

Prospective Relationships between Health Cognitions and Excess Gestational Weight Gain in a Cohort of Healthy and Overweight Pregnant Women



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ABSTRACT

Background Excess gestational weight gain (GWG) contributes to long-term obesity in mothers and children. To guide the tailoring of interventions to prevent excess GWG, a better understanding is needed of the lifestyle-related health cognitions that influence women's attempts to manage GWG.

Objective To examine the relationship between health cognitions and excess GWG for women who enter pregnancy at a healthy weight (body mass index <25) or overweight (body mass index ≥25). It was hypothesized that health cognitions with a positive (negative) influence on health behavior would be associated with lower (higher) likelihood of excess GWG and that specific associations would differ between weight status groups.

Design This prospective, observational study commenced when participants were <20 weeks' gestation, continuing until the end of their pregnancy. A self-administered quantitative survey at recruitment assessed prepregnancy weight and lifestyle-related health cognitions. Height was measured at 16 weeks and weight at 36 weeks using standard procedures.

Participants and setting A consecutive sample of pregnant women (n=715) were recruited from an Australian metropolitan hospital between August 2010 and January 2011. All women <20 weeks' gestation were eligible unless they had preexisting type 1 or 2 diabetes or insufficient English language skills to complete questionnaires.

Main outcome measures Excess GWG defined according to Institute of Medicine 2009 recommendations and predisposing, reinforcing, and enabling cognitions for lifestyle health behaviors.

Statistical analyses performed Logistic regression analyses examined associations between health cognitions and excess GWG stratified for prepregnancy weight status.

Results For healthy-weight women, higher weight locus of control scores were protective against excess GWG (odds ratio 0.6, 95% CI 0.4 to 0.8), whereas higher perceived risk scores (personal risk and risk arising from prepregnancy weight) (odds ratio 1.3, 95% CI 1.1 to 1.7) were associated with excess GWG. For overweight women higher negative outcome expectation scores were associated with an increased risk of excess GWG (odds ratio 1.4, 95% CI 1.1 to 2.0).

Conclusions Lifestyle-related health cognitions are associated with excess GWG and differed by prepregnancy weight status, suggesting the need to tailor behavior change interventions accordingly.

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OBESITY IS A SIGNIFICANT HEALTH AND ECONOMIC burden worldwide.¹ The perinatal period is a critical time for the development of obesity in mothers and children. Excess gestational weight gain (GWG) is directly associated with medical complications such as gestational diabetes, delivery complications such as instrumental deliveries, and large-for-gestational-age babies independent of prepregnancy body mass index (BMI).² Thirty percent to 70% of women gain excess weight during

pregnancy,^{2,3} retaining on average 2 to 5 kg after each pregnancy.⁴ Excess weight gain also contributes independently to the baby's later obesity risk in childhood.² Hence, excess GWG is implicated in longer-term obesity in both mothers and children. The 30% to 50% of women who are already overweight before pregnancy are at greatest risk of excess GWG.^{2,3,5} Intervening during pregnancy provides a window of opportunity to influence the health of two generations.

Dietary counseling appears to influence GWG; however, very few studies have demonstrated a reduction in the number of women who gain excess weight, with differential effects across prepregnancy weight status groups.⁶⁻⁸ A key component of many interventions targeting lifestyle health behaviors is improving knowledge with the view that this will lead to behavior change.^{9,10} However, although knowledge is relatively easy to change, behavior modification does not necessarily follow.⁹ Health behavior theories provide a framework for conceptualizing the complexity of behavior change and identifying the range of cognitions that may need to be addressed. A number of behavior-change theories exist and it has been proposed that the integration of constructs can inform the development of more effective health programs.¹¹

Two recent, large, randomized controlled trials targeting pregnant women who were obese (N=1,555)¹² or overweight and obese (N=2,212)¹³ during early pregnancy (<18 to 20 weeks' gestation) reported different effects on dietary behavior and GWG.^{12,13} The trial targeting obese women with an intervention based on control theory and elements of Social Cognitive Theory reported improvements in all aspects of dietary intake and a small but significant reduction in GWG.¹² The study, including both overweight and obese women, and an intervention containing fewer elements informed by behavior change theory observed improvements in selected aspects of dietary intake¹⁴ but no influence on GWG.¹³ Other studies have demonstrated positive outcomes on health behaviors and GWG for women who enter pregnancy at a healthy weight but not for those who commence pregnancy overweight.^{15,16} These findings highlight the complexity of behavior change and the potential importance of tailoring interventions to women's prepregnancy weight status.

