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Healthcare provider advice on gestational weight gain: uncovering a need for more effective weight counselling

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Abstract

Limited research has examined the factors related to knowledge of gestational weight gain (GWG) recommendations and the receipt of advice from healthcare providers regarding GWG recommendations among women with pre-pregnancy overweight/obesity. Women with pre-pregnancy overweight/obesity ($N = 191$) reported the amount of gestational weight they believed they should gain and that health-care providers advised them to gain. Only 24% ($n = 46$) of women had a correct knowledge of GWG recommendations. Women were less likely to have a correct knowledge of GWG recommendations if they had pre-pregnancy obesity, were of a minority race, or were socioeconomically disadvantaged. Meanwhile, only 17% ($n = 32$) of women reported being correctly advised about GWG recommendations by healthcare providers. There were no differences between women who did and did not report being correctly advised about GWG recommendations from healthcare providers. These findings indicate that women with pre-pregnancy overweight/obesity lack knowledge of GWG recommendations and report being incorrectly advised about GWG recommendations from healthcare providers.

Keywords

Gestational weight gain; pregnancy; overweight; obesity; knowledge; advice

Introduction

Women who gain excessive gestational weight are at risk of serious health repercussions (Cedergren 2006; Amorim et al. 2007; Vesco et al. 2009; Margerison Zilko et al. 2010). To reduce the disease burden associated with excessive gestational weight gain (GWG), the Institute of Medicine (IOM) reissued guidelines for GWG based on the pre-pregnancy body mass index (BMI; Rasmussen and Yaktine 2009). However, 38–64% of women exceed these guidelines (de Jersey et al. 2012; Ferrari and Siega-Riz 2013). Although women with pre-

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pregnancy overweight are more likely to gain excessive gestational weight than are women with pre-pregnancy obesity, women with pre-pregnancy overweight/obesity both are more vulnerable to gaining excessive gestational weight relative to women with pre-pregnancy normal weight (de Jersey et al. 2012; Ferrari and Siega-Riz 2013; Wrotniak et al. 2015). Thus, efforts to reduce excessive GWG, particularly among the women with pre-pregnancy overweight/obesity, are critical for improving maternal health.

Extant literature indicates that women's knowledge of GWG recommendations and women's receipt of information from healthcare providers regarding GWG recommendations are predictive of meeting the IOM guidelines. For example, Phelan et al. (2011) found that women with pre-pregnancy overweight/obesity were more likely than women with pre-pregnancy normal weight to overestimate the GWG recommendations, which predicted a greater first-trimester weight gain. Although the authors did not assess total GWG, these findings suggest that women with pre-pregnancy overweight/obesity may be at risk for excessive GWG, in part, because they believe they should gain more gestational weight than is recommended. Moreover, a study by Tovar et al. (2011) demonstrated that women who reported receiving a GWG target that was concordant with the IOM guidelines from their healthcare providers had greater odds of identifying a GWG goal that fell within the recommended range for their pre-pregnancy BMI compared to the women who reported receiving a GWG target that was discordant with IOM guidelines from their healthcare providers. Having a GWG goal that fell within the recommended range for pre-pregnancy BMI subsequently predicted reduced odds of an excessive GWG, indicating that the women who work together with healthcare providers to accurately identify and understand GWG recommendations may have an increased likelihood of meeting the IOM guidelines.

Although women report high levels of concern about gaining appropriate gestational weight (Willcox et al. 2015; Nikolopoulos et al. 2017), only 31–53% are knowledgeable of GWG recommendations (Brown and Avery 2012; Jeffs et al. 2016). Importantly, a majority of women express interest in learning about GWG from their healthcare providers (Stengel et al. 2012; Nikolopoulos et al. 2017). However, less than half of women report receiving information about GWG from healthcare providers (Phelan et al. 2011; Thompson et al. 2011; Brown and Avery 2012; McDonald et al. 2012; Ferrari and Siega-Riz 2013; Waring et al. 2014; Ledoux et al. 2015; Willcox et al. 2015; Arinze et al. 2016). Indeed, healthcare providers report that they do not prioritise discussions of GWG during prenatal visits (Kominiarek et al. 2010; Lutsiv et al. 2012; Chang et al. 2013; Anderson et al. 2015; Verma et al. 2016; Whitaker et al. 2016) and prefer to only talk about GWG if prompted (Kominiarek et al. 2010; Chang et al. 2013; Duthie et al. 2013; Whitaker et al. 2016). When healthcare providers do offer advice on GWG, they often provide recommendations that are discordant with IOM guidelines (Herring et al. 2010; Moore Simhas et al. 2013; Arinze et al. 2016). For example, Moore Simhas et al. (2013) found that only 6% of providers correctly identified the GWG recommendations for *all* of the BMI categories, with only 32% and 17% of providers correctly identifying GWG recommendations for women with pre-pregnancy overweight/obesity, respectively.

