

## Practitioner Advice and Gestational Weight Gain

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### Abstract

**Background:** The purpose of this study was to investigate receipt of gestational weight gain advice in prenatal care and ideal and expected gestational weight gain outcomes for normal weight and overweight/obese women.

**Methods:** This was a cross-sectional study of normal weight ( $n = 203$ ) and overweight/obese ( $n = 198$ ) women in early (<16 weeks) pregnancy.

**Results:** Less than half of participants (41.7%) reported receiving weight gain advice from a practitioner. In multivariate models, pregravid weight status was not significantly related to receiving advice. However, women with lower income (odds ratio [OR] 0.31, 95% confidence interval [CI] 0.13-0.77,  $p = 0.01$ ), younger age (OR 0.93, 95% CI 0.87-0.99,  $p = 0.02$ ), and multiparity (OR 0.49, 95% CI 0.28-0.87,  $p = 0.02$ ) were least likely to report receiving advice. Among those receiving advice, most (85%) received accurate advice; however, overweight/obese women were more likely to be advised to overgain compared with normal weight women (22.2% vs. 2.3%,  $p = 0.0001$ ). Overweight/obese women were also more likely than normal weight women to report ideal (OR 7.2, 95% CI 2.3-22.7,  $p = 0.001$ ) and expected (OR 4.7, 95% CI 2.6-8.4,  $p = 0.0001$ ) pregnancy weight gains above Institute of Medicine guidelines. Further, a consistent relationship was observed between higher ideal and expected weight gains and greater first trimester weight gain ( $p < 0.03$ ).

**Conclusions:** Clinicians should be encouraged to provide timely and accurate advice to women about gestational weight gain. Interventions to promote healthy gestational weight gain may benefit from targeting women's beliefs about ideal and expected gestational weight gain.

### Introduction

IN 1990, THE INSTITUTE OF MEDICINE (IOM) of the National Academy of Sciences provided pregnancy weight gain guidelines based on prepregnancy body mass index (BMI). The guidelines were designed to optimize maternal and fetal pregnancy outcomes.<sup>1</sup> Recommendations were that normal weight women (19.8–26.0 kg/m<sup>2</sup>) gain 25–35 lb, overweight women (26.0–29.0 kg/m<sup>2</sup>) gain somewhat less (i.e., 15–25 lb), and obese women (>29 kg/m<sup>2</sup>) gain at least 15 lb.<sup>1</sup> More recently, the IOM guidelines were revised to use more widely accepted BMI cutoff points (normal weight, 19.8–24.9; over weight, 25–29.9; obese,  $\geq 30$ ) and to put an upper boundary on the recommended weight gain range for obese women (11–20 lb).<sup>2,3</sup>

Unfortunately, nearly half of normal weight and two thirds of overweight women have been found to exceed the 1990 IOM gestational weight gain guidelines,<sup>4</sup> and women

exceeding the guidelines have been shown in several studies to be at increased risk for adverse maternal and neonatal outcomes, including childhood and adolescent overweight<sup>5,6</sup> and high postpartum weight retention, weight gain, and obesity in the mother.<sup>7,8</sup> As many women exceeded even the more liberal 1990 guidelines 15 years after their introduction,<sup>4</sup> the prevalence of exceeding the newly revised guidelines is likely even higher.

There are significant disparities in which women exceed weight gain recommendations. Several studies have shown that women who are overweight or obese before pregnancy are 2–6 times more likely to exceed weight gain guidelines than women of normal weight.<sup>9–11</sup> In addition, women who are having their first child,<sup>4,9</sup> who have a lower income,<sup>12</sup> who have a history of dieting,<sup>13</sup> or who are younger in age<sup>4</sup> are all more likely to have excessive gestational weight gain than their counterparts. Once a woman is pregnant, however, these risk factors cannot be altered.

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Two potentially modifiable factors that are related to excessive gestational weight gain are patient knowledge and practitioner advice about appropriate gestational weight gain.<sup>14</sup> Little is known, however, about whether and how closely providers of prenatal care are advising patients in a clinical setting about weight gain guidelines<sup>15,16</sup> and if pregnant women's perceptions of ideal and expected pregnancy weight gains are in accordance with recommendations based on their pregravid BMI.