Health cognitions associated with GWG are beginning to receive attention as possible precursors that influence lifestyle health behaviors in pregnancy such as dietary intake, physical activity, and ultimately GWG. The Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis–Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development (PRECEDE-PROCEED) model of health program planning¹⁷ provides an overarching structure for developing effective health behavior change interventions, including the integration of constructs from dominant (widely used) health behavior change theories¹⁸ to define health cognitions. According to the PRECEDE-PROCEED model, predisposing factors are the precursors to behavior that provide motivation for the behavior, including knowledge, intentions, self-efficacy, and outcome expectations; reinforcing factors provide rewards or incentives to initiate and continue the behavior and include social and health professional support; and enabling factors are precursors that enable (facilitators) or hinder (barriers) the realization of a behavior.¹⁷

Previous research has demonstrated that women who commence pregnancy overweight have lower self-efficacy for healthy eating and physical activity, lower weight locus of control (WLOC) and greater barriers to healthy eating and physical activity.¹⁹ However, it is not known whether these associations predict prospective health outcomes. The association between lifestyle behavior-specific health cognitions and GWG has not been systematically explored. Identification

of the health cognitions measured early in pregnancy that may predict differential GWG outcomes for healthy-weight and overweight women could identify opportunities for tailored interventions.

The aim of this prospective study was to examine the independent contribution of lifestyle behavior health cognitions (predisposing, reinforcing, and enabling factors) assessed at 16 weeks' gestation to excess GWG at 36 weeks' gestation according to prepregnancy weight status (healthy weight BMI <25 vs overweight BMI ≥25). Health cognitions were assessed in relation to dietary intake, physical activity, and GWG. It was predicted that higher behavior-specific scores for intentions, knowledge, positive outcome expectancies, self-efficacy, WLOC (the belief that one can control their weight), risk perception, and social support would be associated with lower likelihood of excess GWG, whereas higher scores for negative outcome expectancies and greater barriers would be associated with higher likelihood of excess GWG. Based on past literature indicating differential risk of excess GWG and effectiveness of interventions targeting GWG based on prepregnancy weight status for healthy-weight and overweight women, it was expected that these associations between health cognitions and excess GWG may differ across weight groups. In the absence of prior evidence, we did not offer specific hypotheses regarding where these differences would occur.

MATERIALS AND METHODS

Study Design and Participants

The New Beginnings Healthy Mothers and Babies Study was a prospective observational study (N=715) that explored health cognitions influencing dietary intake, physical activity, and weight gain during pregnancy and early postpartum. Participant recruitment and methods have been previously described.^{3,20} A consecutive sample of eligible women were recruited via mail or in person in a metropolitan antenatal care facility in Australia at <20 weeks' gestation between August 2010 and January 2011. All women referred for antenatal care were eligible except those who had insufficient English language skills to complete questionnaires and those with preexisting type 1 or 2 diabetes. Women who delivered before 32 weeks' gestation or had an infant with major health concerns were withdrawn from the study.

A total of 715 from 1,059 eligible women (67%) consented to participate. Fifteen women subsequently withdrew, 51 provided a signed consent form but no baseline data, 664 provided baseline anthropometric data, 585 completed baseline questionnaires, and 582 provided both sources of baseline data (55% of eligible participants and 87% of recruited participants). The [Figure](#) demonstrates the flow of participants across the two study time points presented in this article. Participants remained in the study unless they actively withdrew or became ineligible through a miscarriage or early delivery (<32 weeks' gestation), or did not have a 36-week appointment booked at the hospital. Seventy-nine percent of participants were retained at 36 weeks (543 out of 715) and provided usable data. Participants were representative of the Queensland and hospital obstetric population from which recruitment occurred for age, marital status, ethnicity, parity, and anthropometric characteristics.²¹ There were no significant differences on key baseline demographic

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