

# The Impact of a Behavioral Intervention on Weight Gain During Pregnancy

Phelan S, Phipps MG, Abrams B, et al. Randomized trial of a behavioral intervention to prevent excessive gestational weight gain: the Fit for Delivery Study. *Am J Clin Nutr* 2011;93:772–9.

## Study Overview

**Objective.** To evaluate the effects of a lifestyle behavioral intervention designed to reduce gestational weight gain and increase the number of women returning to normal weight at 6 months postpartum.

**Design.** Randomized, assessor-blind, controlled trial.

**Setting and participants.** The study took place at 6 obstetrics practices in Providence, Rhode Island, between 2006 and 2008. Participants were English-speaking pregnant women (10–16 weeks gestation; mean, 13.5 weeks) who had singleton pregnancies. Subjects were excluded if they had a history of  $\geq 3$  miscarriages, self-reported major health or psychiatric disease, or a history of weight loss during pregnancy. The researchers enrolled 201 patients of normal weight (NW), defined as a body mass index (BMI) of 19.8–26.0, and 200 patients who were overweight or obese (OW/OB), defined as a BMI of 26.1–40. BMI cutoffs used were based on the 1990 Institute of Medicine (IOM) guidelines [1]. BMIs were calculated based on self-reported pre-gravid weights, and height was measured by research staff on a stadiometer at study entry.

**Intervention.** The Fit for Delivery intervention was

similar to that used for a previous study by Polley et al [2]. This behavioral intervention, based on social learning theory, emphasized appropriate weight gain in pregnancy (using 1990 IOM guidelines), physical activity (30 minutes of walking most days), calorie goals (20 kcal/kg/day), and daily self-monitoring (with provided body-weight scales, food diaries, and pedometers). Individual counseling occurred during a single face-to-face visit with the study interventionist and 3 brief (10–15 min) supportive phone calls by dietitians. Women who gained more or less weight than recommended during any 1-month interval received 2 additional calls for individualized counseling and goal setting. In addition, the intervention group received weekly automated postcards promoting healthy eating and exercise and weight graphs after each medical visit. The standard care group received basic nutrition counseling provided by their health care team, attended one 15-minute visit with the study interventionist, and received newsletters every 2 months that provided general information about pregnancy.

**Main outcome measures.** The primary endpoints were the proportion of women in each group who exceeded the IOM guidelines for weight gain and the proportion of women at  $\pm 0.09$  kg or below their pre-gravid

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weights at 6 months postpartum. Participants' weights were assessed at study entry, 30 weeks gestation, and 6 months postpartum. Secondary endpoints included pregnancy outcomes.

**Main results.** 401 subjects were randomized to the intervention ( $n = 201$ ) or standard care group ( $n = 200$ ). After exclusions (due to miscarriage, gestational diabetes, or subsequent pregnancy), 358 subjects (182 in the intervention group) were included in the intention-to-treat analysis. The mean age was 28.8 years, and the majority were non-Hispanic whites (68.7%). For most subjects (76%), this was their first pregnancy. There were no significant differences in demographics between the intervention and standard care groups.

The intervention group had a lower percentage of NW women who exceeded IOM recommendations for weight gain (40.2% vs. 52.1%; odds ratio [OR], 0.38; 95% confidence interval [CI], 0.20–0.87;  $P = 0.003$ ) but no significant difference was seen in OW/OB women (OR, 1.4; 95% CI, 0.70–2.7;  $P = 0.33$ ). In addition, the intervention group had more women who were at or below their pre-pregnancy weights by 6 months postpartum (30.7% compared with 18.7%; OR, 2.1; 95% CI, 1.3–3.5;  $P = 0.005$ ) with no significant interaction for weight category. They also found that NW women in the intervention group had a lower risk of gestational hypertension (OR, 0.15; 95% CI, 0.02–0.75;  $P = 0.02$ ) but that there was no significant intervention effect in OW/OB women (OR, 1.8; 95% CI, 0.71–4.6;  $P = 0.20$ ).

**Conclusions.** In women who are NW at the start of pregnancy, a lifestyle behavior change intervention decreased the risk of exceeding the 1990 IOM recommendations for gestational weight gain. It also increased the proportion of NW and OB/OW women who returned to their pre-gravid weights at 6 months postpartum.

