoms during pregnancy and retrospectively prior to pregnancy. Global score of $\geq 4$ on EDE-Q was used to indicate presence of ED in pregnancy.	Cross-sectional	Sample of pregnant women attending primary care units located in poor neighbourhoods in two cities of southern Brazil.	Any ED: 0.6%  Prevalence of specific ED symptoms also reported: binge eating episodes (17.3%); excessive shape (5.6%) and weight (5.5%) concerns.	91.3% response rate. PRIME-MD also used to assess other psychiatric symptoms. Anxiety symptoms significantly associated with binge eating during pregnancy. Low socioeconomic status sample; 59% not working or in education.
Stein & Fairburn (1996) <b>UK</b>	92	M=26.6 (SD=3.7)	Pregnancy (M=15 weeks and M=32 weeks) and postpartum (M=3 and M=6 months)	EDE (investigator-based standardised diagnostic interview) and weight measurement at each interview.	Longitudinal	Routine clinical case sample recruited from referrals to maternity department in a hospital in Oxford. Sample limited to first-time mothers with singleton pregnancies. Women with gestational diabetes or serious pregnancy complications were excluded from sample.	Pregnancy: Any ED: 3-4% (all were EDNOS)  Postpartum: Any ED: 4.1-4.4% (all were EDNOS)	78% response rate. SCL also administered to assess presence of other psychiatric symptoms; found no evidence that low mood was associated with ED psychopathology.
Turton, Hughes, Bolton & Sedgwick (1999) <b>UK</b>	421	16-46 M=29.9 (SD=5.47)	Pregnancy (and retrospectively 2 years before pregnancy)	EAT (self-report questionnaire) anonymously completed twice to assess current ED symptoms during pregnancy and retrospectively prior to pregnancy. A recommended cut-off score of 19/20 was applied to identify ED symptomatology.	Cross-sectional	Routine clinical case sample of pregnant women attending antenatal follow-up appointments during 4 consecutive weeks at an inner city hospital.	4.9% of sample scored above cut-off for ED symptoms in pregnancy	79.4% response rate. Some questionnaires were incomplete. EAT is a screening tool and is not designed to diagnose ED in relation to DSM criteria. Prevalence estimate is of ED symptomology but not necessarily meeting strict ED diagnostic criteria.

Watson et al. (2013) <b>Norway</b>	36024	M=30.1 (SD=4.7)	Pregnancy (second trimester; median = 17 weeks) and retrospectively (6 before pregnancy)	(as in Bulik et al., 2007)	Prospective population-based pregnancy cohort study (validation study)	(as in Bulik et al., 2007); validation sample recruited up to 2009 and were not part of sample in Bulik et al. (2007).	Any ED: 4.7% BN: 0.2% BED: 4.8% EDNOS-P: <0.1%	(as in Bulik et al., 2007). 38.5% response rate. This study aimed to validate findings in Bulik et al. (2007) as part of the MoBa study. The validation sample in this study included participants who were recruited as part of MoBa up to 2009, but who were not part of the original sample in Bulik et al. (2007). Recruitment procedures and questionnaires were the same for both sets of samples.
---------------------------------------	-------	--------------------	--	----------------------------	--	--	---	--

Abbreviations: M = Mean; SD = standard deviation; n.r. = not reported; ED = eating disorder; AN = anorexia nervosa; BN = bulimia nervosa; BED = binge eating disorder; EDNOS = eating disorder not otherwise specified; EDNOS-P = recurrent self-induced purging in the absence of binge eating; BMI = body mass index; SIV = self-induced vomiting; EDE= Eating Disorder Examination; EDE-Q = Eating Disorder Examination Questionnaire; EDDS = Eating Disorder Diagnostic Scale; EDI = Eating Disorder Inventory; EAT = Eating Attitudes Test; SCID-I = Structured Clinical Interview for DSM Disorders; EPDS = Edinburgh Postnatal Depression Scale; HADS = Hospital Anxiety and Depression Scale; PRIME-MD = The Primary Care Evaluation of Mental Disorders; ICD-9-M = International Classification of Diseases, Ninth Revision, Clinical Modifications; DSM = Diagnostic and Statistical Manual of Mental Disorders; SCL = Symptom Checklist; MoBa = The Norwegian Mother and Child Cohort Study.

### *Eating Disorder Assessment*

Studies assessed the presence of ED psychopathology in the following ways: (1) using self-report questionnaires measuring symptoms of ED and using threshold or cut-off scores to determine the presence of an ED (n=10), (2) using diagnostic/structured clinical interviews to determine ED diagnoses (n=4) or (3) using self-reporting of ED and participants' pre-pregnancy body mass index (BMI) to determine the presence of an ED (n=1). All studies utilising diagnostic clinical interviews applied diagnostic criteria based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; American Psychiatric Association, 1994), with one study (dos Santos et al., 2017) collecting additional data to allow for further classification of ED according to DSM-V.

Several studies using self-report questionnaires adapted them in various ways, including adjusting them to account for pregnancy (Easter et al., 2013), selecting specific subscales only (Lai, Tang & Tse, 2016; Micali, Siminoff & Treasure, 2011) and reducing items via factor analysis (Pettersson, Zandian & Clinton, 2016). Other studies used self-report questionnaires in conjunction with other data collection methods, including a review of medical/obstetric records (Broussard, 2012; Kelly, Zatzick & Anders, 2001) and further questions about compensatory behaviours (Micali, Simonoff & Treasure) and food frequency (Soares et al., 2009). Two studies (Bulik et al., 2007; Watson et al., 2013) used a self-report questionnaire developed in accordance with DSM-IV criteria, which was used in previous epidemiological studies in Norway.

Assessments of the following ED classifications were reported: Any ED, AN, BN, BED, and EDNOS. Seven studies reported prevalence rates for specific ED, with six of those studies reporting the prevalence of any ED in addition to specific disorders. Eight studies reported prevalence estimates for unspecified ED only, defined as any ED, and one study reported on AN only.

### *Assessment Timing and Duration*

Studies varied in terms of when and how frequently data were collected, and at what stage in the perinatal period prevalence was assessed. The majority of studies collected data in pregnancy (n=11). Three studies collected data in pregnancy and the postpartum period, with one study (Pettersson, Zandian & Clinton, 2016) collecting data from two separate samples of pregnant and postpartum women. One study assessed ED psychopathology in the postpartum period only (Navarro et al., 2008). Broussard (2012) retrospectively assessed ED psychopathology during all three trimesters of pregnancy in postpartum women. The other studies assessed women during their pregnancies, with two studies (Lai, Tsang & Tse, 2006; Stein & Fairburn, 1996) also assessing ED psychopathology in the same samples of women after they had given birth. Six studies also retrospectively assessed ED psychopathology prior to pregnancy.

### *Prevalence*

#### *i. Any ED Prevalence*

Table 1 indicates that all studies except one reported prevalence estimates for any ED during the perinatal period. Prevalence rates varied widely, ranging from 0.2% to 27.8% during pregnancy, and 0.8% to 19.08% during the postpartum period. Examining the table in greater detail offers explanations as to why there may be considerable heterogeneity in these prevalence rates. Prevalence rates of any ED tended to be higher when estimated using continuous measures with thresholds/cut offs than those utilising diagnostic interviews. The highest prevalence estimates for any ED both in pregnancy and in the postpartum period were reported by studies using different variations of the Eating Disorder Inventory self-report questionnaire (Garner, 2004). Both studies also utilised small sample sizes, which may limit the generalisability of findings to perinatal populations.

ii. *Prevalence Estimates for Specific Disorders*

The review identified seven studies examining prevalence for specified ED in women during the perinatal period; covering AN (n=3), BN (n=5), BED (n=5) and EDNOS (n=4). All studies reporting on AN investigated prevalence rates in pregnancy; rates ranged from 0.1% to 0.5%. Prevalence rates for BN ranged from 0.1% to 2%, all of which were assessed in pregnancy. Prevalence rates ranged from 1.1% to 4.8% for BED in pregnant women. No studies reported on AN, BN or BED in the postpartum period. Of the four studies reporting on EDNOS, two reported prevalence estimates for EDNOS-P (purge subtype) which ranged from >0.1 to 0.1%. The remaining two studies reported prevalence for EDNOS without further classification, which ranged from 3% to 5%. Only one study (Stein & Fairburn, 1996) reported on EDNOS in the postpartum period, with prevalence estimated at 4.1% at three months postpartum and 4.4% at six months postpartum.

iii. *Prevalence Reported by Methodologically Superior Studies*

Clinical interviews are considered to be the recommended assessment tool for diagnosing ED as they allow for more detailed questioning and investigation (Anderson, Lundgren, Shapiro & Paulosky, 2004). This review therefore considered studies assessing ED using clinical diagnostic interviews as methodologically superior. Four studies utilised diagnostic interviews to identify ED in women during the perinatal period. Table 2 displays prevalence ranges in pregnancy from all included studies, compared to methodologically superior studies, compared to lifetime female US population estimates (Hudson et al., 2007).

**Table 2.** Prevalence estimates from reviewed studies and lifetime female general population estimates.

	<b>Pregnancy Prevalence Range from Included Studies</b>	<b>Pregnancy Prevalence Range from Methodologically Superior Studies</b>	<b>Lifetime Female General Population Estimates (Hudson et al., 2007)</b>
<b>Any ED</b>	0.2% - 27.8%	0.2% - 1.9%	5.9%
<b>AN</b>	0.1% - 0.5%	0.1%	0.9%
<b>BN</b>	0.1% - 2%	0.7%	1.5%
<b>BED</b>	1.1% - 4.8%	1.1%	3.5%
<b>EDNOS</b>	>0.1% - 5%	3% – 4%	-

Andersson et al. (2003) employed a two-stage screening approach using the PRIME-MD patient health questionnaire (Spitzer et al., 1999) to screen a large sample of 1,734 pregnant women. Clinical diagnoses were then established using the PRIME-MD clinician evaluation guide administered via telephone interviews. This study reported a prevalence rate of 0.2% for any ED and although the PRIME-MD contains questions assessing for BN and BED, the study did not report rates for specific diagnoses. The study estimated prevalence of 20 possible psychiatric disorders and found that out of 220 women with a psychiatric diagnosis, 208 (94.5%) had received no treatment for their mental health difficulties.

In a study of 913 women with high risk pregnancies, dos Santos et al. (2017) administered the Structured Clinical Interview for DSM-IV disorders (SCID-I; First, Spitzer, Gibbon & Williams, 2002), with additional information collected to further classify ED according to DSM-V. Prevalence rates were 0.1% for AN, 0.7% for BN and 1.1% for BED. Prevalence for any ED was 1.9% excluding pica. This study found that the presence of ED was associated with previous induced abortion. An association between ED, symptoms of anxiety and depression was also found, indicating a higher prevalence of general psychological distress in perinatal women with ED. Navarro et al. (2008) was the only study

focussing on ED in the postpartum period only, and used a two-stage design utilising the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden & Sagovsky, 1987) and the SCID-I to establish psychiatric diagnosis. Prevalence for any ED was estimated at 0.8% (0.4-1.2 95% CI). Although this study utilised the EPDS, a screening tool for postnatal depression not designed to screen for ED, the authors noted that the EPDS was used to select a stratified sample for diagnostic interview and subsequently corrected for skewness using statistical weighting. Comorbidity with depression was reported for all participants with ED, supporting findings from dos Santos et al. (2017).

In one of two studies employing a repeated measures design, Stein and Fairburn (1996) administered the Eating Disorder Examination (EDE; Cooper & Fairburn, 1987) to assess ED psychopathology in 100 women during the perinatal period, including postnatally. Prevalence estimates, all of which were EDNOS, remained stable prior to and during the perinatal period; 3% immediately before pregnancy, 3% in early pregnancy, 4% in late pregnancy, 4.1% at three months postpartum and 4.4% at six months postpartum. However, these prevalence estimates did not pertain to the same participants during the study period; the ED cases identified in pregnancy were new cases (i.e. not meeting diagnostic criteria prior to conception), and in the postpartum period new cases also arose, with existing cases no longer meeting diagnostic criteria. These findings indicate that significant changes in eating behaviour and attitudes may be experienced by women during the perinatal period and suggest that the total number of cases across the perinatal period may be higher. In contrast to findings from dos Santos (2017) and Navarro (2008), Stein and Fairburn (1996) found no association between ED and low mood. It is also apparent that although this study may be methodologically superior in terms of ED assessment, the sample size was small and thus findings should be considered with caution.

## Discussion

The current systematic review identified 15 studies reporting on the prevalence of ED in women during the perinatal period. Results showed substantial variability in prevalence rates, with variance being largely apparently dependent on the methodologies applied. Nevertheless, results suggest that ED psychopathology is may be more common than previously thought during pregnancy and in the postpartum (Easter et al., 2013; Cardwell, 2013). Using self-report measures, pregnancy prevalence estimates of ED psychopathology ranged from 0.6% to 27.8% and postpartum estimates from 7.2% to 19.08%. Prevalence estimates identified through use of diagnostic interviews ranged from 0.2% to 4% in pregnancy and from 0.8% to 4.4% in the postpartum. Prevalence rates of specific ED were as follows: AN ranged from 0.1% to 0.5%, BN from 0.1% to 2%, BED from 1.1% to 4.8% and EDNOS from >0.1% to 5%. These more conservative rates appear to be more consistent with female lifetime general population estimates (Hudson et al., 2007).

Several studies reported high levels of comorbidity, including depression and anxiety. This finding is consistent with studies of ED in non-perinatal samples (Hudson et al., 2007). Women with ED are more likely to experience underlying depression or anxiety and this, together with the added stressors of pregnancy including increased weight, changes in shape and perceived loss of control, is thought to make women with ED more vulnerable to postpartum depression (Ward, 2008). Given the high prevalence rates of depression and anxiety in perinatal women (Woody et al., 2017; Leach, Poyser & Fairweather-Schmidt, 2017) and the reluctance of women to disclose ED difficulties, these findings highlight the importance of assessing and identifying ED in women who may present with other, more common and arguably more widely recognised mental health conditions. Furthermore, depression and anxiety may serve as vulnerability factors for the development or maintenance



of ED behaviours and can make treatment and recovery more difficult (Swinbourne & Touyz, 2007; O'Brien & Vincent, 2003).

Comparatively few studies in this review used stringent diagnostic measures to identify the presence of ED in perinatal women. Most studies used various screening or self-report instruments with different thresholds to identify clinically significant cases, which likely contributed to the heterogeneity in prevalence estimates, particularly for rates of unspecified ED. Findings from studies using self-report measures (especially those with elevated prevalence estimates when compared to methodologically superior studies) thus appeared to reflect variations in the stringency of case definitions and may have referred partly to women with elevated symptoms but who did not necessarily meet strict diagnostic criteria or have a documented ED diagnosis. This illustrates how eating behaviour presents on a continuum and some degree of disordered eating behaviour may be normal and relatively common. However, these conclusions are nevertheless important as elevated disordered eating symptoms may still be associated with potential adverse physical and mental health outcomes during pregnancy and the postpartum (Larsen et al., 2016).

It is also important to note that although the assessment of ED in pregnancy is considered to be crucial (Easter et al., 2013) and should occur ideally in a routine manner (Bannatyne et al., 2017), no standardised ED screening method during pregnancy currently exists (Easter et al., 2013), nor have existing ED screening measures been formally validated for use in pregnancy (Bye et al., 2018). Several studies attempted to overcome this by adapting existing ED measures in various ways to account for pregnancy; however such adaptations resulted in further heterogeneity of assessment methods between studies, making a synthesis of findings difficult. Existing measures will need to be modified, or new measures may need to be developed and validated in order to better assess and screen for ED symptoms within the perinatal period. Especially as, despite being ideally placed to identify and support

women with ED, obstetric and midwifery professionals are often not confident or informed in detecting and supporting women with EDs in the community (Bye et al., 2018; Leddy, Jones, Morgan & Schulkin, 2009).

