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Psychiatric disorders and gestational weight gain among women who quit smoking during pregnancy

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ABSTRACT

Objective: Pregnancy is a common time for women to quit using cigarettes and other substances. Such changes in substance use as well as other psychiatric and psychosocial changes during pregnancy can affect gestational weight gain (GWG). Thus, we evaluated the relationship between psychiatric disorders and GWG among pregnant women who had quit smoking.

Methods: Pregnant former smokers ($n = 281$) enrolled in a larger trial for postpartum relapse prevention completed semi-structured psychiatric interviews and measures of prepregnancy nicotine dependence and smoking behavior, and were weighed to estimate gestational weight gain. Using linear regression and mixed-effect models, the relationship between a lifetime prevalence of each psychiatric disorder and total GWG was evaluated, controlling for variables previously related to GWG.

Results: Average GWG was 15.6 (±8.5) kg, and 56% ($n = 157$) of women exceeded the GWG recommended by the Institute of Medicine (IOM) according to prepregnancy BMI. Over one-third (34.3%) of pregnant former smokers had a history of at least one diagnosable psychiatric disorder. History of psychiatric disorder was unrelated to GWG, with one exception; lifetime history of alcohol use disorder was associated with significantly larger GWG.

Conclusion: Women who quit smoking during pregnancy gain a considerable amount of gestational weight, and a previous history of alcohol use disorder is related to GWG. However, the benefits of smoking cessation to maternal and fetal health likely outweigh the disadvantage of weight gain, and other psychiatric disorders are not linked to GWG.

Introduction

Among women, pregnancy is strongly related to weight gain and obesity risk [1–9]. Excessive gestational weight gain (GWG), or weight gain that exceeds the amount recommended by the Institute of Medicine (IOM)'s 2009 guidelines, is a robust predictor of postpartum weight retention [1,10], and although the amount of weight retained after pregnancy varies widely [4], postpartum weight retention has been associated with long-term overweight and obesity more generally [1,2,11]. Thus, understanding pregnancy related changes in weight has become a focus of research.

Importantly, pregnancy also is associated with changes in other health-related behaviors that may, in turn, affect changes in eating and weight-related behaviors. For example, pregnancy is a common time for women to quit smoking [12,13], which has well-documented maternal and fetal health benefits [14,15]. However, smoking cessation also is robustly associated with weight gain in general [16,17]. Indeed, continuing to smoke during pregnancy has been linked to lower GWG, and quitting smoking, particularly quitting earlier in pregnancy [18], has been related larger GWG [19–21].

In addition to smoking cessation, pregnancy-related declines in the use of other substances as well as changes in psychiatric symptoms during pregnancy might affect GWG. Although research on psychosocial predictors of GWG has been limited, initial data suggest that self-reported depressive symptoms are associated with excessive GWG [1]. Similarly, there is evidence that the presence of specific types of psychopathology can affect GWG. Using a Norwegian data set, researchers found that women with current or recent (i.e., within the last 6 months) DSM-IV eating disorder symptoms gained more gestational weight than did those without eating disorder symptoms [22,23]. Finally, evidence suggests that smokers have high rates of psychiatric disorders [24–27] and psychological distress [28,29], which also have an impact on

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changes in weight [30,31]. For example, considerable evidence has linked mood disorders to weight gain and obesity in smokers [30] as well as in the general population [32].

Given that psychiatric disorders are related to obesity and weight gain [33], and smokers have high rates of psychiatric disorders, it is plausible that psychiatric disorders affect GWG, particularly among women who have quit smoking as a result of pregnancy. Thus, in this study, we sought to examine the relationship between maternal psychiatric disorders and excessive GWG in a sample of former women smokers. We hypothesized that psychiatric disorders would be related to excessive GWG among women smokers. We further expected women with a history of mood or substance use disorders to gain more weight than those without a history of these disorders.

Methods

Participants

Participants for the current study were enrolled in a larger randomized controlled trial investigating the efficacy of a postpartum smoking relapse prevention intervention. Eligibility for the larger study, which has been detailed elsewhere [34], required women to have stopped smoking during or immediately prior to this pregnancy. Participants for this study were 281 pregnant former smokers who completed the Structured Clinical Interview for DSM-IV-TR Axis I Disorders: Non-Patient Version (SCID-I/NP) and had GWG data available. Descriptive information about the final sample is shown in Table 1.