The purpose of this study was to compare normal weight and overweight women in the extent to which they received weight gain advice from their practitioners and their perceptions of ideal weight gain and expected weight gain during pregnancy. We hypothesized that overweight and obese women would be less likely to receive appropriate weight gain advice from practitioners and would be more likely to have weight gain expectations and ideals above the IOM recommendations. We used the 1990 IOM recommendations because these data were collected before the 2009 revisions were in effect.

## Materials and Methods

### Participants

Participants were recruited into the Fit for Delivery study, which is an ongoing clinical trial examining the effects of a lifestyle intervention to reduce excessive gestational weight gain (Clinical trials 01117961). Participants were recruited at the time of their first prenatal visit at one of six obstetrics offices representing socioeconomic and ethnic diversity in Providence, Rhode Island, from 2006 to 2008. By design, approximately half the sample ( $n = 203$ ) was normal weight and half ( $n = 198$ ) was overweight/obese. Eligibility criteria included nonsmoking adults (age >18 years), fluency in English, access to telephone, gestational age between 10 and 16 weeks, singleton pregnancy, no current or history of eating disorders, and without major psychiatric illness (i.e., schizophrenia, bipolar disorder, and panic/anxiety disorder) or major medical problems, including diabetes, stroke, and cancer. All women provided written informed consent, and all procedures were conducted in accordance with ethical standards for human experimentation. The study was approved by the Institutional Review Boards at the Miriam Hospital in Providence, the Women and Infants Hospital in Providence, and California Polytechnic State University in San Luis Obispo.

### Measures

All assessments were conducted at the time of study entry when women were at 10–16 weeks of gestation. All women had attended at least their first prenatal care visit with a nurse, nurse practitioner, or physician 1–4 weeks before completing the study assessments.

**Demographics and dieting history.** Participants reported via questionnaire information on maternal race/ethnicity, age, education, parity, employment, marital status, household income, and dieting history. For descriptive purposes, the race variable was defined as non-Hispanic Caucasian, Latina/Hispanic, African American, and other. In other analyses, race was categorized as non-Hispanic Caucasian vs. all other groups combined. Income was categorized as >\$25,000

per year vs  $\leq$ \$25,000 per year.<sup>17</sup> Dieting history was assessed by asking participants to indicate the number of times they had intentionally lost >10 lb.<sup>18</sup>

**Prepregnancy height and weight.** Prepregnancy weight was based on self-report at the time of study enrollment. Validity of self-reported prepregnancy weight has been shown to be reasonable, especially if collected early in pregnancy,<sup>6,19,20</sup> but a measured weight from the year before pregnancy was available from the clinical records of 203 of the 401 participants (109 normal weight and 94 overweight/obese) to assess the validity of the recalled prepregnancy weight. The correlation between participant self-reported and physician measured weight was 0.95 ( $p = 0.0001$ ), with a mean discrepancy of  $0.5 \pm 3.0$  kg and no significant ( $p = 0.64$ ) differences between normal weight and overweight/obese. These data provide evidence that participants' self-reported weight information was a valid indication of their prepregnancy weight across weight strata. Height was measured by trained research staff using a Perspective Enterprises™ wall-mounted stadiometer at study entry and was used with pregravid weight to calculate BMI. Pregravid weight category was based on the 1990 IOM BMI cutoff points (19.8–26, normal weight; >26–29 overweight; >29, obese).<sup>1</sup>

**Early pregnancy weight gain.** At study entry, weight was objectively measured on a Tanita™ digital scale in light clothing, without shoes, and self-reported pregravid weight was subtracted from study entry weight to estimate early pregnancy weight gain (i.e., before 16 weeks gestation, 13 weeks on average).

**Practitioner advice.** Participants were asked: Did a doctor, nurse, or nutrition counselor give you advice about how much weight you should gain during this pregnancy? This was followed by the question: If yes, how many pounds were you told to gain from the beginning to the end of this pregnancy?<sup>15</sup>

**Expected and ideal weight gains.** Similar to questions used in other published reports,<sup>15,16</sup> we assessed ideal weight gain by the question: How much weight do you think you should ideally gain during this pregnancy? Expected weight gain was assessed by asking participants: How much weight do you think you will gain during this pregnancy?