Although the use of self-report measures to identify EDs is considered to be less rigorous than diagnostic interviews (Turton et al., 1999), there are several advantages to this method. Firstly, in terms of practicality, self-report questionnaires allowed for larger samples of participants to be investigated due to the time constraints, training and costs associated with administering diagnostic interviews. Secondly, participants in several included studies anonymously completed ED questionnaires. ED are characterised by high levels of shame, secrecy and stigma (Swan & Andrews, 2003). This is particularly relevant during the perinatal period as women with ED are often reluctant to disclose their difficulties during pregnancy (Franko & Spurrell, 2000; Fogarty et al., 2018). Clinical interviews may therefore present as a barrier to disclosure or result in under-reporting and subsequent under-estimation of ED difficulties. In some cases, anonymous reporting of ED symptoms may have allowed for a more accurate report of the difficulties experienced by women during pregnancy and the postpartum (Turton et al., 1999).

Two studies (Broussard, 2012; Kelly, Zatzick & Anders, 2001) reviewed participants' medical records to investigate documented history of ED in addition to assessment using self-report questionnaires. Both studies found that only one participant in their samples of women with clinically significant ED scores had documented history of ED in their medical notes. These findings suggest that the vast majority of cases with clinically significant symptoms went undetected. Consistent with the secrecy associated with ED, these findings infer that a substantial number of pregnant women may be silently struggling with disordered eating behaviours and cognitions (Broussard, 2012).

Another methodological consideration that may have limited the interpretation and comparability of findings across studies included the variable classification systems applied. Many studies used DSM-IV criteria, either rigorously or as a guide, to determine the presence of ED in perinatal women. dos Santos et al. (2017) was the only study that reported using DSM-5 criteria. The DSM-5 yielded a number of adjustments in the diagnostic criteria for ED, including expanding the boundaries of AN and BN and making BED independent of the EDNOS category (American Psychiatric Association, 2013). It is possible that the expanded threshold for ED in DSM-5 meant that some studies may have underestimated the prevalence of ED during pregnancy under the current classification system (Easter et al., 2013). Watson et al. (2013) reported that although the questionnaire used in their study and in Bulik et al. (2007) was designed in accordance with DSM-IV criteria, it did not correspond directly to DSM-IV and may in fact be closer to DSM-5. Furthermore, several studies did not report prevalence estimates for AN. The prevalence of AN in perinatal populations was difficult to define and estimate in accordance with DSM-IV criteria due to the practical difficulties in determining low weight in the presence of pregnancy weight-gain, and as amenorrhea could not be determined (Bulik et al., 2007), although amenorrhea is no longer a criterion for AN in DSM-5.

DSM-IV versus DSM-5 classification of ED also presented difficulties in estimating the true prevalence of BED and OSFED (formerly EDNOS) across studies, as some studies reported BED in addition to EDNOS, some reported EDNOS only (without clarifying whether this included BED), and some reported BED without reporting EDNOS. No studies reported on the DSM-5 classification of OSFED, given that this is a relatively new category. EDNOS has historically accounted for the majority of cases in ED epidemiological studies, and yet has considerable heterogeneity in terms of its psychopathology (Smink, Van Hoeken & Hoek, 2012). Prevalence rates of EDNOS alone therefore yield limited descriptive

information regarding the symptoms and associated difficulties that comprise this broadly defined ED in perinatal women. This could also be said for studies that reported the prevalence of the broadly defined ‘any ED’, as the behaviours and cognitions that comprised ‘any ED’ likely varied considerably across studies. New data is required from future studies using DSM-5 criteria to account for these issues. Arguably, further research focussing on ED behaviours and cognitions, rather than diagnostic entities alone, may be best placed to advance understanding of the epidemiology of ED in the perinatal population.

In addition to the methodological considerations already discussed, there are several further limitations of the included studies. Many studies relied on consecutive and convenience samples recruited from routine antenatal appointments. Although most studies reported response rates, which were generally high, convenience samples are vulnerable response bias, particularly due to the known tendency for perinatal women with ED to conceal their difficulties. Indeed, Andersson et al. (2003) reported that women who refused an interview following a screening questionnaire had a higher prevalence of mental health difficulties during screening. This issue is compounded by a number of studies comprising relatively small samples in relation to prevalence studies, including Stein and Fairburn (1996), which this review deemed methodologically superior. This is problematic when investigating the prevalence of ED in perinatal populations as ED meeting formal diagnostic criteria have a relatively low general population prevalence, which necessitates larger sample sizes in order to detect cases.

Although the aim of this review was to investigate ED prevalence across the perinatal period, only three studies reported ED prevalence in the postpartum period. The existing literature suggests that pregnancy can be protective in terms of the severity of ED psychopathology as concern for the baby may surpass the ED whilst the mother is pregnant (Blais et al., 2000; Rocco et al., 2005; Crow et al., 2008). However, this is not always the

case, as some studies have shown that ED symptoms can remain (Coker, Mitchell-Wong & Abraham, 2013) or worsen (Conrad et al., 2003) during pregnancy. Pregnancy has also been found to precipitate ED (Tiller & Treasure, 1998). The postpartum period is generally viewed as a time of increased risk for the worsening of symptoms or relapse of an ED (Rocco et al., 2005; Crow et al., 2008). Although the number of studies reporting prevalence in the postpartum period was too low to meaningfully compare with pregnancy prevalence, it was clear that women were vulnerable to experiencing ED psychopathology both in pregnancy and during the postpartum months. Future studies investigating the prevalence of ED psychopathology in pregnancy could continue to monitor symptoms during the postpartum period to clarify the trajectory and severity of symptoms across the perinatal period.

#### *Limitations of Review*

This review is limited in a number of ways that should be acknowledged. The first, as previously discussed, concerns the heterogeneity of ED assessment methods, classification of ED and agreed thresholds for cases. Heterogeneity across studies and the resultant wide-ranging prevalence estimates make it difficult to succinctly synthesise findings in a meaningful way. It was therefore not possible to conduct a meta-analysis of prevalence rates. Additionally, several retrospective cohort studies and database analysis studies were excluded from this review due to the absence of a clear description of whether ED were active during the perinatal period or historic, resulting in a relatively small number of studies meeting the final inclusion criteria. Finally, this review did not include or review papers reporting on the course or risk factors of ED during the perinatal period. Whilst the current review provided insight into the question of how many perinatal women experience ED, a review of the risk factors and course is a critical next step in providing further insight into the epidemiology of this condition. This may serve further important clinical implications regarding the detection and treatment of women presenting with ED during the perinatal period.

## *Conclusion*

The presence of ED psychopathology in perinatal women appears to be relatively common. Prevalence estimates in this review challenge the historical assumption that pregnancy is rare in women who experience ED. Although research has indicated that pregnancy can be protective against ED, this review demonstrated that perinatal women are vulnerable to experiencing ED both in pregnancy and during the postpartum months. Mental health assessments during pregnancy and the postpartum period should include an assessment of ED history and current symptoms, which could be facilitated by the development or validation of ED screening and diagnostic measures specific to pregnancy. Future epidemiological studies of ED during the perinatal period need to take into account adjusted ED criteria in relation to the DSM-5. As existing studies did not always adopt an agreed threshold in terms of cut-off scores on self-report measures, future research should implement a consistent threshold in line with current classification systems.

## References

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: Author.
- Anderson, D. A., Lundgren, J. D., Shapiro, J. R., & Paulosky, C. A. (2004). Assessment of eating disorders: Review and recommendations for clinical use. *Behavior Modification*, 28(6), 763-782.
- Andersson, L., Sundström-Poromaa, I., Bixo, M., Wulff, M., Bondestam, K., & Åström, M. (2003). Point prevalence of psychiatric disorders during the second trimester of pregnancy: A population-based study. *American Journal of Obstetrics and Gynecology*, 189(1), 148-154.
- Bannatyne, A. J., Hughes, R., Stapleton, P., Watt, B., & MacKenzie-Shalders, K. (2017). Consensus on the assessment of disordered eating in pregnancy: An international Delphi study. *Archives of Women's Mental Health*, 21(4), 383-390.
- Blais, M. A., Becker, A. E., Burwell, R. A., Flores, A. T., Nussbaum, K. M., Greenwood, D. N., ... & Herzog, D. B. (2000). Pregnancy: Outcome and impact on symptomatology in a cohort of eating-disordered women. *International Journal of Eating Disorders*, 27(2), 140-149.
- Boyle, M. H. (1998). Guidelines for evaluating prevalence studies. *Evidence-based mental health*, 1(2), 37-39. Retrieved from <https://ebmh.bmj.com/content/ebmental/1/2/37.full.pdf>

- Broussard, B. (2012). Psychological and behavioral traits associated with eating disorders and pregnancy: A pilot study. *Journal of Midwifery & Women's Health*, 57(1), 61-66.
- Bulik, C. M., Von Holle, A., Hamer, R., Berg, C. K., Torgersen, L., Magnus, P., ... & Reichborn-Kjennerud, T. E. D. (2007). Patterns of remission, continuation and incidence of broadly defined eating disorders during early pregnancy in the Norwegian Mother and Child Cohort Study (MoBa). *Psychological medicine*, 37(8), 1109-1118.
- Bye, A., Shawe, J., Bick, D., Easter, A., Kash-Macdonald, M., & Micali, N. (2018). Barriers to identifying eating disorders in pregnancy and in the postnatal period: A qualitative approach. *BMC Pregnancy and Childbirth*, 18(1), 114.
- Cardwell, M. S. (2013). Eating disorders during pregnancy. *Obstetrical & Gynecological Survey*, 68(4), 312-323.
- Coker, E. L., Mitchell-Wong, L. A., & Abraham, S. F. (2013). Is pregnancy a trigger for recovery from an eating disorder? *Acta Obstetrica et Gynecologica Scandinavica*, 92(12), 1407-1413.
- Conrad, R., Schablewski, J., Schilling, G., & Liedtke, R. (2003). Worsening of symptoms of bulimia nervosa during pregnancy. *Psychosomatics*, 44(1), 76-78.
- Cooper, Z., & Fairburn, C. (1987). The eating disorder examination: A semi-structured interview for the assessment of the specific psychopathology of eating disorders. *International Journal of Eating Disorders*, 6(1), 1-8.



- Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale. *The British Journal of Psychiatry*, 150(6), 782-786.
- Crow, S. J., Agras, W. S., Crosby, R., Halmi, K., & Mitchell, J. E. (2008). Eating disorder symptoms in pregnancy: A prospective study. *International Journal of Eating Disorders*, 41(3), 277-279.
- dos Santos, A. M., Benute, G. R. G., dos Santos, N. O., Nomura, R. M. Y., de Lucia, M. C. S., & Francisco, R. P. V. (2017). Presence of eating disorders and its relationship to anxiety and depression in pregnant women. *Midwifery*, 51, 12-15.
- Easter, A., Bye, A., Taborelli, E., Corfield, F., Schmidt, U., Treasure, J., & Micali, N. (2013). Recognising the symptoms: How common are eating disorders in pregnancy? *European Eating Disorders Review*, 21(4), 340-344.
- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. (2002). *Structured clinical interview for DSM-IV-TR axis I disorders, research version, non-patient edition (SCID-I/NP)*. New York, NY: Biometrics Research, New York State psychiatric Institute.
- Fogarty, S., Elmir, R., Hay, P., & Schmied, V. (2018). The experience of women with an eating disorder in the perinatal period: A meta-ethnographic study. *BMC Pregnancy and Childbirth*, 18(1), 121.
- Franko, D. L., & Spurrell, E. B. (2000). Detection and management of eating disorders during pregnancy. *Obstetrics & Gynecology*, 95(6), 942-946.

- Garner, D. M. (2004). *Eating disorder inventory-3 manual*. Lutz, FL: Psychological Assessment Resources.
- Hoffman, E. R., Zerwas, S. C., & Bulik, C. M. (2011). Reproductive issues in anorexia nervosa. *Expert Review of Obstetrics & Gynecology*, 6(4), 403-414.
- Hudson, J. I., Hiripi, E., Pope Jr, H. G., & Kessler, R. C. (2007). The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. *Biological Psychiatry*, 61(3), 348-358.
- Kelly, R. H., Zatzick, D. F., & Anders, T. F. (2001). The detection and treatment of psychiatric disorders and substance use among pregnant women cared for in obstetrics. *American Journal of Psychiatry*, 158(2), 213-219.
- Lai, B. P. Y., Tang, C. S. K., & Tse, W. K. L. (2006). A longitudinal study investigating disordered eating during the transition to motherhood among Chinese women in Hong Kong. *International Journal of Eating Disorders*, 39(4), 303-311.
- Larsen, P. S., Nybo Andersen, A. M., Olsen, E. M., Micali, N., & Strandberg-Larsen, K. (2016). What's in a self-report? A comparison of pregnant women with self-reported and hospital diagnosed eating disorder. *European Eating Disorders Review*, 24(6), 460-465.
- Leach, L. S., Poyser, C., & Fairweather-Schmidt, K. (2017). Maternal perinatal anxiety: A review of prevalence and correlates. *Clinical Psychologist*, 21(1), 4-19.
- Leddy, M. A., Jones, C., Morgan, M. A., & Schulkin, J. (2009). Eating disorders and obstetric-gynecologic care. *Journal of Women's Health*, 18(9), 1395-1401.

Loney, P. L., Chambers, L. W., Bennett, K. J., Roberts, J. G., & Stratford, P. W. (1998).

Critical appraisal of the health research literature: Prevalence or incidence of a health problem. *Chronic Diseases in Canada*, 19(4), 170-6.

Magnus, P., Birke, C., Vejrup, K., Haugan, A., Alsaker, E., Daltveit, A. K., ... & Paltiel, L.

(2016). Cohort profile update: The Norwegian mother and child cohort study (MoBa). *International Journal of Epidemiology*, 45(2), 382-388.

Micali, N., Simonoff, E., & Treasure, J. (2011). Pregnancy and post-partum depression and anxiety in a longitudinal general population cohort: The effect of eating disorders and past depression. *Journal of Affective Disorders*, 131(1-3), 150-157.

Micali, N., Stemmann Larsen, P., Strandberg-Larsen, K., & Nybo Andersen, A. M. (2016). Size at birth and preterm birth in women with lifetime eating disorders: A prospective population-based study. *BJOG: An International Journal of Obstetrics & Gynaecology*, 123(8), 1301-1310.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Annals of Internal Medicine*, 151(4), 264–269.

Navarro, P., García-Esteve, L., Ascaso, C., Aguado, J., Gelabert, E., & Martín-Santos, R.

(2008). Non-psychotic psychiatric disorders after childbirth: Prevalence and comorbidity in a community sample. *Journal of Affective Disorders*, 109(1-2), 171-176.

