



Research report

Depression symptoms during pregnancy: Evidence from *Growing Up in New Zealand*

Karen E. Waldie^{a,*}, Elizabeth R. Peterson^a, Stephanie D'Souza^{a,b}, Lisa Underwood^b, Jan E. Pryor^c, Polly Atatoa Carr^b, Cameron Grant^{b,d}, Susan M.B. Morton^{b,d}

^a School of Psychology, The University of Auckland, Auckland, New Zealand

^b Centre for Longitudinal Research – He Ara ki Mua, The University of Auckland, Auckland, New Zealand

^c Roy McKenzie Centre for the Study of Families, Victoria University, New Zealand

^d School of Population Health, The University of Auckland, Auckland, New Zealand

ARTICLE INFO

Article history:

Received 19 May 2015

Received in revised form

3 June 2015

Accepted 10 June 2015

Available online 21 July 2015

Keywords:

Depression

Antenatal

Prenatal

Perceived stress

Wellness

Longitudinal

ABSTRACT

Background: Depression during pregnancy has significant implications for pregnancy outcomes and maternal and child health. There is a need to identify which family, physical and mental health factors are associated with depression during pregnancy.

Methods: An ethnically and socioeconomically diverse sample of 5664 pregnant women living in New Zealand completed a face-to-face interview during the third trimester. Antenatal depression (AD) symptoms were assessed using the Edinburgh Postnatal Depression Scale (EPDS). Maternal demographic, physical and mental health, and family and relationship characteristics were measured. The association between symptoms of AD and maternal characteristics was determined using multiple logistic regression.

Results: 11.9% of the participating women had EPDS scores (13+) that indicated probable AD. When considering sociodemographic predictors of AD symptoms, we found that women from non-European ethnicities, specifically Pacific Islander, Asian and other, were more likely to suffer from AD symptoms. Greater perceived stress during pregnancy and a diagnosis of anxiety both before and during pregnancy were also associated with greater odds of having AD according to the EPDS.

Limitations: The women were in their third trimester of pregnancy at the interview. Therefore, we cannot discount the possibility of recall bias for questions relating to pre-pregnancy status or early-pregnancy behaviours.

Conclusions: AD is prevalent amongst New Zealand women. Ethnicity, perceived stress and anxiety are particularly associated with a greater likelihood of depression during pregnancy. Further attention to supporting maternal mental health status in the antenatal period is required.

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1. Introduction

Depression during pregnancy has adverse effects on maternal health and pregnancy outcomes. Maternal complications of pregnancy associated with depression include inadequate weight gain, underutilisation of prenatal care, continuation of smoking, and premature delivery (Goedhart et al., 2010). Depression during pregnancy is a risk factor for postnatal depression (Cankorur et al.,

2015; Evans et al., 2001; Mallikarjun and Oyeboode, 2005).

Depression during the antenatal period is also an important determinant of child health. Poor mental health during pregnancy is associated with intrauterine growth retardation, lower Apgar scores, smaller head circumference, and increased risk of infant mortality (Goedhart et al., 2010). It decreases the likelihood of breastfeeding initiation (Grigoriadis et al., 2013).

The prevalence of depression during pregnancy has been estimated at 7%, 14%, and 12% for first, second, and third trimesters, respectively (systematic review by Bennett et al., 2004). Despite these high rates, depression during pregnancy has received much less attention than postnatal depression, in terms of research, media and health care community interest (Bowen and Muhajarine, 2006).

Recent interest in antenatal depression (AD) has been kindled by research into “foetal programming” (Ponder et al., 2011).

Abbreviations: AD, antenatal depression; BMI, body mass index; CI, confidence interval; EPDS, Edinburgh Postnatal Depression Scale; EPDS-AD, EPDS-defined antenatal depression; FACES III, Family Adaptation and Cohesion Scales; PSS, Perceived Stress Scale; OR, Odds Ratios

* Correspondence to: School of Psychology, Faculty of Science, The University of Auckland, Private Bag 92019, Auckland 1142, New Zealand. Fax: +64 9 373 7486.

E-mail address: k.waldie@auckland.ac.nz (K.E. Waldie).

Multidisciplinary studies show that a mother's psychological state while pregnant has a strong and long-lasting impact on her child's subsequent development and health. O'Donnell et al. (2009) concluded a review of the field by stating: "the evidence for an association between maternal stress, depression or anxiety in pregnancy and an adverse neurodevelopmental outcome for the child is now substantial" (p. 290).

Antenatal depression, anxiety and stress are frequently comorbid (Lancaster et al., 2010; Poudevignel and O'Connor, 2006) and can negatively impact the intrauterine environment. For example, stress-induced activation of the sympathetic nervous system (de Bruijn et al., 2009) can increase uterine artery resistance, reducing blood flow to the foetus and altering brain structure and function (Teixeira et al., 1999; Welberg and Seckl, 2001). Antenatal depression has been linked to delayed infant motor development (Huizink et al., 2003) as well as childhood (e.g., Talge et al., 2007) and adolescent (Pawby et al., 2009) behavioural and emotional problems. These effects are thought to be via the neuroendocrine effects of maternal depression, anxiety and stress (Field et al., 2003; O'Donnell et al., 2009).