Based on the 1990 IOM guidelines, we classified expected and ideal gestational weight gain as excessive in normal weight women who reported expected or ideal gains >35 lb (15.9 kg) and in overweight women who reported expected or ideal gains >25 lb (11.4 kg). Similar to other studies, we combined overweight and obese women in our analysis and, thus, also set an upper weight gain goal of 25 lb (11.4 kg) for these heaviest women.<sup>9,15,16</sup>

### Statistics

For descriptive purposes, we examined differences in maternal demographic characteristics by BMI category using independent  $t$  tests and the chi-square test. We used multivariate logistic regression to examine independent associations between demographic variables and receipt of practitioner advice. We used similar analysis to examine variables associated with excessive weight gain expectations and ideals using adequate/inadequate expectations or ideals as the reference. We

included predictors that were identified *a priori*, including age, education, marital status, income, parity, dieting history, and prepregnancy BMI (normal weight vs. overweight/obese), and adjusted for gestation length in these analyses. Linear regression analyses were also conducted examining predictors of the discrepancy between self-reported ideal and expected weight gain. *Post hoc* exploratory analyses were conducted examining the influence of prepregnancy BMI categorized into three groups (normal weight, overweight, obese). Results were similar for overweight and obese, although cell sizes were small and estimates were more imprecise in some of these analyses. Only findings based on overweight/obese collapsed into one category are presented here.

## Results

### Participants

Among the 1499 patients who received information about the study from nurses at the recruitment sites, 304 could not be further located, 421 declined participation, 196 were deemed ineligible, and 177 were eligible but did not show for their first scheduled study appointment, leaving 401 participants as the final sample. Participant characteristics are displayed in Table 1. Based on the 1990 IOM BMI classifications, 203 participants were normal weight (BMI 19.8–26), 97 were overweight (BMI 26–29), and 101 were obese (BMI >29). Normal weight women were more likely than overweight/obese women to be primiparous. Mean gestational age at the time of data collection was 13 weeks (Table 1).

### Practitioner advice

We first examined whether patients reported having received advice from practitioners about pregnancy weight gain

and, if so, how much weight they were advised to gain. Overall, less than half of participants (41.7%) reported receiving weight gain advice from a practitioner. In multivariate models, pregravid weight status was not significantly related to receiving advice. However, women with lower income (odds ratio [OR] 0.31; 95% confidence interval [CI] 0.13–0.77,  $p = 0.01$ ), younger age (OR 0.93, 95% CI 0.87–0.99,  $p = 0.02$ ), and multiparity (OR 0.49, 95% CI 0.28–0.87,  $p = 0.02$ ) were significantly less likely to report receiving practitioner advice about weight gain than comparison groups (i.e., women of higher income, older age, and primiparous).

Among women receiving weight gain advice ( $n = 167$ ), the vast majority (85%) reported receiving advice that was within the 1990 IOM guidelines for their prepregnancy BMI. However, a minority reported receiving practitioner advice that was above (12%) or below (3%) recommendations. Moreover, in multivariate analysis, there were significant differences in accuracy of advice received based on prepregnancy BMI. Specifically, overweight/obese women had 18-fold increased odds (OR 18.7, 95% CI 3.6–94.6,  $p = 0.0001$ ) of being advised to gain more than the IOM recommendations compared with normal weight women (Table 2). There were no significant independent differences in accuracy of advice received based on marital status, age, race, income, education, parity, and dieting history.

### Ideal and expected pregnancy weight gains

Participants were also asked how much weight they ideally would like to gain during their current pregnancy. The majority of women selected ideal weight gain goals that were within the IOM guidelines for their weight category (Table 3). However, significantly more overweight and obese women reported ideal gains that exceeded guidelines, whereas more normal weight women reported ideal gains that were below guidelines (Table 3).