- O'Brien, K. M., & Vincent, N. K. (2003). Psychiatric comorbidity in anorexia and bulimia nervosa: nature, prevalence, and causal relationships. *Clinical Psychology Review, 23*(1), 57-74. doi:10.1016/S0272-7358(02)00201-5
- Pettersson, C. B., Zandian, M., & Clinton, D. (2016). Eating disorder symptoms pre-and postpartum. *Archives of Women's Mental Health, 19*(4), 675-680.
- Redshaw, M., & Martin, C. (2011). Motherhood: A natural progression and major transition. *Journal of Reproductive and Infant Psychology, 29*(4), 305-307. doi:10.1080/02646838.2011.639510
- Rocco, P. L., Orbitello, B., Perini, L., Pera, V., Ciano, R. P., & Balestrieri, M. (2005). Effects of pregnancy on eating attitudes and disorders: A prospective study. *Journal of Psychosomatic Research, 59*(3), 175–179. doi:10.1016/j.jpsychores.2005.03.002
- Smink, F. R., Van Hoeken, D., & Hoek, H. W. (2012). Epidemiology of eating disorders: Incidence, prevalence and mortality rates. *Current Psychiatry Reports, 14*(4), 406-414.
- Soares, R. M., Nunes, M. A., Schmidt, M. I., Giacomello, A., Manzolli, P., Camey, S., ... & Ozcariz, S. (2009). Inappropriate eating behaviors during pregnancy: Prevalence and associated factors among pregnant women attending primary care in southern Brazil. *International Journal of Eating Disorders, 42*(5), 387-393.
- Spitzer, R. L., Kroenke, K., Williams, J. B., & Patient Health Questionnaire Primary Care Study Group. (1999). Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. *Journal of American Medical Association, 282*(18), 1737-1744.

- Stein, A., & Fairburn, C. G. (1996). Eating habits and attitudes in the postpartum period. *Psychosomatic Medicine*, 58(4), 321-325.
- Swan, S., & Andrews, B. (2003). The relationship between shame, eating disorders and disclosure in treatment. *British Journal of Clinical Psychology*, 42(4), 367-378.
- Swinbourne, J. M., & Touyz, S. W. (2007). The co-morbidity of eating disorders and anxiety disorders: A review. *European Eating Disorders Review: The Professional Journal of the Eating Disorders Association*, 15(4), 253-274.
- Tiller, J., & Treasure, J. (1998). Eating disorders precipitated by pregnancy. *European Eating Disorders Review: The Professional Journal of the Eating Disorders Association*, 6(3), 178-187.
- Turton, P., Hughes, P., Bolton, H., & Sedgwick, P. (1999). Incidence and demographic correlates of eating disorder symptoms in a pregnant population. *International Journal of Eating Disorders*, 26(4), 448-452.
- Vesga-Lopez, O., Blanco, C., Keyes, K., Olfson, M., Grant, B. F., & Hasin, D. S. (2008). Psychiatric disorders in pregnant and postpartum women in the United States. *Archives of General Psychiatry*, 65(7), 805-815.
- Ward, V. B. (2008). Eating disorders in pregnancy. *BMJ*, 336(7635), 93-96. doi:10.1136/bmj.39393.689595.BE
- Watson, H. J., Von Holle, A., Hamer, R. M., Berg, C. K., Torgersen, L., Magnus, P., ... & Bulik, C. M. (2013). Remission, continuation and incidence of eating disorders during early pregnancy: A validation study in a population-based birth cohort. *Psychological Medicine*, 43(8), 1723-1734.

Woody, C. A., Ferrari, A. J., Siskind, D. J., Whiteford, H. A., & Harris, M. G. (2017). A systematic review and meta-regression of the prevalence and incidence of perinatal depression. *Journal of Affective Disorders*, 219, 86-92.

## **Chapter 2**

### **Empirical Paper**

**Admissions to Psychiatric Units in the Postpartum Period: Is Socioeconomic  
Deprivation a Risk Factor for Women Living in Wales?**

Emma K. S. Alofs<sup>a,b</sup>, Dr Mike Jackson<sup>a,b</sup> and Dr Christopher W. N. Saville<sup>a</sup>

<sup>a</sup> North Wales Clinical Psychology Programme, Bangor University, Bangor, UK

<sup>b</sup> Betsi Cadwaladr University Health Board, NHS Wales, UK

**Corresponding Author:** Emma Alofs, North Wales Clinical Psychology Programme, School of Psychology, Brigantia Building, Bangor University, Bangor, LL57 2AS.

**E-mail addresses:** emma.alofs@yahoo.co.uk (E.K.S. Alofs), mike.jackson@bangor.ac.uk (M. Jackson), c.saville@bangor.ac.uk (C.W.N. Saville).

**Declaration of interest:** none

---

This paper will be submitted to *Health and Place* and will follow submission guidelines for the journal:

<https://www.elsevier.com/journals/health-and-place/13538292/guide-for-authors>



*Highlights:*

- Area-level unemployment associated with psychiatric admissions after birth
- Effect is strongest for mothers age 40 and over
- Living in deprived areas increases risk of admission in postpartum period

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

## Abstract

This paper explored the characteristics of women admitted to psychiatric units in the postpartum period and investigated whether admissions were associated with area-level socioeconomic deprivation. Postpartum psychiatric admissions were identified by linking hospital birth records to psychiatric inpatient admissions occurring within 12 months after the birth date. Postpartum admissions were described and then modelled with administrative unemployment data for middle-layer super output areas covering Wales. To investigate the relationship between deprivation and admissions, rate ratios were generated after fitting Poisson generalised linear mixed-effects models to age-stratified admission rates for each area. Of 536,003 hospital births, 1,062 postpartum psychiatric admissions were identified during the study period. Admissions were most commonly related to mood and affective disorders and were most likely to occur in the first few weeks following birth. Overall, there was a positive association between area-level employment deprivation and postpartum admissions (RR=1.23 [RR<sub>95%CI</sub>=1.15-1.31]). This association was significantly stronger for mothers age 40 and over (RR=1.61 [RR<sub>95%CI</sub>=1.18-2.19]) when compared to younger mothers (age 20-29, RR=1.19[RR<sub>95%CI</sub>=1.09-1.30], reference group). Mothers age 40 and over also had a higher risk of admission overall (RR=1.59[RR<sub>95%CI</sub>=1.16-2.17]). Perinatal mental health service providers should be aware that living in areas of deprivation increases women's risk of serious adverse mental health outcomes in the postpartum period, with this risk being strongest for older mothers.

*Key words:* Postpartum period; psychiatric admission; socioeconomic deprivation; spatial epidemiology.

## **Introduction**

The transition to motherhood is a life-changing event for a woman and involves significant physical, social and emotional adjustment and change (Kendall-Tackett, 2007). As such, it is recognised that the perinatal period is a time of vulnerability for experiencing psychological distress and mothers may experience mental health problems ranging from mild to severe, including depression, anxiety and psychosis (Leight, Fitelson, Weston & Wisner, 2010). The onset of severe mental illness can have a profound and, if left untreated, lasting detrimental impact on the mother, child and family which is well documented in the literature (Hogg, 2013).

Mothers who go on to experience severe mental illness after birth may require hospitalisation due to the severity of symptoms and potential risk of harm to both mother and baby (Langan Martin, McClean, Cantwell & Smith, 2016). A recent enquiry into maternal deaths highlighted that suicide continues to be the leading cause of maternal deaths in the first year after pregnancy (Knight et al., 2018). It is recommended that women with severe presentations requiring psychiatric admission in late pregnancy or during the postpartum period should be admitted to a specialist mother and baby unit (MBU) with their baby (Royal College of Psychiatrists, 2015). However, MBU provision varies considerably across the UK, and currently there is no specialist perinatal psychiatric facility in Wales (Children, Young People and Education Committee, 2017). Mothers in Wales who require inpatient care are admitted to adult psychiatric units without their baby, with an estimated small percentage of these women opting to travel out of area to access an MBU in England. However, little is known about the mothers who experience psychiatric admission in Wales and there is a dearth of research conducted in the UK exploring postpartum admissions to psychiatric inpatient units.

The relationship between socioeconomic deprivation and range of mental health difficulties appears to be well documented in the literature (e.g. Lorant et al., 2003; O'Donoghue, Roche & Lane, 2016) and an association between socioeconomic status and psychiatric admissions has been evidenced in a number of studies (e.g. Kammerling & O'Connor, 1993; Harrison, Barrow & Creed, 1995). A smaller body of literature has investigated the association between socioeconomic deprivation and psychiatric admission in the postpartum period. Nager, Johansson and Sundquist (2006) examined the relationship between neighbourhood income and psychiatric admission for postpartum psychosis in Sweden. They found that women living in the poorest neighbourhoods had a significantly higher risk of hospital admission when compared to women living in the richest neighbourhoods. Langan Martin and colleagues (2016) used the Scottish Index of Multiple Deprivation as a measure of socioeconomic status to investigate the impact of deprivation, age and parity on psychiatric admission rates. This study found that women from the most deprived social quintiles accounted for the largest proportion of admissions. Both studies also found evidence to suggest that higher maternal age was associated with higher risk of admission.

In a study investigating the impact of socioeconomic deprivation on perinatal mental health conditions presenting to UK general practice, Ban et al. (2012) explored whether this effect varied by maternal age. The authors found that although socioeconomic deprivation increased the risk of all perinatal mental illnesses, this effect was more marked in older mothers. However, studies examining the relationship between deprivation, maternal age and admissions in the postpartum period are still scarce, and there is a dearth of such research conducted in the UK.

The aim of the present study was to contribute to the limited existing literature reporting on deprivation and maternal mental health by addressing the following research

questions: (1) what are the characteristics of women admitted to psychiatric units after birth in Wales? (2) are area-level measurements of deprivation associated with area-level rates of postpartum admission? (3) is this relationship differentially affected by maternal age?

We hypothesised that women living in areas of higher deprivation would be at an increased risk of admission after birth. In accordance with emergent evidence from previous studies, we hypothesised that this association may be stronger for older mothers.

## Methods

The study protocol was approved by the School of Psychology ethics committee at Bangor University and by Wales Research Ethics Committee 5.

### *Data*

The Patient Episode Database for Wales (PEDW) was used to obtain hospital birth records and psychiatric admission data, which was provided by NHS Wales Informatics Service (NWIS). We obtained anonymised data on all hospital births in Wales during the study period, which was from January 2000 to December 2017. PEDW does not record home births and we were advised by NWIS that due to data quality issues, home births could not be captured in our study. All hospital births were stratified by age, which accounted for the at-risk population for this study.

PEDW captures data regarding inpatient psychiatric admissions in Wales by recording admissions with psychiatric treatment codes. Birth records were linked with psychiatric admission data by NWIS to identify cases that met our inclusion criteria, which were as follows: (1) Women who had experienced an admission to an adult psychiatric unit within 12 months of giving birth, defined as the postpartum period for the purposes of this study, and (2) resident in Wales at time of admission. We included only the first psychiatric admission per birth to account for women who had experienced multiple admissions following the same birth. Mothers who had experienced multiple births resulting in a psychiatric admission were included as separate cases for each birth because we wanted to minimise the risk of bias towards younger mothers. Excluding admissions for multiple births could result in potentially skewing the data in a way that underrepresented older mothers. Given that we examined the effect of age, it was important to account for this.

Each mother was given a unique ID to identify which births and admissions were for the same woman. We obtained data on mothers' ICD-10 psychiatric diagnoses on discharge, age (in bands: under 20, 20-29, 30-39 and 40+ years), and middle layer super output area (MSOA) of residence. MSOAs are units of UK census geography designed to improve the reporting of small area statistics. There are 410 MSOAs in Wales, with an average population of 7000 and a range of 5000 to 15000. Postpartum admissions with missing age or MSOA were excluded, as were cases where the mother resided outside of Wales. For the at-risk population, birth records with missing MSOA data were also excluded.

In order to describe individual-level characteristics, we explored psychiatric diagnoses, which referred to the ICD-10 codes of F00-F99. We reported the primary psychiatric diagnosis only in our results. Psychiatric diagnoses were grouped into the following categories in accordance with ICD-10 blocks: (1) substance misuse disorders (F10-F19) (2) schizophrenia and other psychotic disorders (F20-F29); (3) mood/affective disorders (F30-F39); (4) anxiety/stress-related disorders (F40-F49); (5) behavioural syndromes, including eating disorders and puerperal mental disorders (F50-F59); (6) personality and behavioural disorders (F60-F69); and (7) 'other' diagnoses, including F00-F99 codes not covered in the aforementioned categories, and any non-F codes.

We calculated the number of postpartum women from each MSOA who were admitted during the study period. Cases were stratified by age band, resulting in women belonging to one of four strata. A stratum within MSOA became the unit of measurement, as opposed to individual cases, with a total of 1640 observations (four strata per 410 MSOA).

### *Measure of Deprivation*

Deprivation was measured using the employment indicator from the Welsh Index of Multiple Deprivation (WIMD; Welsh Government, 2014), an official measure of relative

deprivation for small areas. Specifically, we used the 2017 employment indicator of deprivation at the MSOA level, which was the percentage of the working-age people within each MSOA who were on employment-related benefits. Socioeconomic status and deprivation can be measured in various ways at individual and area level and no method is considered to be conceptually superior to others (Nager et al., 2006).

Although the WIMD provides a rank of overall deprivation, constructed from a weighted sum of eight deprivation indicators, an overall deprivation rank is only available at the Lower-layer Super Output Area (LSOA) level, of which there are 1909 in Wales. Due to the relatively low number of cases, the decision was made to analyse the data at the MSOA level, as at the LSOA level a large proportion of LSOAs had no cases. However, as the WIMD does not provide deprivation ranks based on MSOA geography, we decided to use one of two indicators with the highest weighted deprivation score (income and employment deprivation). We used employment as both indicators were highly correlated ( $r = .95$ ), suggesting that either indicator was a suitable and appropriate measure of deprivation.

### *Statistical Analyses*

Statistical analyses were performed using R software (R Core Team, 2013) packages ‘lme4’ (Bates et al., 2015), ‘DHARMA’ (Hartig, 2019), ‘ggplot2’ (Wickham, 2016) and ‘dvmisc’ (Van Domelen, 2019). A multilevel mixed modelling approach was considered to be most appropriate given the non-independent nature of the data and to account for both fixed and random effects. We fitted Poisson generalised linear mixed-effects models to the number of cases in each stratum of each MSOA, with logged number of births of the relevant stratum coded as an offset in order to model cases as a rate (i.e. the regression coefficient had a weight of 1), and random intercepts of MSOA, age and local authority. A simple model was fitted including a fixed effect for deprivation (z-scored) for each MSOA, and a full model



included fixed effects of deprivation (z-scored), age, and their interaction. From these models we generated rate ratios (RR) and 95% confidence intervals (CI) for admissions after birth by the explanatory variables. Risk of admission was also calculated as a percentage for each age group for low unemployment areas (2-10% unemployment) and high unemployment areas (11-27% unemployment) using a median split of unemployment by area to further illustrate the absolute risk of admission.

## Results

Following the exclusion of 984 births due to missing MSOA data, a total of 536,003 hospital births were recorded during the study period and these represented the at-risk population. 1,070 postpartum admissions were initially identified; four of these cases were excluded due to missing MSOA data and four due to the mother residing outside of Wales. The total number of cases meeting our study criteria was 1,062 episodes of postpartum psychiatric admissions for 1,014 women, resulting in an overall incidence rate of 0.2%.

