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The Role of Parity in Gestational Weight Gain and Postpartum Weight Retention

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A B S T R A C T

Objectives: Parity, excessive gestational weight gain (GWG), and postpartum weight retention (PPWR) have been identified as risk factors for maternal obesity. The aim of this study was to explore whether GWG and PPWR at 6 and 12 months after birth differed for primiparous and multiparous Australian women.

Methods: One hundred thirty-eight Australian women provided weight measures in early to mid pregnancy ($M = 16.7$ weeks, $SD = 2.3$), late pregnancy ($M = 37.7$ weeks, $SD = 2.4$), 6 months postpartum ($M = 6.1$ months, $SD = 1.4$), and 12 months postpartum ($M = 12.6$ months, $SD = 0.7$). Height, parity, and demographic information were also collected. Prepregnancy body mass index (BMI), total GWG, incidence of excessive GWG, as well as change in BMI and BMI category from prepregnancy to 6 and 12 months postpartum were computed. Differences between primiparous and multiparous women were compared using analysis of covariance (controlling for age, prepregnancy BMI, and GWG) and χ^2 test of independence.

Results: Seventy women (50.7%) were primiparous and 68 women (49.3%) were multiparous. Primiparous women were more likely to retain weight at 12 months postpartum than multiparous women ($p = .021$; Cohen's $d = .24$). This difference was not reflected when analyzing change in BMI categories from prepregnancy to the postpartum.

Conclusions: Evidence for the role of parity in PPWR is inconclusive. Future research should consider the temporal development of PPWR in primiparous and multiparous women, leading to tailored care in the postpartum period to help women return to a healthy prepregnancy weight.

Approximately one-third of women of childbearing age are obese (Ogden, Carroll, Kit, & Flegal, 2014). Maternal obesity during pregnancy is associated with increased risk of miscarriage, gestational diabetes, pregnancy-induced hypertension, preeclampsia, caesarean delivery, wound infections, and infant shoulder dystocia (Bogaerts et al., 2012; Catalano & Ehrenberg, 2006; Magann et al., 2011). These morbidities are notwithstanding the obesity-related risks for any nonpregnant individual, including type 2 diabetes, cardiovascular disease, and cancer (Field et al., 2001), and the increasing economic burden of this condition (Colagiuri et al., 2010; Tsai, Williamson, & Glick, 2011).

Excessive gestational weight gain (GWG) is defined as weight gained in excess of the U.S. Institute of Medicine (IOM) recommendations for pregnancy weight gain according to prepregnancy body mass index (BMI; Rasmussen & Yaktine, 2013). Excessive GWG is associated with the development of obesity in women (Amorim, Rossner, Neovius, Lourenco, & Linne, 2007; Siega-Riz et al., 2010), and also places the mother and infant at increased risk of gestational diabetes, preeclampsia, and delivery complications over and above the existing risk associated with maternal obesity (Heude et al., 2012; Melzer & Schutz, 2010; Rasmussen & Yaktine, 2013). Excessive GWG is widely recognized as the strongest predictor of postpartum weight retention (PPWR; weight retained in excess of prepregnancy weight after giving birth to a child; van der Pligt et al., 2013), which is also associated with the development of obesity in women (Siega-Riz et al., 2010). Siega-Riz et al. (2010) examined PPWR in a prospective pregnancy cohort and found that 40% of overweight women in their sample had become obese by 12 months postpartum and 18% of normal weight women had moved up to the overweight or obese BMI categories. Indeed, women themselves have reported that having children is a cause of weight gain

Conflict of Interest: The authors declare that they have no conflict of interest.

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(Rössner, 1992). The role of childbearing in the development of obesity is fortified by evidence that suggests parity is associated independently with increased weight over time. That is, the more children a woman has, the more likely she is to be obese (Melzer & Schutz, 2010). Women experiencing short interpregnancy intervals are also at increased risk of developing obesity (Davis et al., 2014).

However, GWG and PPWR seem to differ according to how many children a woman has had. Primiparous women (typically defined as pregnant women who will have their first child) are more likely to gain a greater amount of gestational weight and experience excessive GWG than their multiparous counterparts (women who have previous children; Ashley-Martin & Woolcott, 2014; Gaillard et al., 2013; Haugen et al., 2014; Lan-Pidhainy, Nohr, & Rasmussen, 2013). The evidence for the role of parity in PPWR is less clear. Data from the American Infant Feeding Practices Study indicated that primiparous women were at increased risk of PPWR at 6 months after birth compared with multiparous women, irrespective of prepregnancy BMI (Lan-Pidhainy et al., 2013). Similarly, data from a population-based retrospective cohort study in Nova Scotia, Canada, found that within each GWG category, mean PPWR was higher after women's first pregnancies than after any subsequent pregnancies (Ashley-Martin & Woolcott, 2014). In contrast, an analysis of data from the Danish National Birth Cohort found that 6-month PPWR was associated strongly with GWG to the same extent in both primiparous and multiparous women, although multiparous women exhibited additional risk in terms of delivering small- or large-for-gestational age infants (Nohr et al., 2009). Both Lan-Pidhainy et al. (2013) and Nohr et al. (2009) suggest that, once confirmed by future studies, there may be evidence supporting the development of different GWG recommendations for primiparous and multiparous women. Clearly, more research is needed to delineate the specific pathways by which parity affects GWG and PPWR.