These findings indicate that the majority of pregnant women, particularly those with pre-pregnancy overweight/obesity, lack knowledge of GWG recommendations and report being either not informed or misinformed about GWG recommendations by healthcare providers. Accordingly, the present study aimed to examine factors related to the knowledge of GWG recommendations and the receipt of advice from healthcare providers regarding GWG recommendations among women with pre-pregnancy overweight/obesity.

Materials and methods

The participants were women with pre-pregnancy overweight/obesity who were enrolled in a larger study assessing perinatal weight (Emery et al. 2017; Kolko et al. 2017). Women were recruited from obstetric clinics and were eligible to participate in the larger study if they were 14 years old, had a BMI ≥ 25 kg/m², and were carrying a singleton pregnancy. Women were excluded from participation if they were taking weight-affecting medications, participating in a structured weight-management programme, diagnosed with type 1 diabetes, or reported a psychiatric disorder requiring immediate treatment. The women completed questionnaires and had their height and weight measured at the prenatal baseline (12–20 weeks gestation) and again at the postpartum follow-up (6-months postpartum). Women provided written informed consent prior to participation. All study procedures were approved by the University of Pittsburgh Institutional Review Board. A subset of the 261 women enrolled in the larger study provided data at the prenatal baseline but did not complete the postpartum follow-up ($n = 70$) and were excluded from the present study. The present study thus included 191 women. Sample characteristics are displayed in Table 1.

Measures

Demographic and pregnancy-related information—At the prenatal baseline, the women reported demographic and pregnancy-related information.

Pre-pregnancy body mass index: Upon screening for study eligibility, the women reported their pre-pregnancy weight. Their height was measured using a mounted stadiometer during the prenatal baseline. A pre-pregnancy BMI was calculated as pre-pregnancy weight in kilograms divided by height in metres squared. Women were categorised as having pre-pregnancy overweight (BMI: 25–29.9 kg/m²) or obesity (BMI: ≥ 30 kg/m²).

Gestational weight gain: GWG was calculated by subtracting the self-reported pre-pregnancy weight from the weight recorded at delivery, obtained via electronic medical records. The GWG was not computed for 17 women who were <37 weeks gestation at delivery (Spong 2013) and could not be computed for an additional 10 women who had incomplete information in their medical records. The remaining 164 women were categorised according to whether their GWG was below (inadequate), within (adequate), or above (excessive) the recommended range for their pre-pregnancy BMI. In line with the IOM guidelines (Rasmussen and Yaktine 2009), the recommended ranges for GWG were defined as 6.8–11.3 kilograms for women with pre-pregnancy overweight and 5.0–9.1 kilograms for women with a pre-pregnancy obesity.

Knowledge of gestational weight gain: At the prenatal baseline, women were asked the following question: ‘When you first realised you were pregnant, did you have an idea of how much weight you should gain during your pregnancy?’ The women who said yes were then asked: ‘About how much weight do you think you should gain?’ Women were categorised according to whether they reported having knowledge of GWG recommendations. The women who reported having knowledge of GWG recommendations were further categorised according to whether the amount of gestational weight they believed they should gain fell within the recommended range for their pre-pregnancy BMI.

Healthcare provider advice about gestational weight gain: At the postpartum follow-up, women were asked the following question: ‘During your pregnancy, did your doctor, nurse, or midwife advise you about weight gain?’ The women who said yes were then asked: ‘About how much weight did your doctor, nurse, or midwife advise you to gain?’ Women were categorised according to whether they reported having received advice from a healthcare provider regarding GWG recommendations. The women who reported receiving advice from a healthcare provider regarding GWG recommendations were further categorised according to whether the amount of weight they reported being advised to gain fell within the recommended range for their pre-pregnancy BMI.