### *Individual Clinical Characteristics*

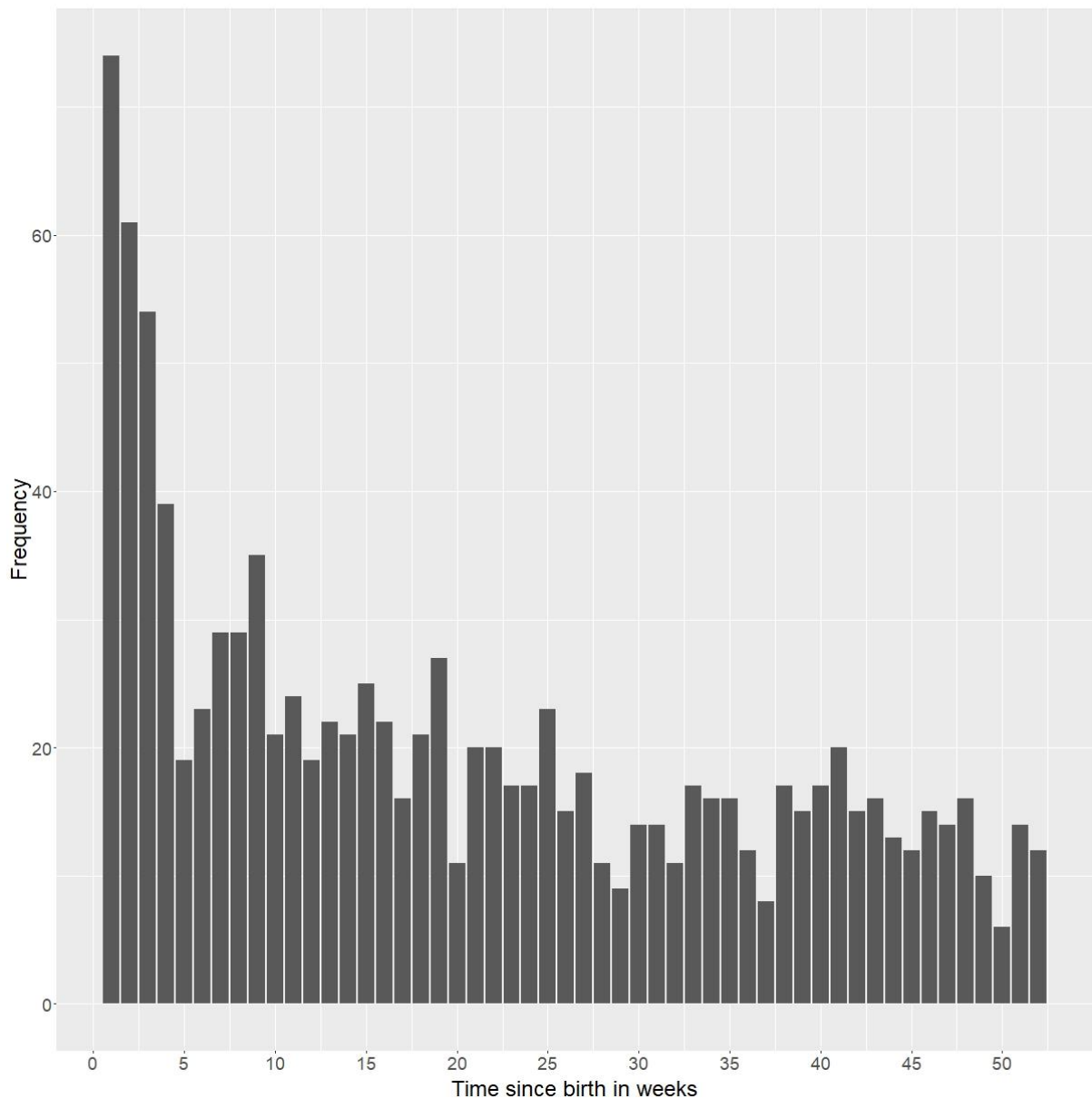
Table 1 presents individual characteristics including age and psychiatric diagnosis upon admission. Diagnostic data was available for 835 admissions (78.6%). Of these, the most common primary diagnoses were for mood/affective disorders (33.1%), followed by schizophrenia and psychotic disorders (14.3%), stress-related/anxiety disorders (13.4%), behavioural syndromes, including eating disorders and puerperal mental disorders (13.4%), and personality disorders (10.7%). The single most common psychiatric diagnosis was emotionally unstable personality disorder (F60.3; n=69), followed by puerperal mental disorder (F53.0; n=58) and adjustment disorder (F43.2; n=48). Diagnoses were missing for 227 cases (21.4%), 142 (62.6%) of which were concentrated in a single health board.

**Table 1***Descriptive information for psychiatric admissions after birth in Wales*

Individual Variables		Admissions	% <sup>1</sup>
<i>Age</i>	Under 20	80	7.5
	20-29	550	51.8
	30-39	384	36.2
	40+	48	4.5
<i>Diagnoses</i>	F10 – F19 Substance misuse disorders	76	9.1
	F20 – F29 Schizophrenia/psychotic disorders	119	14.3
	F30 - F39 Mood (affective) disorders	276	33.1
	F40 – F49 Anxiety/stress-related disorders	112	13.4
	F50 – F59 Behavioural syndromes	112	13.4
	F60 – F69 Personality/behavioural disorders	90	10.7
	Other	51	6.1

<sup>1</sup>Percentages are of the total number of cases with diagnostic information available and not inclusive of missing data.

Trends in admissions were explored by plotting weekly admission rates in relation to childbirth. Figure 1 illustrates a peak in admissions in the first week after birth. Following a decline in admissions in the fifth postpartum week, a smaller peak can be observed in week nine, followed by a gradual pattern of decline in admissions over subsequent weeks.



**Fig. 1.** Psychiatric admissions per week in relation to childbirth

### *Area Level Analyses*

As shown in Table 2, in the simple model, higher employment deprivation was significantly predictive of postpartum psychiatric admissions (rate ratio (RR)=1.23[RR<sub>95%CI</sub>=1.15-1.31]) (Figure 2). This result indicates that the rate of admission increased by 23% for each standard deviation increase in unemployment ( $SD = 4.63$ ).

**Table 2**

*Results of simple and full models: Ratio Ratios (RR) with 95% confidence intervals (CI), z-values (Z) and p-values (p) for psychiatric admissions after birth in Wales*

	Simple Model				Full Model			
	RR	95% CI	Z	p	RR	95% CI	Z	p
Intercept			-53.44	<.001			-103.10	<.001
Deprivation	1.23	1.15-1.31	6.33	<.001	1.19	1.09-1.30	4.01	<.001
Under 20					1.01	.77-1.31	0.05	.963
30-39					.94	.82-1.07	-0.94	.349
40+					1.59	1.16-2.17	2.91	.004
Deprivation*Under 20					.80	.64-1.01	-1.88	.059
Deprivation*30-39					1.10	.97-1.25	1.51	.131
Deprivation*40+					1.35	1.03-1.76	2.20	.028

*Note.* The 20-29 age group was used as the reference group. Rate ratios for interaction terms refer to the strength of the interaction, not the overall risk ratio for age group.

In the full model, deprivation was significantly predictive of admissions after birth in the 20-29 age group, which was the reference group (RR=1.19[RR<sub>95%CI</sub>=1.09-1.30]). A significant interaction effect was observed in the 40+ group, indicating that the effect of deprivation on postpartum admissions was significantly stronger for women aged 40 and over compared to the reference group (RR=1.35[RR<sub>95%CI</sub>=1.03-1.76], Figure 3). The overall rate ratio for the effect of deprivation in the 40+ group was 1.61 (RR<sub>95%CI</sub>=1.18-2.19). No significant interaction effects were found of deprivation and age on admissions for the under 20 and 30-39 groups in relation to the reference group.

The absolute risk of admission for each age group, split by low unemployment and high unemployment areas, can be seen in Table 3. This indicates that the 40+ group had the highest absolute risk of admission in areas with both low and high unemployment.

**Table 3**

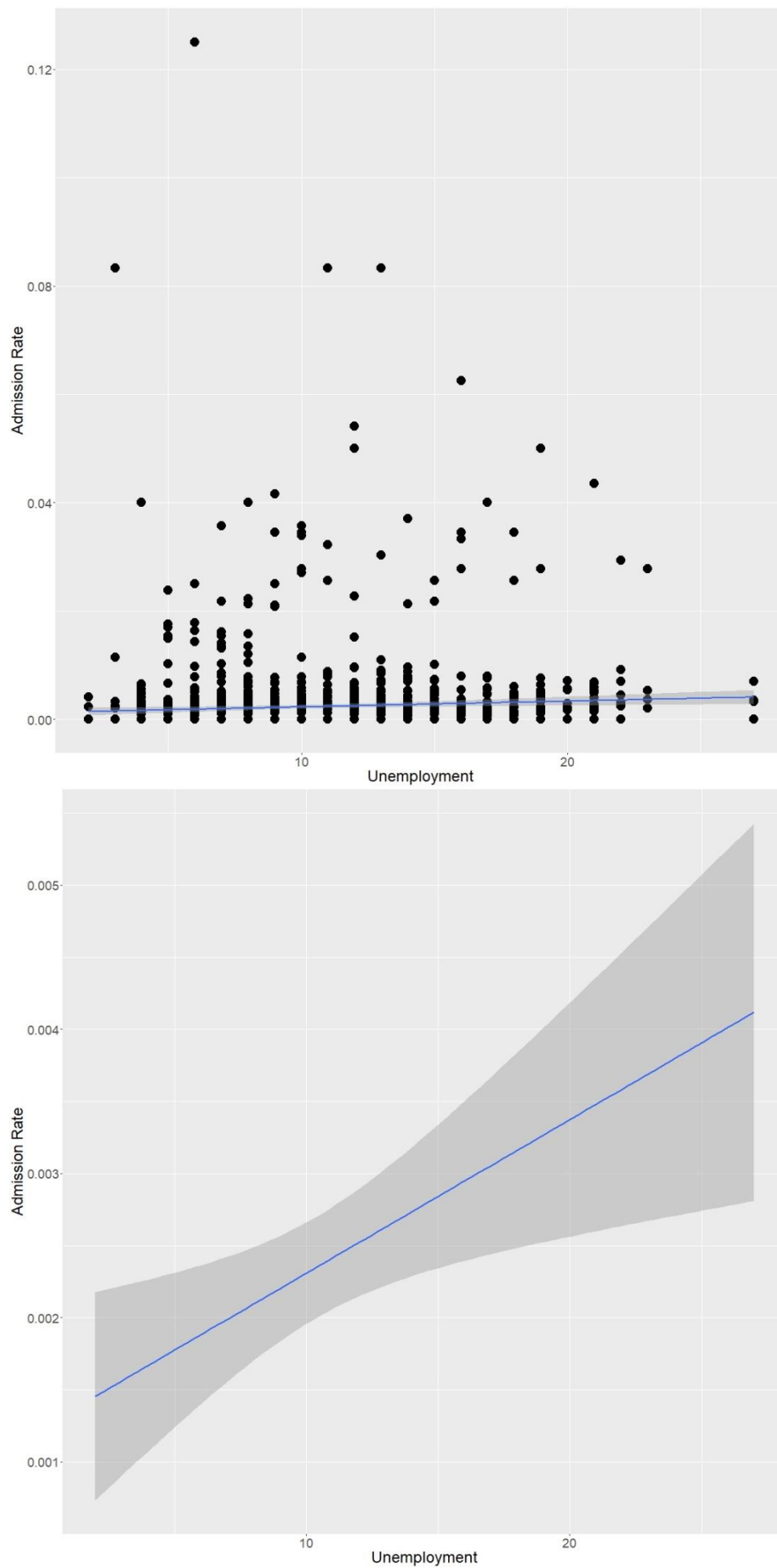
*Absolute risk of admission for each age group, split by areas of low and high unemployment*

Age Group	Risk (%)	
	Low Unemployment	High Unemployment
Under 20	0.20%	0.15%
20-29	0.17%	0.22%
30-39	0.15%	0.22%
40+	0.30%	0.48%

*Note.* Areas of low and high unemployment calculated by a median split: 2-10% unemployment = low unemployment; 11-27% = high unemployment.

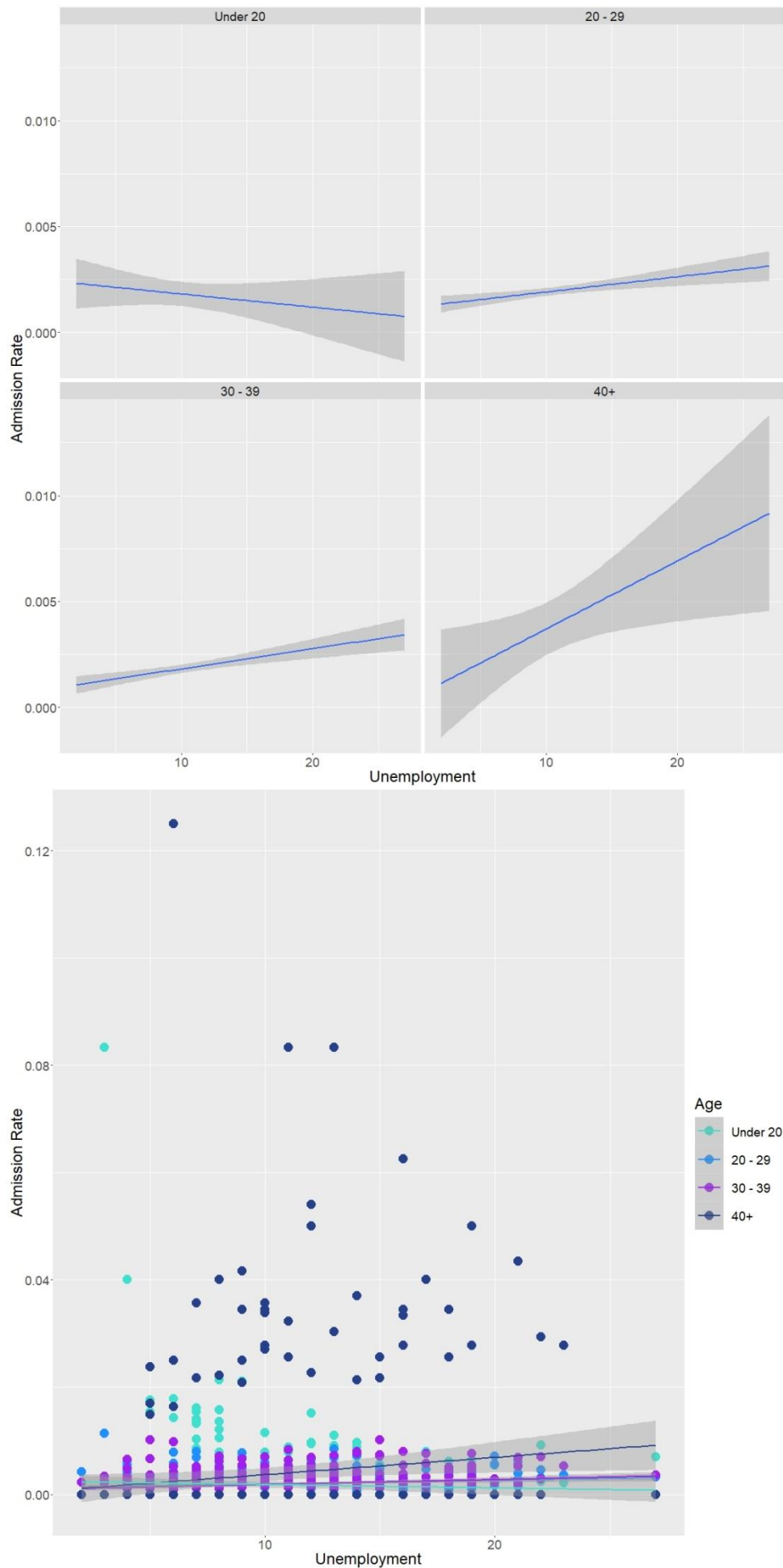
It is noteworthy that the results illustrate a slight downward trend in admissions as deprivation increased in the under 20 group. However this effect was not statistically

significant and was influenced by two outliers, which can be seen in Figure 3. It is not certain whether the outliers were due to chance or whether they were representative of an effect in the under 20 group, albeit not a statistically significant effect. Additionally, both the under 20 and 40+ group had small numbers of cases, evidenced by wide confidence intervals, and therefore these results should be interpreted with caution.