We also asked participants how much weight they expected to gain during pregnancy. Nearly 70% of normal weight but only 52% of overweight/obese women expected to gain within guidelines (Table 3). Moreover, the discrepancy between ideal weight gain and expected weight gain was greater among overweight/obese women than normal weight women ( $p = 0.01$ ). Whereas overweight participants expected gains that were, on average, 6 lb more than their ideal amount, normal weight women expected gains that were 3 lb more than their reported ideal.

TABLE 1. CHARACTERISTICS OF 401 NORMAL WEIGHT AND OVERWEIGHT WOMEN EARLY IN PREGNANCY

|                                          | Overall<br>n = 401 | NW<br>n = 203 | OW/OB<br>n = 198 | p<br>value <sup>a</sup> |
|------------------------------------------|--------------------|---------------|------------------|-------------------------|
| Age, years (SD)                          | 28.7 (5.2)         | 28.2 (5.3)    | 29.1 (5.0)       | 0.16                    |
| Prepregnancy BMI, kg/m <sup>2</sup> (SD) | 26.4 (5.7)         | 22.7 (1.9)    | 30.6 (5.2)       | 0.0001                  |
| Education > high school, %               | 85.8               | 86.1          | 85.6             | 0.88                    |
| Non-Hispanic Caucasian, %                | 65.3               | 69.1          | 61.5             | 0.39                    |
| Latina/Hispanic, %                       | 19.0               | 16.7          | 21.1             |                         |
| African American, %                      | 8.5                | 7.1           | 9.9              |                         |
| Other, %                                 | 7.2                | 7.1           | 7.5              |                         |
| Income >\$25,000/y, %                    | 78.9               | 81.2          | 76.3             | 0.26                    |
| Primiparous, %                           | 76.6               | 86.1          | 66.7             | 0.0001                  |
| Married, %                               | 69.3               | 68.3          | 70.3             | 0.74                    |
| Community-based clinic, %                | 26.1               | 24.6          | 27.7             | 0.55                    |
| Weeks gestation, mean (SD)               | 13.6 (1.8)         | 13.7 (1.8)    | 13.4 (1.9)       | 0.18                    |
| Dieting history, mean (SD)               | 6.3 (1.1)          | 5.8 (0.9)     | 6.8 (1.2)        | 0.0001                  |

<sup>a</sup>Compares NW vs. OW/OB groups; based on chi-square test for categorical variables and independent *t* test for continuous variables.

BMI, body mass index; NW, normal weight; OW/OB, overweight/obese; SD, standard deviation.

TABLE 2. NORMAL WEIGHT, OVERWEIGHT/OBES PATIENTS' REPORTS OF PRACTITIONER WEIGHT GAIN RECOMMENDATIONS COMPARED WITH 1990 INSTITUTE OF MEDICINE RECOMMENDATIONS

|               | NW<br>n = 86 | OW/OB<br>n = 81 | p<br>value          |
|---------------|--------------|-----------------|---------------------|
| Mean (lb), SD | 27.6 (4.0)   | 24.2 (7.3)      | 0.0001 <sup>a</sup> |
| % under IOM   | 2.3          | 3.7             |                     |
| % within IOM  | 95.3         | 74.1            | 0.001 <sup>b</sup>  |
| % above IOM   | 2.3          | 22.2            |                     |

<sup>a</sup>Based on independent *t* test.

<sup>b</sup>Based on chi-square test for overall difference between prepregnancy weight and Institute of Medicine (IOM) categories.

TABLE 3. REPORTED IDEAL AND EXPECTED PREGNANCY WEIGHT GAINS COMPARED WITH 1990 INSTITUTE OF MEDICINE RECOMMENDATIONS AMONG NORMAL WEIGHT AND OVERWEIGHT/OBESE PREGNANT WOMEN