Analytic strategy

Independent samples *t*-tests and Chi-square analyses were used to assess the differences in GWG between the women with pre-pregnancy overweight versus obesity. Independent samples *t*-tests and Chi-square analyses then were used to assess differences in demographic and pregnancy-related information between the women who did and did not report having knowledge of GWG recommendations, as well as between those who did and did not report receiving advice from a healthcare provider regarding GWG recommendations. Demographic and pregnancy-related information also were compared between women who provided an amount of gestational weight that fell within versus outside the recommended range as well as between the women who reported that their healthcare provider had advised them to gain an amount of gestational weight that fell within versus outside the recommended range for their pre-pregnancy BMI. Because of the number of comparisons made in each set of analyses ($n = 14$), a Bonferroni correction was applied to correct for family-wise error. Accordingly, all statistical tests were evaluated with a two-sided, Type I error rate of 0.004.

Results

Gestational weight gain

At the prenatal baseline, 17% ($n=18$) of women with pre-pregnancy obesity had gained excessive gestational weight compared to 6% ($n=5$) of women with pre-pregnancy overweight. The women who carried their pregnancy to term and had complete information in their medical records ($n=164$) had an average GWG of 13.85 ± 8.73 kilograms. Only 13% ($n=22$) of these women gained adequate gestational weight, with 70% ($n=114$) gaining excessive gestational weight. The women with pre-pregnancy obesity had a significantly lower GWG ($t(162)=3.09$; $p=.002$) than did the women with pre-pregnancy overweight but

were equally likely to gain an excessive gestational weight ($z=1.94$; $p=.05$). Specifically, the women with pre-pregnancy obesity had an average GWG of 11.97 ± 9.89 kilograms, with 12% ($n=11$) gaining an adequate gestational weight and 63% ($n=56$) gaining an excessive gestational weight. Meanwhile, the women with pre-pregnancy overweight had an average GWG of 16.08 ± 6.50 kilograms, with 15% ($n=11$) gaining an adequate gestational weight and 77% ($n=58$) gaining an excessive gestational weight.

Knowledge about gestational weight gain

Although 46% ($n = 88$) of women reported knowing how much gestational weight to gain during pregnancy, only 52% ($n = 46$) reported an amount of gestational weight within the recommended range for their pre-pregnancy BMI. Of the remaining women, 35% ($n = 31$) overestimated the GWG recommendations whereas 13% ($n = 11$) underestimated the GWG recommendations. Women were more likely to report an amount of gestational weight within the recommended range for their pre-pregnancy BMI if they had pre-pregnancy overweight, were white, were more highly-educated, or had a greater income (see Table 2). The amount of gestational weight that the women believed they should gain was not associated with actual GWG ($p = .09$).

Healthcare provider advice about gestational weight gain

At the postpartum follow-up, only 39% ($n = 75$) of women reported having received advice about GWG from a health-care provider, 11% ($n = 8$) of whom reported that their healthcare provider did not provide them with a specific amount of gestational weight to gain. Among the 35% ($n = 67$) of women who reported being advised to gain a specific amount of gestational weight, only 48% ($n = 32$) reported that they were instructed to gain weight within the recommended range for their pre-pregnancy BMI. Of the remaining women, 39% ($n = 26$) reported that their healthcare provider overestimated the GWG recommendations whereas 13% ($n = 9$) reported that their healthcare provider underestimated the GWG recommendations. There were no differences in the demographic or pregnancy-related information between the women who did and did not report being correctly advised about the GWG recommendations from their healthcare provider (see Table 3). The amount of gestational weight that women reported being advised to gain from their healthcare providers was not associated with actual GWG ($p = .16$).