**Fig. 2.** Scatterplots of area-level unemployment (%) against psychiatric admission rate after birth in Wales. Data points in top plot represent age-stratified MSOAs and bottom plot illustrates the steepness of the slope.





**Fig. 3.** Scatterplots of area-level unemployment (%) against psychiatric admission rate after birth for each age group.

## Discussion

The aim of this study was to firstly to explore and describe the individual characteristics of women admitted to psychiatric units following hospital births in Wales. Secondly, we aimed to investigate whether socioeconomic deprivation, measured by area-levels of unemployment, was associated with admission rates.

Exploratory analyses indicated that in general, women were most likely to be admitted with mood and affective disorders, followed by psychosis-related conditions. These findings are broadly consistent with other studies examining postpartum psychiatric admissions. For example, a Scottish linkage study found that psychosis-related diagnoses were most common in admissions within the early postpartum period, and depression was more common in the late postpartum period (Langan Martin et al., 2016). A population-based cohort study in Canada found that mood disorders were the most common diagnosis for both short and long postpartum psychiatric admissions (Shlomi-Polachek, Fung, Meltzer-Body and Vigod, 2017). However, the single most common reported ICD-10 diagnostic code was for emotionally unstable personality disorder, which appears to conflict with findings from previous work examining the characteristics of postpartum inpatient admissions (Xu et al., 2014).

Examining the timing of admissions in relation to hospital births indicated that the early postpartum weeks, particularly the first week, were peak times for admission to psychiatric hospital. This higher rate of admissions in the early postpartum period is consistent with previous work, which has shown that the first few weeks are a peak time for the development of postpartum psychosis (Kendell, Chalmers & Platz, 1987; Terp & Mortensen, 1998; Langan Martin et al., 2016). Although the current study did not examine admissions data outside of the postpartum period, the pattern of postpartum admission rates

in this study was strikingly similar to previous work by Langan Martin et al., (2016), which compared weekly postpartum admission rates with pregnancy and pre-pregnancy admission rates. Their results indicated that admissions increased substantially in the early postpartum weeks when compared to both pregnancy and pre-pregnancy rates. Furthermore, the mean rate of admission in the late postpartum period remained higher than both pre-pregnancy and pregnancy rates, suggesting that the postpartum period in particular is a time of increased vulnerability for severe psychological distress.

The principal focus of this study was to investigate the impact of socioeconomic deprivation on rates of postpartum admissions, and how this relationship was moderated by maternal age. We found that deprivation was significantly associated with cases of postpartum admissions, with areas of greater unemployment having higher overall admission incidence. Furthermore, we found that this relationship was significantly stronger for older mothers age 40 and over. Older mothers appeared to have a higher risk of admission than younger age groups, both in areas of low and high unemployment.

A pattern of increased rates of admission with greater deprivation was consistent with our hypotheses. Indeed, a growing body of research has identified associations between the socioeconomic environment and perinatal mental health difficulties of varying degrees of severity. These include increased rates of depression and anxiety during pregnancy (Ban et al., 2012), psychological difficulties in the postpartum such as postpartum depression, anxiety and serious mental illnesses such as postpartum psychosis and other psychosis-related presentations (O'hara & Swain, 1996, Ban et al., 2012; Nager et al., 2006). Given that after the birth of a child, mothers are likely to spend great amounts of time in their neighbourhood environment and local community, it makes sense that living in a deprived area could affect women's mental health during this vulnerable postpartum period. This study contributes to

the existing literature as our findings indicate that deprivation measured at the area-level has a significant impact on rates of serious postpartum mental illness requiring hospitalisation.

Previous work has cited several possible explanations for such an association. At the individual level, exposure to socioeconomic stressors (such as financial instability, housing issues or living in an area with high crime rates) may precipitate a sense of instability and lack of safety, thus likely impacting significantly on the mental health of a woman at a time considered to be one of the most vulnerable periods of her life, i.e. around the birth of a child (Nager et al., 2006). Moreover, at the area-level, more deprived neighbourhood environments with weaker social cohesion (O'Donoghue et al., 2016) may limit the support available from the community during this life-changing period. Support from social and community networks around the time of childbirth offers women valuable resources for facing the challenges of new motherhood. In contrast, lack of social support at this time can lead to feelings of isolation, increased stress, and ultimately an increased vulnerability to psychological distress (Balaji et al., 2007).

However, interactions between deprivation and the social environment are complex, and this study did not examine the mediating effects of social cohesion and community support on rates of admission in the postpartum period. Future research in this area could provide valuable contributions to the existing literature, particularly as Wales has large areas of rurality, which may present as a barrier to women accessing support from social networks within their community.

Our finding that the effect of deprivation was significantly stronger for older mothers, as well as older mothers having the highest risk of admission overall is consistent with several other studies (Nager et al., 2006; Ban et al., 2012; Langan Martin et al., 2016). These results are noteworthy because the mean age of mothers is rising in Wales (Office for

National Statistics, ONS; 2019), a nation which contains some of the most deprived communities in the UK (Abel, Barclay & Payne, 2016). Although it is accepted that socioeconomic factors have important implications for maternal mental health, the joint effects of deprivation and older maternal age among pregnant women and new mothers as a predictor of adverse maternal mental health outcomes is still not well understood and needs further exploration (Ban et al., 2012).

### *Strengths and Limitations*

This study had important strengths that should be acknowledged. To our knowledge, this is the first study to examine the characteristics of new mothers admitted to psychiatric units in Wales and thus can contribute valuable information to inform rapidly expanding perinatal mental health provision across the region. Obtaining data for the whole of Wales, a nation with diverse geography that is comprised of rural and urban areas, as well as varying levels of deprivation across communities, is a further strength. Additionally, the modelling approach used allowed us to account for possible service-level confounding factors such as differences in psychiatric provision between local authorities due availability of beds or variation in clinical practice.

This study also had several limitations. Firstly, there were service-level factors that likely significantly influenced our calculated rate of postpartum admissions, including admissions to MBUs in England (not captured in our study), reliance on home treatment teams to care for women requiring admission in order to prevent separation of mother and baby, and the closure of Wales' only MBU during the study period. Variation in perinatal-specific mental health services, home treatment teams and proximity to English MBUs across Wales may have impacted on the rate of admissions across different geographical areas. These service-level issues likely resulted in an under-estimate of incidence of serious

postpartum mental health difficulties requiring admission and so our incidence rates should be interpreted with caution. Moreover, our data captured only inpatient admissions, not outpatient psychiatric attendances or women who were cared for in the community. Our data therefore represents only a very small proportion of women with potentially severe psychological distress and thus does not capture the true extent of serious perinatal mental health difficulties in Wales. Furthermore, the diagnostic data captured in the study relied on working discharge diagnoses of unknown reliability which may have been influenced by individual differences in diagnostic practice.

Finally, due to data quality issues our data did not include home births, which made up approximately 2.1% of births in England and Wales in 2017 (ONS, 2019). Albeit a small percentage, our findings cannot be generalised to this group and the characteristics of postpartum admissions following home births in Wales remains unknown.

It should be acknowledged that the overall number of cases was small, particularly in the under 20 and 40 and over groups. We thus used slightly larger geographical areas (MSOAs), rather than the LSOAs used in the WIMD (Welsh Government, 2014) to measure deprivation and only used one indicator of deprivation; unemployment. Individual-level deprivation measures were not available and therefore we could not ascertain whether women admitted after birth were themselves exposed to the neighbourhood-level risk within their MSOA, i.e. the ecological fallacy. Finally, an association between deprivation and postpartum admissions does not prove causality. It may be that selective migration exists whereby women who are vulnerable to psychological distress move to more deprived areas, in addition to unemployment and financial strain being a causal risk factor for psychological distress, particularly around the time of childbirth.

## *Conclusion*

This study describes the characteristics of women with arguably the most severe mental health presentations following childbirth. It highlights that living in areas of higher deprivation increases the risk of psychiatric admission after giving birth, and this association is stronger for older mothers over the age of 40. This work adds to our knowledge of risk and therefore provides important information for service providers regarding the provision and distribution of perinatal mental health services across Wales during a time where this field has received increased attention and funding in the UK. Future research should focus on measures of deprivation at an individual-level, as well as factors that may mediate the impact of area-level deprivation, especially in older mothers, in order to further our understanding of the impact of deprivation on perinatal mental health.

## References

- Abel, G. A., Barclay, M. E., & Payne, R. A. (2016). Adjusted indices of multiple deprivation to enable comparisons within and between constituent countries of the UK including an illustration using mortality rates. *BMJ Open*, 6(11), e012750.
- Balaji, A. B., Claussen, A. H., Smith, D. C., Visser, S. N., Morales, M. J., & Perou, R. (2007). Social support networks and maternal mental health and well-being. *Journal of Women's Health*, 16(10), 1386-1396.
- Ban, L., Gibson, J. E., West, J., Fiaschi, L., Oates, M. R., & Tata, L. J. (2012). Impact of socioeconomic deprivation on maternal perinatal mental illnesses presenting to UK general practice. *British Journal of General Practice*, 62(603), 671-678.
- Bates, D., Maechler, M., Bolker, B., & Walker, S. (2015). Fitting Linear Mixed-Effects Models Using lme4. *Journal of Statistical Software*, 67(1), 1-48. doi:10.18637/jss.v067.i01. Retrieved from <https://cran.rproject.org/web/packages/lme4/index.html>
- Harrison, J., Barrow, S., & Creed, F. (1995). Social deprivation and psychiatric admission rates among different diagnostic groups. *The British Journal of Psychiatry*, 167(4), 456-462.
- Hartig, F. (2019). DHARMA: *Residual Diagnostics for Hierarchical (Multi-Level / Mixed) Regression Models*. R package version 0.2.4. Retrieved from <https://CRAN.Rproject.org/package=DHARMA>
- Hogg, S. (2013). *Prevention in mind – all babies count: Spotlight on perinatal mental health*. UK: NSPCC. Retrieved from <https://www.nspcc.org.uk/globalassets/documents/research-reports/all-babies-count-spotlight-perinatal-mental-health.pdf>



- Kammerling, R. M. & O'Connor, S. (1993). Unemployment rate as a predictor of psychiatric admission. *British Medical Journal*, 307, 1536-1539.
- Kendall-Tackett, K. (2007). The psychological impact of birth experience: An underreported source of trauma in the lives of women. *Trauma Psychology*, 2(3), 9-11.
- Kendell, R. E., Chalmers, J. C., & Platz, C. (1987). Epidemiology of puerperal psychoses. *British Journal of Psychiatry*, 150, 662-673.
- Knight, M., Bunch, K., Tuffnell, D., Jayakody, H., Shakespeare, J., Kotnis, R., ... Kurinczuk, J. J. (Eds.) on behalf of Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK (MBRRACE-UK) (2018). *Saving lives, improving mothers' care – lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2014–2016*. Oxford, UK: National Perinatal Epidemiology Unit, University of Oxford.
- Langan Martin, J., McLean, G., Cantwell, R., & Smith, D. J. (2016). Admission to psychiatric hospital in the early and late postpartum periods: Scottish national linkage study. *BMJ Open*, 6. Retrieved from <https://bmjopen.bmj.com/content/bmjopen/6/1/e008758.full.pdf>
- Leight, K. L., Fitelson, E. M., Weston, C. A., & Wisner, K. L. (2010). Childbirth and mental disorders. *International Review of Psychiatry*, 22(5), 453-471.
- Lorant, V., Deliège, D., Eaton, W., Robert, A., Philippot, P. & Ansseau, M. (2003). Socioeconomic inequalities and depression: A meta-analysis. *American Journal of Epidemiology*, 157(2), 98-112.

- Nager, A., Johansson, L.-M., & Sundquist, K. (2006). Neighborhood socioeconomic environment and risk of postpartum psychosis. *Archive of Women's Mental Health*, 9, 81-86.
- National Assembly for Wales. Children, Young People and Education Committee. (2017). *Perinatal mental health in Wales*. Cardiff, UK: Author. Retrieved from <http://www.assembly.wales/laid%20documents/cr-ld11234/cr-ld11234-e.pdf>
- O'Donoghue, B., Roche, E., & Lane, A. (2016). Neighbourhood level social deprivation and the risk of psychotic disorders: A systematic review. *Social Psychiatry and Psychiatric Epidemiology*, 51(7), 941-950.
- Office for National Statistics. (2019). *Birth Characteristics in England and Wales: 2017*. London, UK: Office for National Statistics. Retrieved from <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/bulletins/birthcharacteristicsinenglandandwales/2017>
- O'hara, M. W., & Swain, A. M. (1996). Rates and risk of postpartum depression—a meta-analysis. *International Review of Psychiatry*, 8(1), 37-54.
- R Core Team. (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <http://www.R-project.org/>.
- Royal College of Psychiatrists. (2015). *Perinatal Mental Health Services. Recommendations for the provision of services for childbearing women* (Report CR197). Retrieved from <http://www.rcpsych.ac.uk/files/pdfversion/CR197.pdf>

- Shlomi-Polachek, I., Fung, K., Meltzer-Brody, S., & Vigod, S. N. (2017). Short stay vs long stay postpartum psychiatric admissions: a population-based study. *Archives of Women's Mental Health*, 20(4), 505-513.
- Terp, I. M., & Mortensen, P. B. (1998). Post-partum psychoses: Clinical diagnoses and relative risk of admission after parturition. *The British Journal of Psychiatry*, 172(6), 521-526.
- Van Domelen, D. R. (2019). *dvmisc: Convenience Functions, Moving Window Statistics, and Graphics*. R package version 1.1.3. Retrieved from <https://CRAN.Rproject.org/package=dvmisc>
- Welsh Index of Multiple Deprivation. (2014). Welsh Government. Retrieved from: <http://gov.wales/statistics-and-research/welsh-index-multipledeprivation/?lang=en>
- Wickham, H. (2016). *ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. Retrieved from <https://cran.r-project.org/web/packages/ggplot2/index.html>
- Xu, F., Sullivan, E. A., Li, Z., Burns, L., Austin, M. P., & Slade, T. (2014). The increased trend in mothers' hospital admissions for psychiatric disorders in the first year after birth between 2001 and 2010 in New South Wales, Australia. *BMC Women's Health*, 14(1), 119.

## **Chapter 3**

### **Contributions to Theory and Clinical Practice**

## **Abstract**

This thesis has explored different aspects of perinatal psychopathology in an attempt to further our understanding of psychological distress experienced by women around the time of childbirth. In chapter 1, a systematic review examined the prevalence of eating disorders in women during the perinatal period and included studies from multiple cultural and international settings. The empirical study in chapter 2 explored the characteristics of women experiencing psychiatric admissions following childbirth in Wales and investigated whether area-level unemployment as a measure of deprivation was a risk factor. The final chapter will consider implications for theory, research and clinical practice, and a short reflective commentary of the research process is provided.

## **Summary of Thesis Findings**

The systematic review summarised and critically appraised studies reporting on the prevalence of eating disorders during the perinatal period. To the author's knowledge, a systematic review of this kind had not been undertaken and the review was therefore novel in synthesising existing studies investigating the presence of eating disorder psychopathology during pregnancy and after birth. Wide-ranging prevalence estimates of up to 27.8% in pregnancy and 19.08% in the postpartum period were identified for the presence of eating disorder psychopathology. Studies attempting to estimate prevalence of specific eating disorders in the context of more stringent diagnostic criteria found more conservative estimates. Collectively, the results suggested that the perinatal period can be a time of vulnerability for experiencing difficulties associated with disordered eating.

