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Lifestyle behaviors and ethnic identity among diverse women at high risk for type 2 diabetes

Susan D. Brown*, Samantha F. Ehrlich, Ai Kubo, Ai-Lin Tsai, Monique M. Hedderson, Charles P. Quesenberry Jr., Assiamira Ferrara

Division of Research, Kaiser Permanente Northern California, Oakland, CA, United States

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ABSTRACT

Background: Diet and physical activity lifestyle behaviors are modifiable risk factors for type 2 diabetes and are shaped by culture, potentially influencing diabetes health disparities.
Objectives: We examined whether ethnic identity—the strength of attachment to one's ethnic group, and a long-standing focus of psychological research—could help account for variations in lifestyle behaviors within a diverse population at high risk for chronic disease.
Methods: Using data from the Gestational Diabetes' Effects on Moms trial, this US-based cross-sectional study included 1463 pregnant women (74% from minority ethnic/racial groups; 46% born outside the US) with gestational diabetes (GDM), a common pregnancy complication conferring high risk for type 2 diabetes after delivery. Mixed linear regression models examined whether ethnic identity is associated with lifestyle behaviors after adjusting for demographic, clinical, and acculturative characteristics (e.g., nativity and length of residence in the US).
Results: In the overall sample, a one-unit increase in ethnic identity score was significantly associated with 3% greater fiber intake, 4% greater fruit/vegetable intake, 11% greater total activity, and 11% greater walking (p values < 0.01). Within ethnic/racial groups, a one-unit increase in ethnic identity score was significantly associated with 17% greater fiber intake among Filipina women; 5% lower total caloric intake among non-Hispanic White women; and 40% greater total activity, 35% greater walking, and 8% greater total caloric intake among Latina women (p values ≤ 0.03).
Conclusion: Results from this large study suggest that ethnic group attachment is associated with some lifestyle behaviors, independent of acculturation indicators, among young women with GDM who are at high risk for type 2 diabetes. Stronger ethnic identity may promote certain choices known to be associated with reduced risk of type 2 diabetes. Prospective research is needed to clarify the temporal nature of associations between ethnic identity and modifiable diabetes risk factors.

Diabetes health disparities persist in the US, with greater diabetes prevalence among African American, Latino, Native American, and Asian as compared to non-Hispanic White adults (Centers for Disease Control and Prevention, 2014; Menke et al., 2015). Indeed, incidence continues to climb among African American and Latino adults despite plateauing in the total population (Geiss et al., 2014). Many minority groups suffer disproportionately from diabetes risk factors including obesity (Adams and Schoenborn, 2006; Albright et al., 2008; Flegal et al., 2010), physical inactivity (Adams and Schoenborn, 2006), and poor diet (August and Sorkin, 2011).

At particularly high risk are women with a history of gestational diabetes (GDM), or hyperglycemia first recognized during pregnancy (Metzger, 1991). Women with GDM are seven times more likely to develop type 2 diabetes than parous women without GDM (Bellamy et al., 2009). Ethnic and racial minority groups suffer disproportionately from GDM (Ferrara et al., 2004; Hedderson et al., 2010) and are more likely to develop type 2 diabetes after a pregnancy complicated by GDM (Xiang et al., 2011). Similarly, women from certain ethnic/racial groups born outside the US suffer disproportionately from GDM as compared to their US-born counterparts (Hedderson et al., 2010).

Diet and physical activity are key modifiable risk factors for diabetes which play an important role during pregnancy. In the

* Corresponding author. Division of Research, Kaiser Permanente Northern California, 2000 Broadway, Oakland, CA 94612, United States.
E-mail address: susan.d.brown@kp.org (S.D. Brown).

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Diabetes Prevention Program (Knowler et al., 2002), a lifestyle intervention focused on weight loss and improved diet and activity reduced type 2 diabetes risk by 53% among women with a history of GDM (Ratner et al., 2008). Building on this evidence base, the National Diabetes Prevention Program's weight management curriculum emphasizes physical activity and nutrient-dense diets that are high in fiber and lower in total fat and calories for the general population of at-risk adults (Centers for Disease Control and Prevention, 2016). Observational research has also identified diet and physical activity as important predictors of progression to type 2 diabetes after a pregnancy complicated by GDM (Bao et al., 2014; Kim, 2014). In the Nurses Health Study II, greater physical activity (Bao et al., 2014) and dietary patterns characterized by greater fiber, whole grain, fruit, and vegetable intake and lower saturated fat intake (Tobias et al., 2012) were associated with significantly lower risk for disease progression. Finally, diet and activity are implicated in the risk of excess weight gain during pregnancy (Stuebe et al., 2009), which in turn is associated with adverse pregnancy outcomes such as preeclampsia, delivery by cesarean section, hyperbilirubinemia, and having a large-for-gestational age infant (Hedderson et al., 2006; Rosenberg et al., 2005; Siega-Riz et al., 2009; Stotland et al., 2004). Clear opportunities exist to reduce ethnic/racial health disparities in type 2 diabetes by addressing modifiable lifestyle behaviors.