|                                | NW<br>n = 203 | OW/OB<br>n = 198 | p<br>value          |
|--------------------------------|---------------|------------------|---------------------|
| Ideal gain                     |               |                  |                     |
| Mean, lb (SD)                  | 25.8 (5.9)    | 23.0 (6.4)       | 0.0001 <sup>a</sup> |
| % under IOM                    | 19.7          | 7.2              |                     |
| % within IOM                   | 77.8          | 77.3             | 0.0001 <sup>b</sup> |
| % above IOM                    | 2.5           | 15.7             |                     |
| Expected gain                  |               |                  |                     |
| Mean, lb (SD)                  | 29.1 (8.4)    | 29.0 (9.3)       | NS <sup>a</sup>     |
| % under IOM                    | 15.8          | 3.5              |                     |
| % within IOM                   | 69.0          | 51.5             | 0.0001 <sup>b</sup> |
| % above IOM                    | 15.3          | 44.9             |                     |
| Discrepancy ideal vs. expected |               |                  |                     |
| Mean, lb (SD)                  | 3.2 (6.1)     | 5.9 (6.5)        | 0.01 <sup>a</sup>   |

<sup>a</sup>Based on independent *t* test.

<sup>b</sup>Based on chi-square test for overall difference between prepregnancy weight and IOM categories.

NS, not significant.

#### Predictors of patients' ideal and expected pregnancy weight gains

We next sought to identify the patient characteristics that were independently related to reports of excessive ideal or expected pregnancy weight gains. Overweight and obese women had 7-fold increased odds of reporting ideal pregnancy gains above IOM guidelines and 5-fold increased odds of reporting expected weight gains above IOM recommendations (Tables 4 and 5). In addition, each kilogram of weight gained early in pregnancy was significantly associated with 10% increased odds of ideal gains above guidelines and 40% increased odds of expected gains above guidelines. Lower income was also independently related to both ideal and expected weight gains above guidelines (Tables 4 and 5).

TABLE 4. ODDS OF REPORTING PREGNANCY WEIGHT GAIN IDEAL GOALS ABOVE 1990 INSTITUTE OF MEDICINE RECOMMENDATIONS

| Variable                                               | Odds<br>ratio | 95%<br>CI | p<br>value |
|--------------------------------------------------------|---------------|-----------|------------|
| Age, years                                             | 1.0           | 0.9-1.1   | 0.62       |
| BMI (ref: NW)                                          | 7.2           | 2.3-22.7  | 0.001      |
| Weeks gestation                                        | 0.8           | 0.6-0.9   | 0.12       |
| Race (ref: Caucasian) <sup>a</sup>                     | 1.1           | 1.0-1.3   | 0.02       |
| Nonmarried (ref: married)                              | 2.2           | 0.8-5.7   | 0.10       |
| Early pregnancy weight gain, kg                        | 1.1           | 1.0-1.3   | 0.03       |
| Multiparity (ref: primiparous)                         | 1.5           | 0.6-3.6   | 0.36       |
| Lack of practitioner advice<br>(ref: receiving advice) | 2.1           | 0.9-4.9   | 0.08       |
| Dieting history, number<br>of times lost $\geq$ 10 lb  | 1.2           | 0.9-1.6   | 0.25       |
| Low education<br>(ref: $\geq$ high school education)   | 1.7           | 0.5-5.7   | 0.37       |
| Low income (ref: $>$ \$25,000)                         | 3.3           | 0.9-11.3  | 0.05       |

<sup>a</sup>Race: Latina, African American, and other combined. Ref(ref)erence category: non-Hispanic Caucasian.

CI, confidence interval.

TABLE 5. ODDS OF HAVING PREGNANCY WEIGHT GAIN EXPECTATIONS ABOVE 1990 INSTITUTE OF MEDICINE RECOMMENDATIONS

| Variable                                              | Odds<br>ratio | 95%<br>CI | p<br>value |
|-------------------------------------------------------|---------------|-----------|------------|
| Age, years                                            | 1.0           | 0.88-1.0  | 0.24       |
| BMI (ref: NW)                                         | 4.7           | 2.6-8.4   | 0.0001     |
| Weeks gestation                                       | 0.9           | 0.9-1.1   | 0.88       |
| Race (ref: Caucasian) <sup>a</sup>                    | 1.0           | 0.5-2.1   | 0.95       |
| Nonmarried (ref: married)                             | 0.8           | 0.3-1.7   | 0.49       |
| Early pregnancy weight gain, kg                       | 2.7           | 1.3-1.5   | 0.0001     |
| Multiparity (ref: primiparous)                        | 0.9           | 1.5-4.9   | 0.001      |
| Practitioner advice<br>(ref: no advice)               | 0.6           | 0.5-1.4   | 0.58       |
| Dieting history,<br>number of times lost $\geq$ 10 lb | 1.0           | 0.8-1.2   | 0.76       |
| Low education<br>(ref: $\geq$ high school education)  | 2.5           | 1.0-5.7   | 0.04       |
| Low income (ref: $>$ \$25,000)                        | 2.8           | 1.0-7.4   | 0.04       |