The empirical paper explored the characteristics of women admitted to psychiatric inpatient units in Wales within the first postpartum year. The principal focus of this research was to investigate the relationship between socioeconomic deprivation and postpartum psychiatric admissions and in particular whether area-levels of unemployment were associated with higher rates of admission. Results indicated that mothers were most likely to be admitted for mood and affective disorders and admissions were most likely to occur within the first few days and weeks following childbirth. It was also found that in areas with higher unemployment, rates of postpartum psychiatric admission were significantly higher. This association appeared to be significantly stronger for older mothers. Overall, these results suggested that living in areas of deprivation increased women's risk of serious mental health difficulties in the postpartum period, and this risk appeared to be stronger for older mothers.

Collectively, and in accordance with a wealth of existing perinatal mental health literature, the thesis findings continue to highlight that the perinatal period can be a time of

vulnerability for the precipitation and perpetuation of psychological distress. This vulnerability exists across a spectrum of mental health conditions and presentations, from anxiety and depression, to eating disorders, to arguably the most severe and serious mental health presentations that require inpatient psychiatric care. The findings of this thesis thus have important clinical implications for policy-makers, commissioners and multidisciplinary healthcare providers, including those from midwifery, obstetric and mental health professions.

### **Implications for Future Research and Theory Development**

#### *Systematic Review*

Existing theories of eating disorders offer explanations as to why pregnant and postpartum women may be vulnerable to disordered eating difficulties. The transdiagnostic theory of eating disorders, developed from cognitive behavioural theory, emphasises over-evaluation of eating, shape, weight and their control as central features of eating disorders, which can be observed in patterns of cognitions and behaviour across different eating disorder types (Fairburn, Cooper & Shafran, 2003). Pregnancy can result in experiences such as changes in appetite, nausea and vomiting, cravings and food aversions, during which food and eating can become an undue focus (McNicholas, 1996). For women with or without a history of disordered eating, it is plausible that pregnancy may then trigger or perpetuate such a preoccupation and associated behaviours.

Pregnancy is also a time of enormous body transformation over which a woman has very little control (Fogarty et al., 2018). Indeed, many women without eating disorders express negative thoughts and feelings about weight gain and changing body shape associated with pregnancy and the postpartum (Fairburn & Welch, 1990). However, the need for control, and an intense fear of loss of control, is considered to be central to the maintenance

of eating disorders, in particular anorexia nervosa (Froreich et al., 2016). Pregnancy can therefore seem especially terrifying for many women with a history of eating disorders because they may feel that they have lost control of their body, their ability to control their weight, and thus their perceived ability to control their own life (Harris, 2010). For some women, this loss of control may be met with an increase in eating disorder behaviours in an attempt to regain a sense of control over their body and emotional experiences (Tierney, McGlone & Furber, 2013).

Research has demonstrated that this may be particularly relevant in the postpartum period, as a woman's motivation to suspend or reduce eating disorder behaviours for the benefit of the baby during pregnancy may be overshadowed by the desire to regain a sense of control. Quantitative and qualitative studies have demonstrated that the postpartum period is a time of significant risk for the worsening of symptoms, relapse or even the development of a new eating disorder (e.g. Rocco et al., 2005; Crow et al., 2008; Fogarty et al., 2018). However, the review identified only three studies estimating prevalence in the postpartum period and thus conclusions can only tentatively be drawn on the basis of these findings.

Theoretical links between control and eating disorders propose that behaviours such as bingeing, purging and other compensatory behaviours can be understood as strategies to reduce or avoid overwhelming emotions, and that difficulties managing emotions play a role in the development and maintenance of eating disorders. Evidence of this is seen in the review, which identified high levels of comorbidity, including depression and anxiety, amongst women with eating disorder psychopathology. However, association does not indicate causality, and a debate exists in the literature regarding the relationship between eating disorders and the presence of depression and anxiety.



Bulik (2002) presented a series of models of comorbidity to explain the relationship between eating, affective and anxiety disorders. One model depicted depression and anxiety as sequelae of eating disorders and another described eating disorders as sequelae of affective and anxiety disorders, whereby anxiety or depression manifests prior to the onset of an eating disorder. However, Bulik (2002) concluded that in light of existing research evidence, the model with the most compelling argument was one which presented eating, affective and anxiety disorders as a unique set of conditions, which share some (but not all) etiological factors. This model makes no predictions about which difficulties manifest first. The review found evidence to support this theory, as although there were high rates depression and anxiety found in some studies, this was not the case for all studies and there was also no pattern apparent as to which difficulties predisposed the other.

A key finding of the review related to the classification of eating disorders and how this impacted on prevalence estimates. In particular, the stringency of case definitions and the methods used to identify the presence of eating disorder psychopathology appeared to affect prevalence, as rates of ‘any eating disorder’ were considerably higher than estimates for specific disorders, as were prevalence rates reported in studies that utilised self-report questionnaires. Moreover, the review highlighted the methodological difficulties in identifying cases of anorexia nervosa, namely that diagnostic criteria specific to anorexia at the time, such as a low BMI or the absence of menstruation would not apply to pregnant women. These findings echo the growing recognition of the limitations of current categorical approaches to psychiatric classification, which is particularly apparent in the diagnosis of eating disorders (Wildes & Marcus, 2013). Longitudinal research has demonstrated considerable diagnostic crossover between anorexia and bulimia nervosa (Eddy et al., 2008), and historically the residual ‘eating disorder not otherwise specified’ category has comprised that largest proportion of eating disorder diagnoses in epidemiological studies (Smink, Van

Hoeken & Hoek, 2012). These issues call into question the validity of diagnostic classification of eating disorders, particularly for perinatal women, who may not fit within the boundaries of existing diagnostic criteria. Indeed, the review identified a disparity between prevalence rates of any eating disorder and distinct diagnostic categories.

The transdiagnostic theory of eating disorders (Fairburn, Cooper & Shafran, 2003) offers an alternative framework to diagnostic categories, focussing instead on common maintaining features across different eating disorder presentations (Cooper & Dalle Grave, 2017). Future epidemiological research on eating disorder psychopathology in perinatal women could draw on a transdiagnostic framework to focus on core psychopathology, that is, patterns of cognitions, behaviours and processes, instead of diagnostic categories. This approach may be best placed to overcome the methodological issues highlighted by the review to understand the full extent of the problem for perinatal women.

Although the review contributed to our understanding of the epidemiology of eating disorders during the perinatal period by estimating the scale of the problem, it did not focus explicitly on the course, risk or resilience factors. There is a growing body of research investigating how the course of eating disorder psychopathology changes during pregnancy and after birth, and a synthesis of findings is vital in identifying key points for intervention. There is also a dearth of studies investigating effective interventions for eating disorders during the perinatal period and it is therefore vital to investigate whether existing evidence-based interventions such as cognitive behavioural therapy for eating disorders is effective for perinatal populations.

### *Empirical Paper*

Researchers have studied and attempted to explain serious perinatal mental health difficulties using a range of theories and models which are underpinned by biological,

psychological and sociocultural perspectives (Ross & Toner, 2004). Indeed, childbirth is a significant transitional life event that is influenced by, and can lead to changes in, a range of psychological, environmental, social and physical factors (Buultjens et al., 2013). The aetiology of perinatal mental health problems is therefore considered to be multifactorial (O'Hara & Wisner, 2014). A biopsychosocial approach offers a theoretical framework within which the processes that lead to, impact on and ameliorate perinatal mental illness can be understood (Buultjens et al., 2013).

Findings from the empirical paper provide evidence to support a biopsychosocial theory of serious perinatal mental health difficulties on multiple levels. A dramatic spike in admissions during the first few days after childbirth is consistent with existing research examining the temporal relationship between childbirth and the timing of psychiatric admissions. Researchers have suggested that this points to biological, most likely hormonal factors that interact with situational factors such as sleep deprivation, particularly in the context of postpartum psychosis (Kendell, Chalmers & Platz, 1987; Jones, Chandra, Dazzan & Howard, 2014). Indeed, previous research on postpartum psychosis has shown that risk factors are biological and genetic in nature (Jones & Craddock, 2001). However, findings from the empirical paper need to be tentatively considered in this respect as it was not possible to identify cases of postpartum psychosis *per se*, due to the reliance on ICD-10 codes to identify diagnoses upon admission. Current classification systems do not recognise postpartum psychosis as a separate nosological entity, and although this term has remained widespread in clinical use, the confusion around its classification has hindered research (Jones et al., 2014). In our study, episodes of postpartum psychosis were most likely captured under the mood and affective disorders, schizophrenia and psychosis domains, or coded as F53, a category of mental and behavioural disorders associated with the puerperium, which was the second single most common psychiatric diagnosis.

Interestingly, the finding that emotionally unstable personality disorder was the most common single psychiatric diagnosis highlights the influencing role of psychological factors, such as psychiatric history, on the development of severe postpartum psychological distress. The chronic and complex nature of emotionally unstable personality disorder infers that this diagnosis is unlikely to be precipitated for the first time after child birth, suggesting that previous psychiatric history is relevant for women who are admitted to psychiatric units after birth. A history of mental health problems has been consistently demonstrated as a significant risk factor for the development or exacerbation of a range of mental health difficulties of varying severity in the perinatal period (O'Hara & Wisner, 2014). However, the empirical study did not explicitly examine psychiatric history prior to childbirth, nor did it explore individual-level psychological risk factors in any detail and thus such inferences should be made with caution on the basis of our study's findings.

The empirical study contributed to biopsychosocial theory most meaningfully at the socio-environmental level by highlighting the significant predictive qualities of socioeconomic deprivation on mental health outcomes in the postpartum period. Throughout history, socioeconomic status has been linked to physical and mental health outcomes (Adler et al., 1994) and it is now widely acknowledged that socioeconomic deprivation has an impact on emotional wellbeing (Murali & Oyebode, 2004). However fewer studies have assessed this in the perinatal field (Ban et al., 2012). The relationship between the neighbourhood environment and perinatal mental health outcomes is still a developing area of research, and there is a dearth of such research conducted in the UK. The empirical paper made a novel contribution to the literature by providing insight into these associations at a national level by including birth and admissions data for the whole of Wales.

The finding that older mothers may be more vulnerable to the effect of area-level unemployment deprivation has important theoretical and research implications, as existing research regarding higher maternal age and psychological distress has been inconsistent. In some studies, older mothers did not experience an increased risk of symptoms of depression either in pregnancy or after birth (e.g. Zasloff, Schytt & Waldenström, 2007), although in other studies advanced maternal age has been shown to be associated with higher rates of postpartum depression (Aasheim et al., 2012; Muraca & Joseph, 2014). However, in studies investigating the impact of the socioeconomic environment on adverse psychiatric outcomes, older mothers have been consistently shown to be at an increased risk, including for anxiety and depression (Ban et al., 2012) and admission to psychiatric hospital (Nager, Johansson & Sundquist, 2006; Langan Martin et al., 2016). Our empirical paper has provided support for evidence of an effect specific to the socioeconomic environment that appears to be stronger for older mothers. The mechanisms explaining these age-dependent associations remain unclear, and it is possible that intermediate factors may be involved, which warrants further investigation. It has been hypothesised that for older mothers, a lack of social support, and ultimately social isolation, may serve as important influencing factors due to deviations from social norms surrounding maternal age (Carlson, 2011). This may be especially relevant in areas of higher socioeconomic deprivation, which is associated with higher rates of younger mothers (van Roode, Sharples, Dickson & Paul, 2017), which consequently may impact on older mothers' sense of connection with other mothers in their community.

Socioeconomic deprivation is a multi-faceted construct and this study used only one measure of deprivation at the area-level. Single indicators have been shown to be just as effective in measuring socioeconomic gradients as multiple measures and indices (Rajaratnam, Burke & O'Campo, 2006). However, unemployment is only one aspect of a more complex set of characteristics that comprise deprivation; including domains such as

education, occupation, social resources, neighbourhood violence and crime. More research is needed to explore which individual and group-level factors protect against the effect of deprivation in the perinatal period. Social cohesion has been shown to mediate the effects of income deprivation on mental health outcomes in the general adult population (Fone et al., 2007). Moreover, considerable evidence exists regarding the protective role of maternal social support networks against psychological distress during the perinatal period (Balaji et al., 2007). Further research could investigate whether social support networks mediate the effect of deprivation on severe mental health outcomes such as psychiatric admission during the perinatal period, and in particular how this affects outcomes for older mothers, who appear to be particularly vulnerable in areas of high deprivation.

### **Implications for Clinical Practice**

This section discusses the clinical implications of the current thesis and makes suggestions for clinical practice based on the thesis findings.

#### *Provision of Specialist Services for Perinatal Mental Health Difficulties*

The findings of this thesis have important clinical implications regarding the provision of specialist perinatal mental health services. There has been considerable political debate and professional guidance regarding the development of perinatal mental health services across the UK in recent years and this has been met with significant increases in government funding (Bate, Parkin & Mackley, 2018). However, there are clear inconsistencies in the type and level of perinatal mental health service provision, particularly in Wales (Witcombe-Hayes et al., 2018).

Clinical guidelines recommend that women requiring inpatient psychiatric treatment care within 12 months of giving birth should be admitted to a specialist mother and baby unit

(MBU), yet no such service currently exists in Wales. Findings from the empirical paper advocate for an MBU, as women who require inpatient care are currently admitted to general psychiatric wards without their babies. Separation between mother and baby during this critical period may disrupt and adversely impact on bonding and the development of the attachment relationship (Howard et al., 2012), which can have a detrimental impact on the mother and developing child. Although prevalence estimates presented in the empirical paper indicate that postpartum mental illness requiring psychiatric admission is a rare event, mothers in Wales should nevertheless have access to the recommended treatment and this should not be determined by the area in which they reside (Witcombe-Hayes et al., 2018).

Findings from the systematic review demonstrate that women are at risk of eating disorder psychopathology during pregnancy and after birth. However, the availability of specialist eating disorders services varies considerably across the UK (Ward, 2008) and often referral criteria are determined by rapid weight loss or low BMI (NICE, 2017). Pregnant or postpartum women may not meet the threshold for such criteria. Furthermore, the systematic review indicated that pregnant women are at risk of binge eating disorder, which again may not meet criteria for access to specialist eating disorder services. This raises the question as to which services may be best placed to support perinatal women with disordered eating difficulties. Specialist perinatal mental health teams may therefore be well placed to offer support and treatment. Knowledge of the prevalence and clinical course of eating disorders in the perinatal period, in addition to training in best-practice and evidence-based treatments is thus imperative to achieve the best outcomes for women with eating disorders during pregnancy and after birth.

Evidence from the empirical paper regarding the timing of admissions demonstrates that following an initial peak in admissions in the early days and weeks following childbirth,

cases of psychiatric admissions continue to occur up to a year postpartum. This suggests that severe psychological distress requiring admission persists into the late postpartum period. National standards for perinatal mental health services emphasise that women should access specialist care and support until at least 12 months postpartum (Royal College of Psychiatrists, 2018). However, this is often not reflected in clinical practice, as demands on specialist services, insufficient staffing levels and space means that perinatal mental health teams in Wales are stretched beyond capacity and unable to deliver services that are accessible to all women who need it (Witcombe-Hayes et al., 2018). Indeed, at the time of writing, the North Wales perinatal mental health team had only very recently extended their referral criteria from two to four months postpartum. The empirical paper provides evidence to suggest that women may be vulnerable to severe psychological distress in the late postpartum months and this highlights the importance of offering specialist care up to 12 months postpartum, in accordance with national standards.