Discussion

The present study examined the factors related to the knowledge of GWG recommendations and the receipt of advice from healthcare providers regarding GWG recommendations among women with pre-pregnancy overweight/obesity. Although 46% of women reported knowing how much gestational weight to gain during pregnancy, only 24% of the total sample knew the appropriate amount of gestational weight to gain for their pre-pregnancy BMI. These findings are similar to those in previous studies (Brooten et al. 2012; de Jersey et al. 2012; Krukowski et al. 2017) and indicate that most women with pre-pregnancy overweight/obesity have either limited or incorrect knowledge of GWG recommendations. Consistent with extant literature (Stotland et al. 2005; Phelan et al. 2011), women were particularly likely to have an incorrect knowledge of GWG recommendations if they had

pre-pregnancy obesity, were of a minority race, were less educated, or had a lower income, indicating that women comprising these demographic groups could benefit from additional education on GWG recommendations.

Despite the apparent need to enhance the knowledge of GWG recommendations among the women with pre-pregnancy overweight/obesity, only 35% of women reported receiving advice regarding GWG recommendations from their healthcare provider. Importantly, less than half of these women reported being instructed to gain weight within the recommended range for their pre-pregnancy BMI. Given that women with pre-pregnancy overweight/obesity are especially likely to gain excessive gestational weight (de Jersey et al. 2012; Ferrari and Siega-Riz 2013; Wrotniak et al. 2015), the finding that 83% of women reported receiving either no advice or incorrect advice about GWG recommendations from their healthcare provider is of particular concern. Unlike previous studies (Phelan et al. 2011), we did not find any differences between women who did and did not report being advised about GWG from their healthcare providers. Accordingly, additional research is needed to explore factors that relate to whether healthcare providers discuss GWG recommendations with women with pre-pregnancy overweight/obesity.

Although previous reports suggest that women's knowledge of GWG recommendations (Phelan et al. 2011) and women's receipt of information from healthcare providers regarding GWG recommendations (Tovar et al. 2011) are predictive of meeting the IOM guidelines, these findings were not supported in the present study. Women may require additional advice beyond being accurately informed of GWG recommendations from healthcare providers to identify specific behavioural strategies that they can adopt to meet the IOM guidelines for GWG (Ferrari and Siega-Riz 2013; Wrotniak et al. 2015). Consistent with prior research (de Jersey et al. 2012; Ferrari and Siega-Riz 2013; Wrotniak et al. 2015), we found that few women had adequate GWG and over two-thirds of women gained an excessive gestational weight. Although women with pre-pregnancy obesity had a significantly lower GWG than did the women with pre-pregnancy overweight, they did not differ in their likelihood of gaining an excessive gestational weight. However, it is worth noting that 17% of women with pre-pregnancy obesity had already gained an excessive gestational weight by the beginning of their second trimester compared to 6% of the women with pre-pregnancy overweight. Thus, efforts to prevent excessive GWG should begin early in pregnancy or even before pregnancy, particularly among the women with pre-pregnancy obesity.

This study had several limitations. First, women were asked at 6-months postpartum to retrospectively recall information about advice they received from healthcare providers regarding GWG during pregnancy. Women may have incorrectly recalled the specific weight gain recommendations that they received from their healthcare providers (Lutsiv et al. 2012). Second, pre-pregnancy weight was based on self-report rather than objective measurement, which may have resulted in miscalculations of pre-pregnancy BMI or GWG. However, the use of self-reported pre-pregnancy weight is common in studies of GWG (Schieve et al. 1999; Gunderson et al. 2001; Rosenberg et al. 2003) and is accurate within 0.91 to 1.81 kilograms (Gunderson et al. 2001). Finally, the women were not asked to report whether they were knowledgeable of or received advice from healthcare providers about additional

factors that may influence GWG, such as diet or physical activity, which would be useful to assess in future studies.

Despite these limitations, findings from the present study indicate that the majority of women with pre-pregnancy overweight/obesity lack knowledge of GWG recommendations and report that education on GWG recommendations from healthcare providers is an aspect of their prenatal care that is largely insufficient. Although the majority of pregnant women report being interested in receiving education about GWG from healthcare providers throughout pregnancy (de Jersey et al. 2013), these findings highlight an ongoing disparity between what women want from their prenatal care regarding GWG recommendations and what services they report receiving (de Jersey et al. 2013; Duthie et al. 2013). Accordingly, a more effective tailoring of prenatal care to ensure that women receive accurate advice from healthcare providers regarding GWG recommendations is warranted.