<sup>a</sup>Race: Latina, African American, and other combined. Reference category: non-Hispanic Caucasian.

In linear regression analyses, we also examined predictors of the discrepancy between ideal and expected weight gains. Women with greater first trimester weight gain ( $\beta = -0.32$ ,  $p = 0.0001$ ) and those who were overweight/obese ( $\beta = -0.17$ ,  $p = 0.05$ ) and multiparous ( $\beta = -0.19$ ,  $p = 0.01$ ) were more likely to have weight gain expectations exceed their self-reported ideal weight gain goals (overall model:  $p = 0.0001$ ,  $R^2 = 0.25$ ). As indicated by the standardized beta coefficients, first trimester weight gain was the strongest predictor, followed by multiparity and prepregnancy weight status.

#### Discussion

In this ethnically diverse clinical sample of women early in pregnancy, less than half reported receiving advice from a prenatal provider about recommended amounts of weight gain during pregnancy, despite all having attended at least their first prenatal visit. Moreover, younger, economically disadvantaged women and those with a previous pregnancy were less likely to report receiving practitioner advice about weight gain. Lack of practitioner advice, particularly among low-income populations, may reflect patient-practitioner communication or literacy barriers or practitioners addressing more acute medical and psychosocial issues that disproportionately affect underserved populations.<sup>21</sup> Practitioners may assume women with a previous pregnancy know about weight gain guidelines. Nonetheless, in the sample as a whole, the prevalence of receiving weight gain advice was low compared with the estimated 60%–73% of first trimester mothers reporting receiving advice about weight gain in reports even before the 1990 IOM recommendations were released.<sup>22,23</sup> However, other research in diverse patient populations has reported a low level of receipt of practitioner advice about appropriate weight gain.<sup>24</sup> As lack of provider advice in the first trimester is related to excessive gestational weight gain in prospective<sup>14</sup> and cross-sectional studies,<sup>16,22,23</sup> efforts are needed to increase the number of practitioners who advise patients early in pregnancy about appropriate weight gain.

Notably, most of the women who received practitioner advice were given weight gain goals in accordance with the IOM recommendations. Only a minority of women overall reported receiving incorrect advice to gain above the guidelines (12%). Of concern, however, is that many more overweight/obese women than normal weight women were advised to overgain, which is consistent with other research.<sup>16</sup> It is possible that practitioners may advise overweight women less accurately, applying the higher weight gain goal for normal weight women to overweight women.<sup>15,16,25</sup> Alternately, it is possible that practitioners have time constraints, medical reasons, or other reasons for not prescribing weight gain goals based on the IOM recommendations. They may lack training in or feel uncomfortable broaching the topic of weight with overweight/obese patients.<sup>26</sup> Practitioners may question the effectiveness of practitioner counseling in reducing excessive weight gain in patients.<sup>26</sup> They may also be skeptical about the ability of overweight/obese patients to adhere to weight gain guidelines<sup>25</sup> or prescribe higher goals based on their prior experience with overweight/obese patients exceeding the recommended goals.