### *Training and Partnership Working*

Healthcare professionals such as GPs, midwives and health visitors are the first point of contact for pregnant and postpartum women and so are ideally placed to perform early identification and to assess, monitor, support and refer to appropriate services. Perinatal depression and anxiety has received much attention in the literature over the years which has resulted in training in detection, assessment and management of such difficulties by frontline healthcare professionals (Dennis, 2009). However, much less attention has been paid to eating disorders in the perinatal period. Variable prevalence estimates found in the review, in addition to the finding that only very small numbers of women presenting with clinically significant symptoms had such difficulties documented in their medical notes, suggests that for many women, eating disorders go undetected by healthcare professionals (Ward, 2008).



Education and training for healthcare professionals in the nature and detection of eating disorders during the perinatal period is therefore imperative (Fogarty et al., 2018).

It has been suggested that antenatal care should routinely include screening questions relating to weight, eating behaviour and weight control methods in pregnancy (Franko & Spurrel, 2000). However, assessment should go beyond disordered eating behaviours only (Castellini, Trisolini & Ricca, 2014) and should also explore how women perceive their changing body, as research suggests that even if behavioural symptoms reduce or stop in pregnancy, extreme concerns with shape and weight often persist (Tierney, McGlone & Furber, 2013). An awareness of the impact of stigma, shame and secrecy often experienced with eating disorder difficulties is important as this may serve as a barrier to disclosure, particularly during the perinatal period (Franko & Spurrel, 2000). Finally, healthcare providers should be aware that the postpartum period is a time of increased risk for development or exacerbation of eating disorder symptoms, as well as comorbid depression and anxiety, and therefore should provide increased monitoring and support for women with a history of eating disorders as well as those displaying symptoms in pregnancy (Harris, 2010).

Findings from the empirical paper have important clinical implications for professionals working within areas of deprivation. Flying Start is a Welsh Government programme providing services to children and families living in deprived areas (National Assembly for Wales, 2018). Flying start midwives and health visitors are therefore uniquely placed to monitor and support of women living in deprived areas who have an increased risk of severe mental health difficulties after birth. Data from the empirical paper provides evidence to support the Flying Start initiative and highlights the importance of specialist perinatal mental health teams maintaining close working links with Flying Start professionals

to ensure that women from more deprived areas receive adequate perinatal mental health care. Flying start professionals should be aware of the stronger association between deprivation and psychiatric admission in older mothers and could offer increased monitoring and support in the postpartum period accordingly.

### *The Importance of Accurate Data Collection*

Findings from the empirical paper highlight the fundamental importance of accurate data collection to inform service provision, particularly in the context of MBU provision, which is a current topic of political and clinical discussion in Wales (National Assembly for Wales, 2017). The Royal College of Psychiatrists (2015) recently published epidemiological data regarding perinatal psychiatric conditions and proposed that for every 1000 births, 34 cases of severe perinatal mental illness were expected to occur. In Wales, it was suggested that between 50 to 70 mothers a year would develop severe episodes of mental illness requiring highly specialised perinatal psychiatric inpatient care (National Assembly for Wales, 2017). The rate of postpartum psychiatric admission identified in the empirical paper was thus lower than the expected rate of serious perinatal mental illness. This suggests that data from the empirical paper is far from capturing the full extent of serious perinatal mental health difficulties and that there is considerable discrepancy between the expected rates of women requiring acute admission and women receiving such treatment.

As briefly discussed in the empirical paper, clinical factors that may have influenced this rate include women being admitted to MBUs in England and the reliance on home treatment teams to care for women in the community, in part due to clinicians and families not wanting to separate mother and baby by means of an admission to a general inpatient ward. However, currently little accurate or comprehensive data exists evidencing the number of women who require acute admission but who receive care from home treatment teams or

out-of-area MBUs and perinatal mental health teams across Wales are currently undertaking this task (National Assembly for Wales, 2017). In a recent inquiry into perinatal mental health in Wales, the National Assembly for Wales (2017) recommended that robust data collection and monitoring methods should be established and maintained in order to identify the level of need for MBU provision. Findings from the empirical paper were therefore a timely and meaningful contribution to the limited evidence and knowledge of postpartum psychiatric admissions in Wales.

### **Reflections**

Much of my experience as an assistant psychologist involved working therapeutically with parents and families in child services and through this work I started to develop a keen interest in maternal and perinatal mental health. Over the course of my training as a clinical psychologist I have continued to pursue this interest through academic work, research and my 12 month specialist placement in the newly established North Wales perinatal mental health team. When I first started on placement, I had not yet chosen a topic for my systematic review and I was motivated to address an issue with current clinical relevance. During multi-disciplinary referral meetings, I was involved in several discussions concerning cases where perinatal women were presenting with eating disorders. I reflected that this was a relatively unfamiliar clinical area for me in the context of what was known in the literature about such difficulties during the perinatal period. I was thus strongly motivated to learn more and I discovered that although a growing number of studies had attempted to explore the epidemiology of eating disorders in the perinatal period, little work had been done to systematically synthesise such findings. I shared the findings of my review with the wider team and through this work I observed my development as a scientist practitioner, as well as the value of working clinically within the field where I was conducting research.

Being on placement in the North Wales perinatal mental health team afforded me a unique insight into the reality of the data I was working with for my empirical paper. I observed the decision-making processes regarding admitting women into general inpatient units and the tensions between keeping mothers at home with their baby and appropriately managing risk during times when they became acutely unwell. I was deeply aware that, despite the recommended treatment being admission to a MBU, a significant proportion of mothers requiring such treatment refused admission to MBUs in England due to the distance from their home. I observed first-hand the reality and limits of current service provision in Wales and that women living in Wales did not have easy access to the best treatment options. This left me at times feeling frustrated and strongly motivated me to address this current and highly significant issue through my research. It also left me reflecting on the rate of cases identified in my findings, and whether this was a considerable under-estimation of the true extent of perinatal women that may have benefitted from inpatient care. Furthermore, as the vast majority of cases I was working with on placement were living in some of the most deprived areas in North Wales, I reflected that my clinical experience may have been on some level a real-world representation of the findings in my empirical paper, further emphasising the relationship between socioeconomic deprivation and the mental health of perinatal women across all levels of severity.

I was aware of the team's ongoing attempts to collect data on the number of admissions to general psychiatric units, cases being cared for by home treatment teams and MBU admissions and refusals. Although the team had started collecting this data after the establishment of their specialist service, their efforts to obtain data on admissions to general psychiatric units prior to the team's establishment in 2018 had been unsuccessful. I was highly aware that my data collection, using data linkage processes, would therefore be a useful clinical contribution and could provide valuable insight into service-level issues.

Due to my preceding apprehension regarding my advanced statistical ability, outstanding supervision has been vital to the completion of this thesis. Not only had I never undertaken a project involving multilevel modelling methodology, I was also completely unfamiliar with R (R Core Team, 2013), the statistical programming language used to complete my analyses. At times, I observed strong feelings of anxiety accompanied by thoughts of ‘what have I done?’ and ‘I can’t do this’ when I was navigating my way through complex statistical procedures. I am thus immensely proud of having completed such a project, which would not have been possible without the support, guidance and patience of my supervisor, which was most gratefully received.

## **Conclusion**

The current thesis explored different levels of perinatal psychopathology and this discussion paper considered the theoretical, research and clinical implications of this work. It highlighted that women in the perinatal period are vulnerable to eating disorder difficulties, findings which appear to be consistent across a diversity of populations and cultures. Prevalence estimates found in some studies suggest that eating disorders in the perinatal period may be relatively common and it is thus vital to ensure such difficulties are detected, assessed and managed by all healthcare providers working in partnership with specialist services. More locally, across Wales, our knowledge of the characteristics of perinatal women receiving inpatient psychiatric care has increased. In particular, this research has highlighted the impact of socioeconomic deprivation, measured at the area level, on psychological wellbeing during a hugely significant and transitional period in a woman’s life; the time of childbirth. The finding that older mothers may be particularly vulnerable to this effect has important implications for healthcare providers as the mean age of mothers in the UK is continuing to rise. Information presented in this thesis can also contribute towards

local service planning at a time where perinatal mental health services are the focus of national discussion, evaluation and development.

## References

- Adler, N. E., Boyce, T., Chesney, M. A., Cohen, S., Folkman, S., Kahn, R. L., & Syme, S. L. (1994). Socioeconomic status and health: The challenge of the gradient. *American Psychologist*, 49(1), 15.
- Aasheim, V., Waldenström, U., Hjelmstedt, A., Rasmussen, S., Pettersson, H., & Schytt, E. (2012). Associations between advanced maternal age and psychological distress in primiparous women, from early pregnancy to 18 months postpartum. *BJOG: An International Journal of Obstetrics & Gynaecology*, 119(9), 1108-1116.
- Balaji, A. B., Claussen, A. H., Smith, D. C., Visser, S. N., Morales, M. J., & Perou, R. (2007). Social support networks and maternal mental health and well-being. *Journal of Women's Health*, 16(10), 1386-1396.
- Ban, L., Gibson, J. E., West, J., Fiaschi, L., Oates, M. R., & Tata, L. J. (2012). Impact of socioeconomic deprivation on maternal perinatal mental illnesses presenting to UK general practice. *British Journal of General Practice*, 62(603), 671-678.
- Bate, A., Parkin, E., & Mackley, A. (2018). *Perinatal Mental Illness* (Debate Pack CDP-2018-0178). Retrieved from House of Commons Library: <http://researchbriefings.files.parliament.uk/documents/CDP-2018-0178/CDP-2018-0178.pdf>
- Blais, M. A., Becker, A. E., Burwell, R. A., Flores, A. T., Nussbaum, K. M., Greenwood, D. N., ... & Herzog, D. B. (2000). Pregnancy: Outcome and impact on symptomatology in a cohort of eating-disordered women. *International Journal of Eating Disorders*, 27(2), 140-149.

- Bulik, C. M. (2002). Anxiety, depression and eating disorders. In C. G. Fairburn & K. D. Brownell (Eds.), *Eating disorders and obesity: A comprehensive handbook* (pp. 193-198). London, UK: Guilford Press.
- Buultjens, M., Murphy, G., Robinsons, P., & Milgrom, J. (2013). The perinatal period: A literature review from the biopsychosocial perspective. *Clinical Nursing Studies*, 1(3), 19-31.
- Cardwell, M. S. (2013). Eating disorders during pregnancy. *Obstetrical & Gynecological Survey*, 68(4), 312-323.
- Carlson, D. L. (2011). Explaining the curvilinear relationship between age at first birth and depression among women. *Social Science & Medicine*, 72(4), 494-503.
- Castellini, G., Trisolini, F., & Ricca, V. (2014). Psychopathology of eating disorders. *Journal of Psychopathology*, 20(1), 461-470.
- Crow, S. J., Agras, W. S., Crosby, R., Halmi, K., & Mitchell, J. E. (2008). Eating disorder symptoms in pregnancy: A prospective study. *International Journal of Eating Disorders*, 41(3), 277-279.
- Dennis, C. L. (2009). Training health visitors to identify and treat depressive symptoms with psychological approaches reduces postnatal depression. *Evidence-Based Mental Health*, 12(3), 83-83.
- Eddy, K. T., Dorer, D. J., Franko, D. L., Tahlilani, K., Thompson-Brenner, H., & Herzog, D. B. (2008). Diagnostic crossover in anorexia nervosa and bulimia nervosa: Implications for DSM-V. *American Journal of Psychiatry*, 165(2), 245-250.



- Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: A “transdiagnostic” theory and treatment. *Behaviour Research and Therapy*, 41(5), 509-528.
- Fairburn, C. G., & Welch, S. L. (1990). The impact of pregnancy on eating habits and attitudes to shape and weight. *International Journal of Eating Disorders*, 2, 153-160.
- Fogarty, S., Elmir, R., Hay, P., & Schmied, V. (2018). The experience of women with an eating disorder in the perinatal period: a meta-ethnographic study. *BMC Pregnancy and Childbirth*, 18(1), 121.
- Fone, D., Dunstan, F., Lloyd, K., Williams, G., Watkins, J., & Palmer, S. (2007). Does social cohesion modify the association between area income deprivation and mental health? A multilevel analysis. *International Journal of Epidemiology*, 36(2), 338-345.
- Franko, D. L., & Spurrell, E. B. (2000). Detection and management of eating disorders during pregnancy. *Obstetrics & Gynecology*, 95(6), 942–946.
- Foreich, F. V., Vartanian, L. R., Grisham, J. R., & Touyz, S. W. (2016). Dimensions of control and their relation to disordered eating behaviours and obsessive-compulsive symptoms. *Journal of Eating Disorders*, 4(1), 14.
- Harris, A. A. (2010). Practical advice for caring for women with eating disorders during the perinatal period. *Journal of Midwifery & Women's Health*, 55(6), 579-586.
- Howard, K., Martin, A., Berlin, L. J. & Brooks-Gunn, J. (2012). Early mother-child separation, parenting, and child well-being in early head start families. *Attachment & Human Development*, 13(1), 5-26. doi:10.1080/14616734.2010.488119

- Jones, I., Chandra, P. S., Dazzan, P., & Howard, L. M. (2014). Bipolar disorder, affective psychosis, and schizophrenia in pregnancy and the post-partum period. *The Lancet*, 384(9956), 1789-1799.
- Jones, I. & Craddock, N. (2001). Familiality of the puerperal trigger in bipolar disorder: Results of a family study. *American Journal of Psychiatry*, 158, 913-917.
- Kendell, R. E., Chalmers, J. C., & Platz, C. (1987). Epidemiology of puerperal psychoses. *British Journal of Psychiatry*, 150, 662-673.
- Langan Martin, J., McLean, G., Cantwell, R., & Smith, D. J. (2016). Admission to psychiatric hospital in the early and late postpartum periods: Scottish national linkage study. *BMJ Open*, 6. Retrieved from <https://bmjopen.bmj.com/content/bmjopen/6/1/e008758.full.pdf>
- McNicholas, F. (1996). Eating psychopathology and its effect on pregnancy, infant growth and development. *Irish Journal of Psychological Medicine*, 13(2), 67-69.
- Muraca, G. M., & Joseph, K. S. (2014). The association between maternal age and depression. *Journal of Obstetrics and Gynaecology Canada*, 36(9), 803-810.
- Murali, V., & Oyeboode, F. (2004). Poverty, social inequality and mental health. *Advances in Psychiatric Treatment*, 10(3), 216-224.
- Nager, A., Johansson, L.-M., & Sundquist, K. (2006). Neighborhood socioeconomic environment and risk of postpartum psychosis. *Archive of Women's Mental Health*, 9, 81-86.
- National Assembly for Wales. (2018). *Flying Start: Outreach*. Retrieved from <https://www.assembly.wales/laid%20documents/cr-ld11425/cr-ld11425-e.pdf>

- National Assembly for Wales. Children, Young People and Education Committee. (2017). *Perinatal mental health in Wales*. Cardiff, UK: Author. Retrieved from <http://www.assembly.wales/laid%20documents/cr-ld11234/cr-ld11234-e.pdf>
- National Institute for Health and Care Excellence [NICE]. (2017). *Quality standards and indicators. Quality standard topic: Eating disorders* [Briefing Paper]. Manchester, UK: NICE. Retrieved from <https://www.nice.org.uk/guidance/qs175/documents/briefing-paper>
- O'Hara, M. W., & Wisner, K. L. (2014). Perinatal mental illness: Definition, description and aetiology. *Best Practice & Research in Clinical Obstetrics and Gynaecology*, 28, 3-12.
- R Core Team. (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <http://www.R-project.org/>
- Rajaratnam, J. K., Burke, J. G., & O'Campo, P. (2006). Maternal and child health and neighborhood context: The selection and construction of area-level variables. *Health & Place*, 12(4), 547-556.
- Rocco, P. L., Orbitello, B., Perini, L., Pera, V., Ciano, R. P., & Balestrieri, M. (2005). Effects of pregnancy on eating attitudes and disorders: A prospective study. *Journal of Psychosomatic Research*, 59(3), 175–179. doi:10.1016/j.jpsychores.2005.03.002
- Ross, L. E., & Toner, B. (2004). Applying a biopsychosocial model to research on maternal health. *Journal of the Motherhood Initiative for Research and Community Involvement*, 6(1).

