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Variation in the relationship between gestational diabetes diagnosis and total gestational weight gain by race/ethnicity

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ABSTRACT

Prior research suggests that women diagnosed and treated for gestational diabetes mellitus (GDM) gain less total gestational weight than normoglycemic women. Our study finds that race/ethnicity modifies this association. Relative to normoglycemic women, non-Hispanic white women with GDM gain less weight but non-Hispanic black and Hispanic women gain more weight.

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1. Introduction

Compared to women without gestational diabetes mellitus (GDM), women with GDM have higher pre-pregnancy body mass indices [1] and gain more weight during their first trimester [2,3]. Yet institutional chart reviews of women treated for GDM have found that these women experience less weight gain following GDM diagnosis [3,4] and less total gestational weight gain (GWG) [3–5] than their normoglycemic counterparts. Thus, diagnosis and treatment of GDM may have a beneficial "side effect" of controlling GWG [3,6]. Larger studies are needed to better understand the association between GDM diagnosis and GWG, particularly among African-American and Hispanic women who are at higher risk than non-Hispanic white women for developing GDM and type 2 diabetes after GDM [7,8]. The purpose of this project was to (1) describe the association between GDM diagnosis and total GWG in a statewide database and (2) determine if the association is modified by race/ethnicity.

2. Materials and methods

We conducted a retrospective cohort study of non-Hispanic white (NHW), non-Hispanic black (NHB) and Hispanic adult
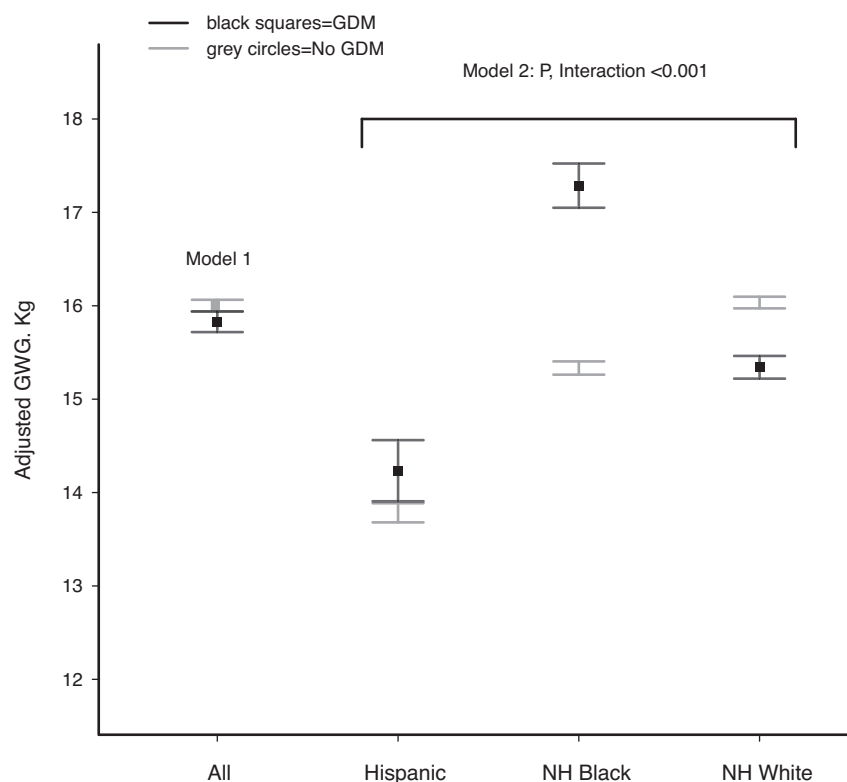

Fig. 1 – *Adjusted GWG in women with and without GDM by race/ethnicity.* *Legend*: GWG = gestational weight gain, GDM = gestational diabetes mellitus, grey circles = women without GDM, black squares = women with GDM. Model 1 calculates GWG by adjusting for maternal race/ethnicity, pre-pregnancy BMI, maternal age, highest maternal education level achieved, payment source for the delivery, parity and tobacco use. Model 2 calculates GWG according to maternal race/ethnicity by adjusting for all of the covariates in Model 1 as well as the cross-product of maternal race/ethnicity and GDM status.

women (age 18 and above) delivering an infant between 2005 and 2011 in Tennessee using maternal data recorded in state birth certificate files [9,10]. Women who self-identified as Hispanic were categorized as Hispanic regardless of their racial identification. We excluded women with missing pre-pregnancy weight or delivery weight data as well as women with pre-gestational diabetes. The dependent variable of interest was GWG (calculated as delivery weight minus pre-pregnancy weight). The independent variable of interest was GDM status. Additional covariates included a priori in the analyses were race/ethnicity, pre-pregnancy BMI, age, highest education level achieved, payment source for the delivery, parity and tobacco use. Age and pre-pregnancy BMI were included as flexible smooth variables to account for non-linear associations.

First, we used a multiple linear regression model to describe the association between GDM and GWG adjusting for all of the covariates (model 1). Next, we included the cross-product term of race/ethnicity and GDM status to determine if race/ethnicity modified the association (model 2). Finally, we calculated adjusted GWG for women with and without GDM in the full sample and stratified by race/ethnicity using parameter estimates obtained from each model. All analyses were conducted using R-software v. 3.1.0 (R statistical

software, Institute for Statistics and Mathematics, Vienna, Austria) [11].

3. Results

We identified 531,638 women who met the study criteria. Approximately 5% of the study sample was diagnosed with GDM. Seventy-two percent of women identified themselves as NHW, 20% as NHB, and 8% as Hispanic.

Women with GDM had less mean GWG than women without GDM (13.1 ± 9.0 kg versus 14.5 ± 8.0 kg). After adjusting for covariates women with GDM were found to gain 0.17 kg less than women without GDM (95%CI -0.27, -0.08) in model 1. However, we observed a statistically significant differential association of GDM status with GWG by race/ethnicity ($p < 0.001$ for interaction). In model 2, NHW women with GDM gained 0.69 kg less than NHW women without GDM (95% CI -0.80, -0.58) but NHB women with GDM gained 1.95 kg more than NHB women without GDM (95%CI 1.72, 2.19) and Hispanic women with GDM gained 0.45 kg more than Hispanic women without GDM (95%CI 0.12, 0.78). Fig. 1 displays adjusted GWG estimates for women with and without GDM in the full sample and according to race/ethnicity.