Interestingly, despite the lack of practitioner advice about weight gain, the vast majority of women (77%) reported ideal weight gain goals that were within guidelines for their prepregnancy BMI. Other research has similarly found a high prevalence (79.4%) of patients reporting weight gain goals within guidelines,<sup>15</sup> and percentages in these recent studies are higher than previous reports from the 1990s (i.e., 59%).<sup>16</sup> Women may receive information about appropriate weight gain from sources other than their prenatal care provider, such as the radio, television, and the Internet.<sup>27</sup>

Overweight and obese women were more likely than normal weight women to report ideal weight gains above guidelines. As with practitioners, it is possible that some overweight and obese women perceived themselves to be normal weight and, thus, adopted those guidelines. Indeed, one study found that 14% of overweight women under-assessed their weight status, and this was associated with a 7-fold increased risk of excessive gestational weight gain compared with normal weight accurate assessors.<sup>28</sup> In the current study, overweight and obese women were more likely to report not only ideal gains above guidelines but also expectations above guidelines. Thus, overweight/obese women appeared more likely to report that they both should and would gain above guidelines. Failed efforts at weight control in the past may underlie their reduced expectations, but dieting history was not a significant predictor of excessive expectations in this study.

Of note, a consistent relationship was observed between higher ideal and expected weight gains and greater first trimester weight gains. This association may suggest that women's perceptions of ideal and expected weight gains influence their actual first trimester weight gains or, alternatively, that women modify their ideal and expected weight gains based on what they actually experienced during the first trimester. In obese nonpregnant women, higher ideal goals, expected goals, and the discrepancy between ideal and expected goals (or unrealistic goals) have been prospectively related to early attrition from weight loss treatment and smaller reductions in BMI after 1 year of treatment.<sup>29,30</sup> However, other research has found no relationship between weight loss ideals or expectations and attrition or actual weight changes.<sup>31-35</sup> In pregnancy, one study

prospectively found a link between excessive weight gain goals and excessive gestational weight gain,<sup>14</sup> but no study to date has prospectively examined the impact of ideal weight gain goals or the discrepancy between ideal and expected goals on gestational weight changes. Although we did not prospectively examine the relationship between ideal and expected gains and actual pregnancy weight gain, we will be following these women throughout their pregnancy and, thus, will be able to determine if the ideal or expected weight gains predict subsequent weight changes. We will be able to examine this among both our overweight/obese and our normal weight participants.

We note several limitations of this study. We used maternal self-report of provider advice and did not include provider assessments; patients may have misunderstood or incorrectly recalled the weight gain recommendations. Although it is best to inform patients of weight gain goals early in pregnancy,<sup>14</sup> it is possible that practitioners informed patients about weight gain recommendations later in pregnancy. Our questionnaire broadly defined prenatal practitioners to include doctors, nurses, and nutrition counselors, and it is not known if advice on gestational weight gain would differ across different prenatal providers. Moreover, the degree of counseling about pregnancy weight changes across clinics and professions was not directly assessed. Nearly half of the sample did not report receiving practitioner advice, so the confidence interval estimate from this analysis was not very precise. Prepregnancy weight was based on self-report, which may have led us to misclassify some overweight/obese women as normal weight,<sup>36</sup> but we were able to validate the recalled prepregnancy weights against objectively measured weights before pregnancy for approximately half of our sample. This study excluded patients at risk for inadequate weight gain and was not designed to separately examine predictors of inadequate/adequate vs. excessive weight gain goals or advice. Finally, diet, exercise, and other psychosocial or behavioral correlates that may relate to weight gain goals<sup>37</sup> were not examined in this report.

## Conclusions

We found that over half of the women studied early in pregnancy reported receiving no advice about gestational weight gain from their prenatal care practitioner and that overweight and obese women were more likely to report receiving advice to gain more than the 1990 IOM recommendations. We also found that overweight/obese women reported weight gain ideals and expectations above these recommendations. These findings are clinically important, as both weight gain advice and patient knowledge have been associated with actual weight gain outcomes in prior research,<sup>14</sup> and interventions targeting gestational weight gain goals have met with some success.<sup>38-46</sup> Both weight gain goals and practitioner advice are modifiable. Given the increasing recognition that appropriate levels of weight gain during pregnancy are important for maternal and infant outcomes as well as for future obesity and weight gain, our study suggests several changes that could be made to achieve healthier weight gains, especially among those who are overweight or obese. They are encouraging clinicians to provide timely and accurate advice to women on weight gain and changing the beliefs of women about ideal weight gains and their expectations of the weight gains they will experience.

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## Disclosure Statement

No competing financial interests exist.

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