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Relationships between mental health symptoms and body mass index in women with and without excessive weight gain during pregnancy

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ABSTRACT

Objective: This study investigated the prospective relationships between mental health symptoms (depressive and anxiety symptoms) and body mass index (BMI) in women with and without excessive weight gain during pregnancy. The secondary aim was to examine whether mental health symptoms and BMI were predictive of one another. Two models were tested: the first depicted depressive or anxiety symptoms predicting BMI, and the second model depicted BMI predicting depressive or anxiety symptoms.

Design and participants: Women completed questionnaires at three time points throughout pregnancy, which comprised of the Depression, Anxiety and Stress Scale-21 and self-reported weight. Height and weight were also reported retrospectively at T1 to calculate pre-pregancy BMI category. To calculate total gestational weight gain (GWG), pre-pregnancy weight was substracted from weight at 36 weeks gestation.

Methods: 183 women were tracked during pregnancy; Time (T)1 (mean=16.50 weeks of gestation, SD=.92), T2 (mean=24.40 weeks of gestation, SD=.92), and T3 (mean=32.61 weeks gestation, SD=.88). The sample was divided into those for whom weight gain exceeded the guidelines for GWG (excessive gestational weight gain; EGWG), and those who for whom it did not. Multigroup path analyses compared the longitudinal relationships between depressive or anxiety symptoms and BMI during pregnancy for women with and without EGWG.

Findings: BMI did not predict depressive or anxiety symptoms. Depressive symptoms at T1, did however predict higher BMI at T2 for women without EGWG. Anxiety symptoms and BMI were not related, regardless of GWG status.

Conclusion: These findings suggest that depressive symptoms may precede increased BMI during pregnancy in women who do not gain weight excessively. There may be longitudinal relationships between depressive symptoms and BMI during pregnancy; however, further research is required to identify the mechanisms that link these health outcomes and inform the focus of intervention design.

Introduction

Pregnancy is a period during which women experience physical and psychological change. Pregnant women are at elevated risk of rapid weight increase and hence maternal obesity (Gunderson and Abrams, 1999; Herring et al., 2008; Gould Rothberg et al., 2011). In fact, approximately 50% of women in Australia report gaining weight excessively during pregnancy (Hure et al., 2012; Hill et al., 2013), with similar rates of excessive gestational weight

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gain being reported in the US (67% of women: Wrotniak et al. (2008); 64.1% of women who are overweight pre-pregnancy: Chu et al. (2009)). Excessive gestational weight gain (EGWG) has been defined as an increase in weight during pregnancy that exceeds the recommendations of the US Institute of Medicine (Rasmussen and Yaktine, 2009) (defined below).

Women who gain excessive weight during pregnancy have an increased risk of post partum obesity and retention of gestational weight gain (GWG) post birth. The latter has been shown to be a strong predictor of maternal overweight and obesity in the ensuing decade (Olson, 2008; Siega-Riz et al., 2009). Pregnant women are at risk of elevated depressive and anxiety symptoms with prevalence estimates ranging from 11.4% at 18 weeks gestation to 13.1% at 32 weeks gestation for antenatal depression and 14.6% at 18 weeks gestation to 15.6% at 32 weeks gestation for anxiety (Heron et al., 2004). Similarly, rates of depression and anxiety have been found to increase over the pregnancy and into the post-birth period (Skouteris et al., 2009a, 2009b). Depression during pregnancy also appears to be associated with an increased the risk of depression post partum (Milgrom et al., 2008; Sexton et al., 2012).' Obesity and mental health symptoms, both common gestational health conditions, share a bidirectional relationship, with each health condition being a risk factor for the other (Desai et al., 2009; Williams et al., 2009; Luppino et al., 2010; Lykouras and Michopoulos, 2011; Lin et al., 2013).