- Royal College of Psychiatrists. (2015). *Perinatal Mental Health Services. Recommendations for the provision of services for childbearing women* (Report CR197). Retrieved from [https://www.rcpsych.ac.uk/docs/default-source/improving-care/better-mh-policy/college-reports/college-report-cr197.pdf?sfvrsn=57766e79\\_2](https://www.rcpsych.ac.uk/docs/default-source/improving-care/better-mh-policy/college-reports/college-report-cr197.pdf?sfvrsn=57766e79_2)
- Royal College of Psychiatrists. (2018). *Standards for community perinatal mental health services* (4<sup>th</sup> ed.). Retrieved from [https://www.rcpsych.ac.uk/docs/default-source/improving-care/ccqi/quality-networks/perinatal/pqn-standards-for-community-perinatal-mental-health-services-4th-edition.pdf?sfvrsn=f31a205a\\_4](https://www.rcpsych.ac.uk/docs/default-source/improving-care/ccqi/quality-networks/perinatal/pqn-standards-for-community-perinatal-mental-health-services-4th-edition.pdf?sfvrsn=f31a205a_4)
- Smink, F. R., Van Hoeken, D., & Hoek, H. W. (2012). Epidemiology of eating disorders: Incidence, prevalence and mortality rates. *Current Psychiatry Reports*, 14(4), 406-414.
- Tierney, S., McGlone, C., & Furber, C. (2013). What can qualitative studies tell us about the experiences of women who are pregnant that have an eating disorder? *Midwifery*, 29(5), 542-549.
- van Roode, T., Sharples, K., Dickson, N., & Paul, C. (2017). Life-course relationship between socioeconomic circumstances and timing of first birth in a birth cohort. *PloS one*, 12(1), e0170170.
- Ward, V. B. (2008). Eating disorders in pregnancy. *BMJ*, 336(7635), 93-96. doi:10.1136/bmj.39393.689595.BE
- Wildes, J. E., & Marcus, M. D. (2013). Alternative methods of classifying eating disorders: models incorporating comorbid psychopathology and associated features. *Clinical Psychology Review*, 33(3), 383-394.


Witcombe-Hayes, S., Jones, I., Gauci, P., Burns, J., & O'Leary, S. (2018). *From bumps to babies: Perinatal mental health care in Wales*. Cardiff, UK: NSPCC, National Centre for Mental Health, Mind Cymru, Mental Health Foundation, Maternal Mental Health Everyone's Business. Retrieved from NSPCC website: <https://learning.nspcc.org.uk/research-resources/2018/from-bumps-to-babies-perinatal-mental-health-care-in-wales/>

Zasloff, E., Schytt, E., & Waldenström, U. (2007). First time mothers' pregnancy and birth experiences varying by age. *Acta Obstetrica et Gynecologica Scandinavica*, 86(11), 1328-1336.

## **Appendices**

1. Bangor University School of Psychology ethical approval
2. NHS REC favourable opinion
3. HCRW approval/management permission letter from Velindre NHS Trust
4. Word count statement

## 1. Bangor University School of Psychology ethical approval

 PRIFYSGOL <b>BANGOR</b> UNIVERSITY DASHBOARD	
Ethics	Current Applications and Reviews   Approved Applications   Completed Reviews   ★ New ▾
Previously approved applicaitons and amendments	
Project	PI
<b>Approved Ethics Applications</b>	
<a href="#">2018-16373 Admissions to psychiatric units in the postpartum period: Is socio-economic deprivation a risk factor for women living in Wales?</a>	Alofs, Ms Emma

## 2. NHS REC approval confirmation



Gwasanaeth Moeseg Ymchwil  
Research Ethics Service



Wales Research Ethics Committee 5  
Bangor

Mailing address:  
Health and Care Research Wales  
Castlebridge 4  
15-19 Cowbridge Road East  
Cardiff, CF11 9AB

telephone: 07825 244673  
email: [WalesREC5@wales.nhs.uk](mailto:WalesREC5@wales.nhs.uk)  
website: [www.hra.nhs.uk](http://www.hra.nhs.uk)

**Please note:**

**This is the favourable opinion  
of the REC only and does not  
allow you to start your study  
at NHS sites until you receive  
HRA /HCRW Approval**

26 November 2018

Dr Christopher Saville  
School of Psychology  
Bangor University  
Brigantia Building  
Bangor  
Gwynedd  
LL57 2AS

Dear Dr Saville

<b>Study title:</b>	<b>Admissions to psychiatric units in the postpartum period: Is socio-economic deprivation a risk factor for women living in Wales?</b>
<b>REC reference:</b>	<b>18/WA/0375</b>
<b>Protocol number:</b>	<b>2018-16373</b>
<b>IRAS project ID:</b>	<b>251613</b>

The Research Ethics Committee reviewed the above application at the meeting held on 15 November 2018. Thank you for attending to discuss the application.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this favourable opinion letter. The expectation is that this information will be published for all studies that receive an ethical opinion but should you wish to provide a substitute contact point, wish to make a request to defer, or require further information, please contact [hra.studyregistration@nhs.net](mailto:hra.studyregistration@nhs.net) outlining the reasons for your request. Under very limited circumstances (e.g. for student research which has received an unfavourable opinion), it may be possible to grant an exemption to the publication of the study.



## Ethical opinion

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

## Conditions of the favourable opinion

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission must be obtained from each host organisation prior to the start of the study at the site concerned.

*Management permission should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).*

*Guidance on applying for HRA and HCRW Approval (England and Wales)/ NHS permission for research is available in the Integrated Research Application System, at [www.hra.nhs.uk](http://www.hra.nhs.uk) or at <http://www.rdforum.nhs.uk>.*

*Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.*

*For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.*

*Sponsors are not required to notify the Committee of management permissions from host organisations.*

## Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database. This should be before the first participant is recruited but no later than 6 weeks after recruitment of the first participant.

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to request a deferral for study registration within the required timeframe, they should contact [hra.studyregistration@nhs.net](mailto:hra.studyregistration@nhs.net). The expectation is that all clinical trials will be registered, however, in exceptional circumstances non registration may be permissible with prior agreement from the HRA. Guidance on where to register is provided on the HRA website.

## Ethical review of research sites

### *NHS Sites*

The favourable opinion applies to all NHS sites taking part in the study taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

## Extract of the meeting minutes

The Chairman welcomed the applicants and introduced the Committee members.  
The following issues were discussed:

### Social or scientific value; scientific design and conduct of the study

The Committee considered whether the research question is important and necessary, will improve health and well-being or increase knowledge and concluded that the research question was highly appropriate.

The Committee discussed whether the design and methodology makes use of accepted scientific principles and methods (including statistical techniques) to produce reliable and valid data, and concluded that the conduct of the study is appropriately described in the protocol, the study design robust and the proposed analysis adequate to answer the research question.

The Committee queried the rationale behind obtaining data both from SAIL and NWIS, as the majority of studies of this kind usually obtain the data from SAIL only.

Dr Saville explained that due to financial implication, the study will plain to obtain the data from NWIS, which is free of charge, provided that certain criteria are met. However it was considered best to use data from SAIL in the event that the dataset provided by NWIS had too many criteria removed to prevent identification.

A further query was raised in relation to the validity of the data and any procedures in place to account for variables and errors in the coding.

Dr Saville clarified that it is expected that NWIS will perform some quality checks before releasing the data. However heterogeneity in the data set is expected, based on factors like 'psychologist' or 'clinician preference' and 'likelihood to admit'. Variables factored in to the data analysis will likely mitigate for errors in coding and diagnostic.

The Committee thanked Dr Saville and Ms Alofs for their availability to speak to this submission and gave them an opportunity to ask questions. The applicants did not raise any issues.

The Committee considered the researchers' responses.

**Other ethical issues were raised and resolved in preliminary discussion before your attendance at the meeting.**

- Recruitment arrangements and access to health information; fair participant selection  
The Committee noted that the study is limited to working with data, as such no participants will be recruited, no ethical issues where raised
- Favourable risk benefit ratio; anticipated benefit/risks for research participants
- Care and protection of research participants; respect for participants' welfare and dignity; data protection and confidentiality  
The Committee noted that data used in this study will be received in anonymised format, no ethical issues where raised.
- Informed Consent process and the adequacy and completeness of participant information
- Suitability of the applicant and supporting staff
- Independent review
- Suitability of supporting information
- Other study procedures
- Other general comments missing information/ typographical errors/ application errors/
- Suitability of the study summary

Please contact the REC Manager if you feel that the above summary is not an accurate reflection of the discussion at the meeting.

### Approved documents

The documents reviewed and approved at the meeting were:

<i>Document</i>	<i>Version</i>	<i>Date</i>
IRAS Application Form [IRAS_Form_15102018]	-	15 October 2018
Research protocol or project proposal [Research Protocol]	1	11 October 2018
Summary CV for Chief Investigator (CI) [Chris Saville CV]	-	11 October 2018
Summary CV for student [Emma Alofs CV]	-	04 September 2018
Summary CV for supervisor (student research) [Mike Jackson CV]	-	17 November 2017

### Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

No declarations of interest have been made in relation to this application

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

### After ethical review

#### Reporting requirements

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

### User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website: <http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/>

## HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at <http://www.hra.nhs.uk/hra-training/>

18/WA/0375

Please quote this number on all correspondence

Yours sincerely



**Dr Philip Wayman White, MBChB, FRSM**  
General Practitioner  
Chair Wales REC 5

E-mail: [WalesREC5@wales.nhs.uk](mailto:WalesREC5@wales.nhs.uk)

*Enclosures: List of names and professions of members who were present at the meeting and those who submitted written comments*

*"After ethical review – guidance for researchers"*



SL-AR2 After ethical  
review - research oth

## Wales Research Ethics Committee 5

### Attendance at Committee meeting 15 November 2018

#### Committee Members

<i>Name</i>	<i>Profession</i>	<i>Capacity</i>	<i>Present</i>
Dr Swapna Alexander	Consultant Physician	Expert	Yes
Mrs Kathryn Chester	Research Nurse	Expert	Yes
Dr Giovanni d'Avossa	Consultant Neurologist	Expert	Yes
Ms Geraldine Jenson	Retired College Vice-Principal	Lay +	No
Mr David Rhys Jones	Retired Teacher	Lay +	Yes
Mr Eliezer Lichtenstein	Student	Lay +	No
Dr Pamela A Martin-Forbes	Clinical Studies Officer	Expert	Yes
Dr Paul G Mullins	Reader, Senior MRI Physicist	Lay +	No
Mr Vishwanath Puranik	Consultant ENT Surgeon	Expert	Yes
Mrs Lynn C Roberts	Matron, Emergency Department	Expert	Yes
Dr Judith L Roberts	Lecturer, Clinical Psychologist	Expert	No
Dr Jason D Walker	Consultant Anaesthetist (Vice-Chair)	Expert	Yes
Dr Philip W White	General Practitioner (Chairman)	Expert	Yes
Ms Sydna A Williams	Retired Lecturer, College Principal	Lay +	Yes

#### In attendance

<i>Name</i>	<i>Position (or reason for attending)</i>
Dr Corinne Scott	Senior Research Ethics Service Manager
Mr Norbert Leon Ciumageanu	RES Administrative Assistant

### 3. HCRW approval/management permission letter from Velindre NHS Trust

**From:** [Michael Morgan \(Velindre - R&D\)](#)  
**To:** [Emma Alofs-Williams](#)  
**Subject:** Admissions to psychiatric units after birth in Wales  
**Date:** 15 November 2018 12:37:06  
**Attachments:** [Image001.png](#)

---

Good Morning Emma,

**Re: Admissions to psychiatric units after birth in Wales**

Velindre University NHS Trust have been assigned the above study by Health and Care Research Wales Permissions Service.

The study will now go through our Trust's feasibility process before it can be approved.

Please can you let me know if you have spoken to any members of staff in NWIS about providing the study data. If yes, please can you provide their contact details. If you have a fully signed version of the NWIS data access agreement please can you also provide me with a copy.

Please let me know if you have any questions.

Kind regards

Mike

#  my name is...

**Michael Morgan**

Research Governance & Quality Assurance Officer

Research & Development Department

Velindre Cancer Centre

Velindre Road, Whitchurch

Cardiff, CF14 2TL

E-bost/ Email: [Michael.Morgan6@wales.nhs.uk](mailto:Michael.Morgan6@wales.nhs.uk)

Ffôn/Tel: 02920 615888 (4442 internal)



**From:** Michael Morgan (Velindre - R&D)  
**To:** Huw Ellis  
**Cc:** Emma Alofs-Williams; Christopher Saville  
**Subject:** Confirmation of Capacity and Capability  
**Date:** 11 January 2019 11:31:15  
**Attachments:** [image001.png](#)  
[251613 Statement of Activities - Signed.docx](#)

---

**\*\*Sent on behalf of Sarah Townsend\*\***

Dear Huw,

**RE: IRAS: 251613. Confirmation of Capacity and Capability at Velindre University NHS Trust**

**Full Study Title:** Admissions to psychiatric units after birth in Wales

This email confirms that Velindre University NHS Trust has the capacity and capability to deliver the above referenced study. Please find attached our agreed Statement of Activities as confirmation.


We agree to start this study on a date to be agreed when you as sponsor give the green light to begin.

If you wish to discuss further, please do not hesitate to contact me.

Kind regards

Sarah Townsend (Mrs.)

**Trust Research and Development Manager and Sponsor Representative**

#  my name is...

**Michael Morgan**

Research Governance & Quality Assurance Officer

Research & Development Department

Velindre Cancer Centre

Velindre Road, Whitchurch

Cardiff, CF14 2TL

E-bost/ Email: [Michael.Morgan6@wales.nhs.uk](mailto:Michael.Morgan6@wales.nhs.uk)

Ffôn/Tel: 02920 615888 (4442 internal)

We constantly strive to improve our services and value your feedback. We'd really like to hear from you and your responses will, of course, remain confidential and you won't be identified in any results. Please click on this link to leave your feedback: [www.healthandcareresearch.gov.wales/your-views/](http://www.healthandcareresearch.gov.wales/your-views/)

#### 4. Word count statement

**Thesis Abstract:** 257

#### **Chapter 1 – Literature Review**

Abstract: 193

Highlights and keywords: 45

Main text (excluding abstract, highlights and keywords, tables, figures and references): 4974

Tables, figures and references: 3780

#### **Chapter 2 – Empirical Paper**

Main text (excluding tables, figures and references): 4145

Tables, figures and references: 997

#### **Chapter 3 – Contributions to Theory and Clinical Practice**

Main text (excluding references): 4978

References: 1237

**Appendices:** 2210

#### **Overall Thesis**

Total word count (excluding tables, figures, references and appendices): 14592

Total word count of tables, figures, references and appendices: 8224

**Total thesis word count (including acknowledgements, dedication, declaration, table of contents, thesis abstract, title pages, tables, figures, references, and appendices): 23478**