### **Commentary**

Excessive weight gain during pregnancy is associated with increased risk of postpartum obesity as well as long-term obesity, which can last up to a decade or more after the birth [3,4]. In addition, many adverse fetal and maternal outcomes have been linked to high gestational weight gain, including impaired maternal glucose tolerance [5], preeclampsia [6], cesarean delivery in the mother [6,7],

babies that are large for their gestational age (LGA) [6,7], and long-term obesity in the offspring [7]. Less gestational weight gain is associated with fewer adverse maternal outcomes, especially among obese women [8].

In 1990, the IOM published guidelines for gestational weight gain: 25–35 lb for NW women (BMI, 19.8–26.0) and 15–25 lb for OW/OB women (BMI, of 26.1–40). These guidelines were revised in 2009 to categorize overweight as a BMI of 25–29.9, with a recommended gestational weight gain of 15–25 lb, and obese as  $\geq 30$  BMI, with the recommended gestational weight gain lowered to 11–20 lb [1,9]. However, in one study of 52,988 women delivering between 2004–05, approximately 40% of NW women and 60% of OW/OB women exceed the 1990 guidelines for gestational weight gain [10], highlighting the need for interventions to address inappropriate weight gain in pregnancy.

The Fit for Delivery intervention is a relatively low-intensity intervention and similar to interventions used in other studies [2,11,12]. Phelan et al evaluated this intervention using a well-designed, assessor-blinded, multi-center randomized trial with intention-to-treat analysis. Weaknesses of the study design are few but include that the patients were not blinded to the intervention, researchers relied on self-reported pre-pregnancy weights, and the researchers based the main outcomes on outdated IOM guidelines for BMI cutoffs and gestational weight gain.

The researchers found that the Fit For Delivery intervention may reduce the proportion of NW women with excessive weight gain during pregnancy (based on the 1990 guidelines) and increase the proportion of NW and OB/OW women who return to their pre-pregnancy weights at 6 months postpartum. In addition, the intervention may decrease the risk of gestational hypertension in NW women. The researchers do not report the percentage of women who exceed the 2009 guidelines for weight gain, but the main outcomes would probably be the same.

It is unclear why this intervention was more likely to prevent excessive weight gain and gestational hypertension in NW but not OW/OB patients. Other behavioral interventions have shown similar difficulty achieving weight reductions in OW/OB women [13]. One possible reason is that OW/OB women need more intensive intervention because they had difficulty managing their weight prior to pregnancy. The authors point out that some more intensive interventions with frequent contact have produced stronger results in OW/OB patients, but that these studies are of lower quality (ie, nonrandom-

ized) [11,14]. Another possible reason for outcome differences between NW and OW/OB subjects is that these groups may have different demographics. Low income, black, and Hispanic women are more likely to be OW/OB than other populations, and differing attitudes and behaviors with regards to weight and lifestyle during pregnancy may impact the short-term efficacy of the intervention in this group [15,16]. Unfortunately, no information is provided by the authors detailing the demographic differences between NW and OW/OB women in the study. Further research is needed to better understand how to prevent excessive gestational weight gain in OW/OB women.

Despite the differences seen in the short-term impact of the intervention in NW and OW/OB women, the study found that the intervention group had a higher percentage of women returning to pre-pregnancy weights in both NW and OW/OB women at 6 months postpartum. This is an important finding since many women fail to lose weight after pregnancy, which may lead to an increased risk of obesity [3,4]. Further, it suggests that the effects of the intervention continued even after the intervention ended. A few intervention studies have examined post-pregnancy weight loss, with mixed results [2,11]. For example, Polley et al did not find a significant difference in postpartum weight retention with intervention [2], while Olson et al found an intervention effect on postpartum weight retention only in low income, overweight women [11]. Also, this study is one of the few studies that has explored pregnancy outcomes, and the finding that the intervention possibly decreases gestational hypertension is very encouraging and further supports the need for behavioral intervention to prevent gestational weight gain during pregnancy.

**Applications for Clinical Practice**

The Fit for Delivery intervention can prevent excessive gestational weight gain in NW women and increase the proportion of women who return to their pre-pregnancy weights. Future research should explore the feasibility, acceptability, and cost-effectiveness of implementing this intervention in other community and academic practices.

*–Review by Rachel Kaplan and Melanie Jay, MD, MS*

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