Both EGWG and maternal mental health symptoms are associated with negative health outcomes for both mother and child, including preeclampsia, complications with labour/childbirth, lower rates of breast feeding for the former, birth defects, late fetal death, reduced cognitive development in early childhood, and emotional and behavioural issues in mid to late childhood for the latter (Cnattingius et al., 1998; Baeten et al., 2001; Sebire et al., 2001; Watkins et al., 2003; Cedergren, 2006; Pedersen et al., 2011; Grigoriadis et al., 2013; Koutra et al., 2013; Leis et al., 2013). Yet, to date, there remains a paucity of research evaluating the longitudinal relationships between these depressive and anxiety symptoms and weight during pregnancy. Carter et al. (2000) examined the relationships between pre-pregnancy BMI and BMI at four months post-birth with anxiety and depressive symptoms during pregnancy and these two post partum time points. These authors found that BMI at both time points was positively associated the depression and anxiety during the post-birth period, and not during pregnancy. However, this study did not measure BMI during pregnancy. To our knowledge, Webb et al. (2008) have conducted the only study examining the longitudinal relationship between antenatal depressive symptoms and weight changes over the course of pregnancy. The overall aim of their study was to identify the psychosocial risk factors of adequate GWG. The authors found that antenatal depressive symptoms in early pregnancy (<20 weeks gestation) and mid-pregnancy (27–29 weeks gestation) were risk factors for EGWG. However, this study did not examine the bidirectional relationship between depressive symptoms and BMI, nor did they include anxiety symptoms as a measure of maternal mental health during pregnancy.

Therefore, the purpose of this study was to examine the extent to which maternal mental health symptoms, as measured by depressive and anxiety symptoms, and weight (measured via BMI to account for height) are related during pregnancy for those with and without EGWG. There were three specific aims:

(1) To explore the prospective relationships between mental health symptoms (depressive and anxiety symptoms) and BMI in women with and without EGWG (as determined by recommended guidelines).
(2) To explore two models to determine whether antenatal depressive and anxiety symptoms precede weight gain, or whether BMI is a predictor of mental health symptoms during pregnancy.
(3) To test a stability model of depressive and anxiety symptoms and BMI through pregnancy.

Methods

Study design

A longitudinal study was conducted comprising 183 pregnant women over the age of 18 years who were tracked across three time points in pregnancy; Time 1 (T1: 16 weeks gestation; mean of 16.50 weeks of gestation, SD=.92), T2 (24 weeks gestation; mean of 24.40 weeks of gestation, SD=.92), and T3 (32 weeks gestation; mean of 32.61 weeks gestation, SD=.88) for depressive and anxiety symptoms, as well as BMI.

Procedure

Participants were recruited via advertising on online mother, child and baby forums, in parenting magazines, at baby and children's markets, and at obstetrician clinic waiting rooms in Geelong/Melbourne in the state of Victoria, Australia. Women between 10 and 16 weeks pregnant were targeted. After expressing interest in the study, prospective participants were provided a copy of the Plain Language Statement and given the opportunity to ask any questions before informed consent was provided. Participants were then mailed a series of questionnaires at each time point and were provided reply paid envelopes in order to complete and return the questionnaires within 1–2 weeks of receipt. Ethics approval was obtained from the Deakin University Human Research Ethics Committee.

Study measurements

Body mass index

Pre-pregnancy BMI (kg/m^2) was calculated using self-reported retrospective height and weight data collected at T1. Participants were classified as underweight (BMI <18.5 kg/m^2), normal weight (BMI 18.5–24.9 kg/m^2), overweight (BMI 25.0–29.9 kg/m^2) or obese (BMI ≥ 30.0 kg/m^2) at pre-pregnancy (World Health Organization, 1995). According to the US Institute of Medicine's (IOM) guidelines (Rasmussen and Yaktine, 2009), recommended weight gain for women during pregnancy is as follows: those who are underweight should gain between 13 and 18 kg; those who are normal weight should gain between 11 and 16 kg; those who are overweight should gain 7–11 kg; and women who are obese should gain 5–9 kg. Total gestational weight gain was calculated at the end stages of pregnancy. EGWG was defined as weight gain beyond these parameters for pregnancy weight gain at 36 weeks of gestation, calculated as pre-pregnancy weight subtracted from weight at 36 weeks. All weight measures were assessed via maternal self-report and were used to calculate BMI at each time point.

Depression, Anxiety, and Stress Scale-21 (Lovibond and Lovibond, 1995; DASS-21)

Participants completed both the Depression and Anxiety scales of the DASS-21 at T1, T2, and T3. The Depression scale consists of seven questions relating to feelings of helplessness and hopelessness, while the seven questions in the Anxiety scale ask participants to report worry, panic, and physical symptoms of anxiety. Participants rate the extent to which each statement