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IMPACT STATEMENT

- **What is already known on this subject?**

Extant literature indicates that women's knowledge of gestational weight gain (GWG) recommendations and women's receipt of information from their healthcare providers regarding GWG recommendations are predictive of meeting the Institute of Medicine guidelines for GWG.

- **What do the results of this study add?**

Findings from the present study indicate that the majority of women with pre-pregnancy overweight/obesity lack knowledge of GWG recommendations and report that education on GWG recommendations from healthcare providers is an aspect of their prenatal care that is largely insufficient. Although there were no differences between women who did and did not report being correctly advised about GWG recommendations by healthcare providers, women were less likely to have a correct knowledge of GWG recommendations if they had pre-pregnancy obesity, were of a minority race, or were socioeconomically disadvantaged.

- **What are the implications of these findings for clinical practise and/or further research?**

These findings highlight a need for more effective tailoring of prenatal care to ensure that women receive accurate advice from healthcare providers regarding GWG recommendations.

Table 1Sample characteristics ($N=191$).

Variable	
Age ^a	27.67 ± 5.30
Pre-pregnancy body mass index	33.12 ± 6.63
% Began pregnancy overweight (<i>n</i>)	45% (85)
% Black (<i>n</i>)	55% (104)
% Education High school degree (<i>n</i>)	35% (67)
% Annual income \$30,000 (<i>n</i>)	68% (129)
% Unemployed (<i>n</i>)	36% (69)
% Medicare/Medicaid (<i>n</i>)	63% (119)
% Nulliparous (<i>n</i>)	35% (66)
% Primagravida (<i>n</i>)	27% (51)
% Pregnancy intentional (<i>n</i>)	45% (86)
Weeks pregnant at delivery	38.81 ± 2.69
Gestational weight gain in kilograms ^b	13.85 ± 8.73
% Adequate gestational weight gain ^b (<i>n</i>)	13% (22)

^aFewer than 2% ($n=3$) of the sample was <18 years of age. Participants <18 years of age did not significantly differ from those ≥18 years of age on any of the study variables ($p > .02$) after applying a Bonferroni correction for multiple comparisons ($\alpha = 0.004$).

^bValues based on information from 164 women after excluding 17 women who were <37 weeks gestation at delivery and 10 women who had incomplete information in medical records. Gestational weight gain did not correlate with gestational age ($r=0.05$, $p=.53$). There also was no difference in gestational weight gain between women who delivered between 37 and 39 weeks gestation and those who delivered between 40 and 43 weeks gestation ($t(162)=-0.76$, $p=.45$). Accordingly, gestational age was not accounted for in analyses including gestational weight gain.

Table 2

Differences between women who did and did not report having knowledge of gestational weight gain (GWG) recommendations at the beginning of pregnancy.

Demographic characteristics	Any knowledge of GWG recommendations		Correct knowledge of GWG recommendations		p
	Yes (n = 88)	No (n = 103)	Yes (n = 46)	No (n = 42)	
Age	28.68 ± 4.69	26.81 ± 5.65	29.11 ± 4.49	28.21 ± 4.92	.38
Pre-pregnancy body mass index	32.65 ± 6.80	33.63 ± 6.49	31.37 ± 7.26	34.06 ± 6.03	.06
% Began pregnancy overweight (n)	55% (48)	36% (37)	72% (33)	36% (15)	.001
% Black (n)	37% (32)	70% (72)	22% (10)	54% (22)	.002
% Education High school degree (n)	25% (22)	44% (45)	9% (4)	43% (18)	<.001
% Annual income \$30,000 (n)	52% (46)	81% (83)	35% (16)	71% (30)	.001
% Unemployed (n)	27% (24)	44% (45)	17% (8)	38% (16)	.09
% Medicare/Medicaid (n)	48% (42)	76% (77)	33% (15)	64% (27)	.01
% Nulliparous (n)	31% (27)	38% (39)	41% (19)	19% (8)	.02
% Primigravida (n)	28% (20)	30% (31)	30% (14)	14% (6)	.07
% Pregnancy intentional (n)	56% (49)	36% (49)	59% (27)	52% (22)	.55
Weeks pregnant at delivery	39.09 ± 2.07	38.56 ± 3.12	39.15 ± 2.43	39.02 ± 1.60	.77
GWG in kilograms ^a	14.19 ± 7.53	13.57 ± 9.64	15.71 ± 7.55	12.76 ± 7.32	.09
% Adequate GWG ^a (n)	19% (14)	9% (8)	19% (7)	18% (7)	.62

All statistical tests were evaluated using a two-sided, Type I error rate of 0.004 after applying a Bonferroni correction for multiple comparisons. Bold text indicates a statistically significant difference.