To date, the literature exploring the independent effect of parity on GWG is based predominately on analyses conducted on secondary outcomes or where parity is included as a covariate (e.g., Asbee et al., 2009; Ashley-Martin & Woolcott, 2014; Gaillard et al., 2013). There is sparse literature extending beyond pregnancy to explore the influence of parity on PPWR specifically (excluding its relationship with later maternal obesity; e.g., Davis et al., 2014). Indeed, we are aware of only two studies in which the primary outcome was to explore the effect of parity on GWG and PPWR (Lan-Pidhainy et al., 2013; Nohr et al., 2009); these two studies were conducted in the United States and Denmark. Hence, the aim of the current study was to explore, using a prospective design, whether GWG and PPWR at 6 and 12 months after birth differs for primiparous and multiparous Australian women. Specifically, we investigated whether 1) the amount of GWG or PPWR (as continuous variables) differed between primiparous and multiparous women, and 2) primiparous and multiparous women differed in terms of classification into IOM GWG categories and World Health Organization (WHO) BMI categories in the postpartum. We hypothesized that primiparous women would gain more gestational weight (and be more likely to experience excessive GWG) and experience more PPWR (and move to a higher BMI category) than multiparous women. The two postpartum time points of 6 and 12 months after birth were chosen because examining PPWR earlier in the postpartum period may not be an accurate representation of true weight changes associated with childbearing, and instead may be associated with factors such as breastfeeding or lack of sleep (Gould Rothberg, Magriples, Kershaw, Rising, & Ickovics, 2011; Siega-Riz et al., 2010). Furthermore, 12 months postpartum seems to be the "tipping point" for postpartum weight trajectory (Schmitt, Nicholson, & Schmitt, 2007). That is, pregnancy-associated weight loss has plateaued and weight gain may occur. To our knowledge, only one other study has explored the association between parity and weight retention at 12 months postpartum.

Materials and Method

Participants and Procedure

Pregnant women who were less than 18 weeks pregnant, over the age of 18 years, and carrying a singleton fetus were recruited via advertising on online pregnancy forums, parenting magazines, or through the maternity clinics at large tertiary hospitals in the Western and Eastern regions of Melbourne, Australia. Women who were interested in participating in this prospective longitudinal study were provided with a Plain Language Statement and gave written informed consent. Participants completed self-reported questionnaires in their own time at home (and were supplied with a reply paid envelope addressed to the researchers) on the following four occasions: in early to mid pregnancy (time 1 [T1]; mean (M) = 16.66 weeks, standard deviation (SD) = 2.30), at the end of pregnancy (time 2 [T2]; M = 37.65 weeks, SD = 2.39), at 6 months postpartum (time 3 [T3]; M = 6.51 months, SD = 1.06), and at 12 months postpartum (time 4 [T4]; M = 12.60 months, SD = 0.72). Five hundred sixty-five women were recruited and 285 (50.4%) completed the study up to 12 months postpartum. Of these, 138 women (48.4%) provided data for all required time points across prepregnancy, gestation, and 6 and 12 months postpartum. Compared with the final sample, the women included in the current study did not differ on any participant demographic characteristics.

Ethics approval was granted from Deakin University Human Research Ethics Committee (36-2009 and 2011-087), Eastern Health Research and Ethics Committee (E40-1011), and Melbourne Health Human Research Ethics Committee (2011.133).

Measures

Demographics

At T1, participants reported their current age, educational achievement, family income, employment status, and place of birth.

Parity

Participants indicated the number of children they had experienced at baseline (T1). Women who were currently pregnant with their first child (i.e., had no other children) were categorized as primiparous, and those who had already had children and were hence pregnant with their second or subsequent child were classed as multiparous.

Prepregnancy BMI

Participants self-reported their prepregnancy weight at T1. All participants had their height objectively measured by a health care professional or a member of the research team early in pregnancy (at their hospital booking visit or at T1). Participant height and weight were used to calculate prepregnancy BMI (kg/m^2). The WHO (2000) classifies BMI using the following criteria: a BMI of less than 18.5 as underweight; a BMI of 18.5 to 24.9 as normal weight; a BMI of 25.0 to 29.9 as overweight; and a