Procedure

Women who had quit smoking for their current pregnancy and provided biochemical verification of cessation completed demographic and smoking assessments during their third trimester of pregnancy (i.e., between 34 and 38 weeks gestation). As shown in Fig. 1, participants for the current study completed the SCID-I/NP either during pregnancy at the time of study enrollment ($n = 215$) or after delivery ($n = 66$). Women who had already delivered were contacted and asked to complete the SCID-I/NP postpartum. Psychiatric interviews that occurred postpartum were completed within 55 weeks of delivery. Diagnostic interviews that occurred during pregnancy were completed between 33 and 41 weeks gestation. Women who were assessed during pregnancy and those postpartum did not differ in demographic variables, total GWG ($p = .78$), rates of excessive GWG ($p = .15$) or rates of psychiatric disorders (p's > .32).

Table 1
Participants characteristics ($N = 281$)

Demographic characteristics	Mean	SD
Age (years)	25.58	5.74
Prepregnancy cigarettes per day	10.96	9.58
Years smoking	8.53	5.74
Number of previous quit attempts	3.51	3.56
Fagerstrom test of nicotine dependence	3.24	2.06
Weeks quit at baseline	17.12	11.78
Wks. between baseline and delivery	4.01	1.97
Prepregnancy body mass index	27.28	7.65
Total gestational weight gain (kg)	15.84	8.76
	%	*n*
Race (% black)	54.80	154
Education level (% ≤ high school degree)	46.26	130
Household income (% < $30,000)	79.57	222
Parity (% nulliparous)	51.08	142
Inadequate gestational weight gain	16.73	47
Adequate gestational weight gain	27.40	77
Excessive gestational weight gain	55.87	157

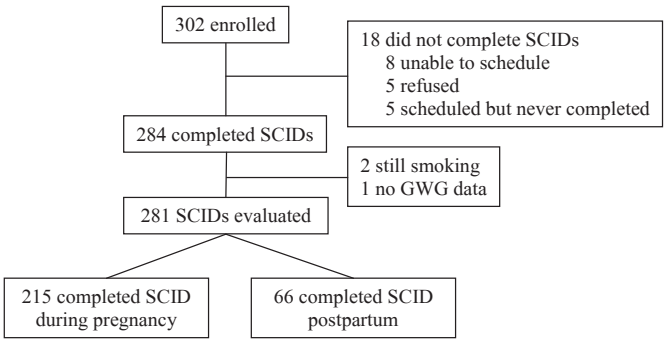

Fig. 1. Flow of participants in the study.

Assessments

Demographic and pregnancy-related information. Women reported demographic and pregnancy-related information, including age, race, income, education, and parity at study enrollment.

Smoking behavior. Because women were required to be abstinent at the time of entry into the study, women were asked to think back to the last time they had smoked every day for at least one month and complete the Fagerstrom Test of Nicotine Dependence (FTND). Women also provided information on the number of cigarettes smoked per day prior to quitting, the number of years they had been smoking, and when and how they had quit smoking for their current pregnancy.

Gestational weight gain. Women were weighed in street clothing without shoes using a digital scale and height was measured using a portable stadiometer. Women self-reported their pre-pregnancy weight. The use of self-reported weight is common in studies of GWG as women usually do not present for care until the middle of the first trimester, and thus there is necessarily a reliance on self-reported pre-pregnancy weight [35]. Pre-pregnancy body mass index (BMI) was calculated as pre-pregnancy weight in kilograms divided by height in meters squared. Total GWG was calculated by subtracting pre-pregnancy weight from weight obtained at study enrollment. Excessive or inadequate GWG was subsequently determined according to the IOM guidelines using pre-pregnancy BMI.

Lifetime psychiatric diagnoses. Lifetime history of psychiatric disorders was assessed by trained clinicians using the SCID-I/NP. Although the psychiatric diagnoses included in this study were scored based on DSM-IV-TR criteria, the categories of disorders are reported using DSM-5. For instance, obsessive compulsive disorder and posttraumatic stress disorder were treated as individual categories of disorders rather than included with the overall anxiety disorders.

Analysis plan

We first examined the lifetime prevalence of each category of disorder as well as the lifetime presence of having had any disorder in this sample. Next using *t*-tests, we evaluated the relationship between having a disorder and total GWG. We then used linear regression to evaluate the relationship between categories of psychiatric disorder and total GWG controlling for parity, race, income, prepregnancy BMI, the number of weeks between GWG assessment and delivery, and levels of nicotine dependence prior to quitting. In the case of significantly unequal variances between the group of participants who had a disorder and the group of those who did not (see Table 3), we used mixed-effect models including group as a random term to model different variances. We also examined the relationship between the presence of a psychiatric disorder and the likelihood of meeting criteria for excessive, adequate, or inadequate GWG according to the IOM guidelines, using multinomial logistic regression while adjusting for all relevant covariates.