In a systematic review of AD risk factors, Lancaster et al. (2010) found that women with a history of depression, who had experienced domestic violence, had an unintended pregnancy, lower income, or were unemployed, were more likely to experience AD. In contrast, women with more social support and positive health related behaviours, such as reducing alcohol consumption and cigarette smoking, and maintaining a reasonable level of physical exercise, were less likely to develop AD (e.g., Goedhart et al., 2009; Poudevignel and O'Connor, 2006; Odendaal et al., 2008). Intimate partner support also protects against AD (Lancaster et al., 2010).

Our aim in this study was to identify maternal characteristics associated with AD in a socioeconomically and ethnically diverse cohort. We anticipated that identification of such factors would increase the capacity for health care providers to identify and thus treat pregnant women with depression. By conducting this study within a cohort of pregnant women whose children would form a new longitudinal study, we also saw the careful description of maternal depression at baseline to be an essential element of any subsequent life-course assessment of the determinants of child health.

2. Methods

2.1. Participant and general procedure

We completed our study of AD symptoms, risk and protective factors in a socioeconomically and ethnically diverse cohort of 5664 pregnant women who were participating in the *Growing Up in New Zealand* longitudinal study (Morton et al., 2012).

The *Growing Up in New Zealand* cohort of pregnant women was recruited to provide information that is broadly generalisable to all current NZ births (Morton et al., 2012). The women had a due date between 25th April 2009 and 25th March 2010 and lived in the geographical area where about one third of the NZ population lives, covered by three contiguous District Health Board regions (Morton et al., 2013). There were no other inclusion or exclusion criteria (Morton et al., 2013). Ethical approval was obtained from the Ministry of Health Northern Y Regional Ethics Committee. Written informed consent was obtained from all participating women. Detailed descriptions of cohort study design and sample recruitment have been published previously (Morton et al., 2012, 2013).

Enrolled women were comparable to the most recent NZ national birth statistics in relation to maternal age, ethnicity, parity, and indicators of socioeconomic position (Morton et al., 2014).

Growing Up in New Zealand is a longitudinal study with data collection waves focusing on six inter-connected domains of influence in child development: health and wellbeing; psychological and cognitive development; education; family and whanau (extended family); culture and identity; and neighbourhoods and the societal context.

A face-to-face computer-assisted interview was completed at participants' homes during the third antenatal trimester with 5664 pregnant women (83% of the 6822 women enrolled into *Growing Up in New Zealand*). The remainder ($n=1158$) completed antenatal interviews retrospectively, after their babies had been born, and were consequently excluded from the analysis for this study. The measures used for the present study are described below.

2.2. Measures

2.2.1. Antenatal depression

Antenatal depression (AD) symptoms were measured using the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987), a screening tool which consists of 10 self-report items focused on the cognitive and affective features of depression. The EPDS was originally designed to screen for postnatal depression. However, it has since been used in studies of pregnant women (Banti et al., 2011; Bennett et al., 2004; Bowen and Muhajarine, 2006; Evans et al., 2001; Korhonen et al., 2012; Rich-Edwards et al., 2006) and has been found to be valid in this population (Cox et al., 1996; Kozinszky and Dudas, 2015; Murray and Cox, 1990). The maximum score is 30 (each item is scored 0–3). Individuals with a score of 13 or greater are considered to have significant antenatal depressive symptoms, which will be referred to herein as EPDS-defined antenatal depression (EPDS-AD). At this cut-off, the EPDS has reported sensitivity and specificity for major depression in pregnancy of 0.83 and 0.90 respectively (NICE, 2014).

2.2.2. Sociodemographic variables

Ethnicity was defined as the mother's self-prioritised ethnicity, coded into five Level 1 Statistics New Zealand categories (Statistics New Zealand, 2005): European, Maori (New Zealand's indigenous population), Pacific Peoples, Asian, and Other (including Middle Eastern, Latin American and African). Educational qualifications and household income were classified according to measures from the Statistics New Zealand's national census (Statistics New Zealand, 2008a), General Social Survey (Statistics New Zealand, 2008b), and the Core Questions module, a set of questions designed to allow comparability across social surveys (Statistics New Zealand, 2013).

Maternal age (<20 years, 20–29 years, 30–39 years, 40+ years), workforce participation (employed, unemployed or not in workforce, student) and relationship status (no relationship, dating but not cohabiting, cohabiting, married or civil union) were also self-reported.

2.2.3. Maternal health

Perceived general health *before* pregnancy was self-reported (5-point Likert scale from *excellent* to *poor* from the SF-36 general health questionnaire; Ware et al., 1994). Participants were asked whether they had ever been diagnosed with a depressive or anxiety disorder (categorised into never, before but not during this pregnancy before and during this pregnancy, and during this pregnancy only).

Perceived maternal stress was assessed using the abbreviated (10-item) Perceived Stress Scale (PSS; Cohen et al., 1983) which has established reliability and validity (e.g., Roberti et al., 2006). The maximum score is 40, with higher scores indicating greater stress.

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