^aValues in the columns relating to whether women had any knowledge of recommended GWG are based on information from 164 women (74 who reported having knowledge of recommended GWG and 90 who reported having no knowledge of recommended GWG) after excluding 17 women who were <37 weeks gestation at delivery and an additional 10 women who had incomplete information in medical records. Meanwhile, values in the columns relating to whether women had correct knowledge of recommended GWG are based on information from 74 participants (36 who reported correct knowledge of recommended GWG and 38 who reported incorrect knowledge of recommended GWG) after excluding seven women who were <37 weeks gestation at delivery and an additional seven women who had incomplete information in medical records.

Table 3

Differences between women who did and did not report receiving advice about gestational weight gain (GWG) recommendations from their healthcare provider during pregnancy.

Demographic characteristics	Report of any advice received from healthcare provider regarding GWG recommendations		Report of correct advice received from healthcare provider regarding GWG recommendations		<i>p</i>
	Yes (<i>n</i> = 75)	No (<i>n</i> = 116)	Yes (<i>n</i> = 32)	No (<i>n</i> = 35)	
Age	28.59 ± 5.31	27.08 ± 5.23	28.84 ± 4.61	28.34 ± 5.80	.70
Pre-pregnancy body mass index	33.61 ± 7.40	32.90 ± 6.10	32.85 ± 7.41	34.26 ± 7.09	.43
% Began pregnancy overweight (<i>n</i>)	45% (34)	44% (51)	.85 53% (17)	37% (13)	.19
% Black (<i>n</i>)	51% (38)	57% (66)	.36 34% (11)	60% (21)	.04
% Education High school degree (<i>n</i>)	26% (19)	41% (48)	.03 16% (5)	29% (10)	.18
% Annual income \$30,000 (<i>n</i>)	60% (44)	73% (85)	.05 41% (13)	71% (24)	.01
% Unemployed (<i>n</i>)	31% (23)	40% (46)	.43 19% (6)	38% (13)	.16
% Medicare/Medicaid (<i>n</i>)	55% (41)	67% (78)	.35 38% (12)	65% (22)	.16
% Nulliparous (<i>n</i>)	44% (33)	28% (33)	.03 41% (13)	51% (18)	.38
% Primagravida (<i>n</i>)	36% (27)	21% (24)	.02 38% (12)	40% (14)	.83
% Pregnancy intentional (<i>n</i>)	45% (34)	45% (52)	.95 56% (18)	37% (13)	.12
Weeks pregnant at delivery	38.48 ± 3.24	39.02 ± 2.26	.18 38.59 ± 3.37	38.37 ± 3.43	.79
GWG in kilograms ^a	15.20 ± 8.55	12.94 ± 8.78	.10 16.57 ± 8.22	13.78 ± 6.89	.16
% Adequate GWG ^a (<i>n</i>)	12% (8)	14% (14)	.15 11% (3)	16% (5)	.76

All statistical tests were evaluated using a two-sided, Type I error rate of 0.004 after applying a Bonferroni correction for multiple comparisons.

^aValues in the columns relating to whether women reported receiving any advice from their healthcare providers about GWG are based on information from 164 women (66 who reported receiving advice from their healthcare provider about GWG and 98 who reported not receiving advice from their healthcare provider about GWG) after excluding 17 women who were <37 weeks gestation at delivery and an additional 10 women who had incomplete information in medical records. Meanwhile, values in the columns relating to whether women reported receiving correct advice from their healthcare providers about GWG are based on information from 59 participants (28 who reported receiving correct advice from their healthcare provider about GWG and 31 who reported receiving incorrect advice from their healthcare provider about GWG) after excluding six women who were <37 weeks gestation at delivery and an additional two women who had incomplete information in medical records.