Health disparities across ethnic/racial groups are well-documented (Institute of Medicine, 2009), and there is recognition that it is through individuals' lived experience of ethnicity/race that disparities emerge (Institute of Medicine, 2012). Yet our understanding of how this occurs remains incomplete. The construct of *ethnic identity* could serve to contextualize associations between health behaviors—and in turn, disease outcomes—and often routine ethnic/racial categorizations. An active focus of research in psychology for decades (Ponterotto and Mallinckrodt, 2007), ethnic identity is conceptualized as a multi-dimensional reflection of the strength and quality of one's attachment to a social group (Ong et al., 2010; Phinney, 1992; Phinney and Ong, 2007). As a developmental process, ethnic identity varies intra-personally across the lifecourse as well as inter-personally within groups, with members differing in the degree to which their ethnic group membership is personally salient and valued. While research on ethnic identity and lifestyle behaviors is limited, among African Americans higher levels of ethnic identity have been associated with greater knowledge of diabetes risk factors (Brezo et al., 2006) and more healthful eating patterns and greater leisure-time physical activity (Siegel et al., 2000). As an "internal structure" (Phinney and Ong, 2007) that exists regardless of one's immigration status, ethnic identity is related to but distinct from the construct of acculturation (Cuéllar et al., 1997), or the process by which individuals such as immigrants and indigenous peoples learn about and adopt a new society's cultural norms. While acculturation has been associated among US immigrant groups with obesity (Oza-Frank and Cunningham, 2010; Perez-Escamilla) and deteriorations in lifestyle behaviors (Allen et al., 2014; Ayala et al., 2008; Montez and Eschbach, 2008; Patil et al., 2009; Perez-Escamilla, 2011), limited research has examined the interplay between ethnic identity and acculturation on lifestyle behaviors in both immigrant and non-immigrant groups.

Within a young and well-defined population at high risk for type 2 diabetes, i.e., women with GDM, we investigated whether ethnic identity was associated with diet and physical activity lifestyle behaviors, and whether these associations varied across ethnic/racial groups. We hypothesized that higher levels of ethnic identity would be associated with healthful lifestyle behaviors, beyond related factors such as indicators of acculturation.

1. Materials and methods

This cross-sectional study was nested within "Gestational Diabetes' Effects on Moms" (GEM), a pragmatic cluster randomized clinical trial conducted from 2011 to 2013 to compare postpartum type 2 diabetes prevention strategies among women with recent GDM (Ferrara et al., 2014, 2016). The present study was set in Kaiser Permanente Northern California (KPNC)—a large integrated US healthcare delivery system whose membership is demographically similar to the underlying population except at the extremes of income and education (Gordon, 2015). The study was approved by the KPNC institutional review board; GEM was registered at ClinicalTrials.gov (identifier NCT01344278).

1.1. Participants and procedure

In KPNC nearly all pregnant women are screened for GDM as part of standard care (Ferrara et al., 2004). Using the electronic health record (EHR) system, women across all 44 KPNC facilities were identified as being eligible for GEM on the basis of being $\geq$ 18 years old and diagnosed with GDM using the Carpenter and Coustan criteria (Ferrara et al., 2014), as recommended by the American College of Obstetricians and Gynecologists during the study period (2011).

This study utilized data from the GEM baseline survey administered during pregnancy, soon after diagnosis with GDM (Ferrara et al., 2014). The two-part survey was administered in English or Spanish as 1) a computer-assisted telephone interview yielding demographic and acculturative data (N = 1706 of 2320 eligible women [73.5%] provided verbal consent and responded), followed by 2) a mailed questionnaire yielding data on ethnic identity, diet, and physical activity (N = 1463 of 1706 [92.6%] responded). Survey responders did not differ from non-responders on characteristics such as age or pre-pregnancy body mass index (BMI), but were slightly more likely to be White (Ferrara et al.).

1.2. Measures

Self-identified ethnic/racial origin was assessed using a 16-category checklist inclusive of multiple Asian and Latina groups, informed by recommendations from the Institute of Medicine (2009). Education, pre-tax household income, and nativity (i.e., country of birth) and years of residence in the US were assessed via single-item questions. Age, preferred language, height, and pre-pregnancy weight to calculate pre-pregnancy BMI (kg/m^2) were assessed via EHR.

Ethnic identity was assessed using the Multigroup Ethnic Identity Measure-Revised (MEIM-R), a 6-item self-report instrument assessing affiliation with one's ethnic group (Phinney and Ong, 2007). Prior research in the present sample has demonstrated good psychometric properties, including good internal consistency reliability (Cronbach's α ranging from 0.79 to 0.91) and evidence of measurement invariance across multiple diverse ethnic/racial groups, supporting its broad utility (Brown et al., 2014). Items address dimensions of exploration (e.g., "I have often talked to other people in order to learn more about my ethnic group") and commitment (e.g., "I feel a strong attachment towards my own ethnic group") on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). MEIM-R scores were calculated by averaging item values, with higher scores corresponding to higher levels of ethnic identity.

Dietary intake in the prior three months was assessed with a 130-item version of the Block 2005 validated food frequency questionnaire (FFQ; Boucher et al., 2006; Subar et al., 2001). The FFQ was modified to reflect diverse dietary habits of women in the