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The Association between Parity and Inflammation among Mexican-American Women of Reproductive Age Varies by Acculturation Level: Results of the National Health and Nutrition Examination Survey (1999–2006)

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Abstract

Introduction—Parity and acculturation are linked with cardiometabolic risk. Their joint association with cardiometabolic health among Mexican-American women is less established, even though immigrant Mexican-American women have the highest fertility rate in the US. We examined the modifying role of acculturation on the association of parity with a cardiometabolic risk biomarker, C-reactive protein (CRP).

Methods—Participants (N=1,002) were women of Mexican background, ages 16–39 years, in the National Health and Nutrition Examination Survey (NHANES) 1999–2006. The association between parity and elevated CRP was examined using logistic regression adjusted for age, household food security, access to health care, Hemoglobin A1c, total cholesterol, HDL-cholesterol, waist circumference, physical activity, acculturation, and a product term of parity and acculturation. Acculturation was measured on a six-point score based on nativity status and duration of residence in the US (0-Mexico-born, US resident < 10 years, 1-Mexico-born, US resident 10–19 years, 2-Mexico-born, US resident ≥20 years, 3-US born), and language used at home (0-Spanish, 1-bilingual, 2-English). Scores 0–1, 2–3, 4–5 represented low, moderate, and high acculturation respectively.

Results—The association of parity with elevated CRP varied by acculturation level ($P_{\text{interaction}}$ = 0.10). Parity was associated with elevated CRP among women with low (adjusted OR: 2.26, 95% CI: 1.07–4.80) and moderate acculturation (adjusted OR: 2.79, 95% CI: 1.16–6.73), compared to nulliparous women.

Conclusions—Higher odds of elevated CRP associated with parity in immigrant Mexican-American women of reproductive age indicate the need for greater utilization of maternal/women's health care services for cardiometabolic risk screening and interventions.

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INTRODUCTION

Mexican-American women of reproductive age have the highest birth rate in the US, with Mexico-born immigrant women having higher rates compared to US-born Mexican-American women. Mexican Americans will account for nearly 30% of the US population by the year 2050, primarily fueled by new births (*The Mexican-American boom: Births overtake immigration,* 2011). The greatest lifetime increases in metabolic syndrome among Mexican-American women are during reproductive years (Ervin, 2009; Heiss et al., 2014; Mozumdar & Liguori, 2011). Higher rates of gestational diabetes (Bardenheier et al., 2015; McDonald, Suellentrop, Paulozzi, & Morrow, 2008) and metabolic syndrome (Cheung et al., 2006; Ramos & Olden, 2008) in this population compared to other major US racial/ethnic groups may signal an inability to meet the "stress test" of pregnancy and thus foretell an increased risk of cardiovascular disease (CVD) (Pina, 2011; Rich-Edwards, Fraser, Lawlor, & Catov, 2014; Sullivan, Umans, & Ratner, 2012). As many Mexican-American women of reproductive age continue to experience considerable barriers to health insurance coverage, despite the implementation of the Affordable Care Act (Jones & Sonfield, 2016), limited health resources make it necessary to refine our understanding of the distribution of cardiometabolic risk in this group to inform preventive goal setting and targeted interventions. The ultimate purpose of this knowledge is to inform maternal/women's health policies to address the adverse cardiometabolic risk profile among Mexican-American women starting in early life and at the time when they are engaged in health care in the setting of childbearing.

For a population with a significant proportion of women in their prime reproductive age and a substantial (~50%) proportion of births to immigrant women (*The Mexican-American boom: Births overtake immigration,*2011) surprisingly little is known about the role of acculturation in the distribution of cardiometabolic risk, particularly in the context of pregnancy-induced risk increases. There is growing recognition that physiological adaptations of pregnancy -- including significant increases in dyslipidemia and insulin resistance, immune function changes, and complex hemodynamic changes (Denison, Roberts, Barr, & Norman, 2010; Sacks & Redman, 1999; Schmatz, Madan, Marino, & Davis, 2010) -- may unveil or potentiate health risks in women (Catalano, 2010; Pina, 2011). Prospective studies have demonstrated that a history of live birth or parity is an independent risk factor for metabolic syndrome among young and middle-aged women (Gunderson et al., 2009). A growing number of studies have suggested that acculturation is significantly associated with cardiometabolic health in Mexican-American women. Proxies of lower acculturation (i.e., being Mexico-born, shorter duration of US residence, or use of Spanish as a primary language at home) have been associated with greater prevalence of negative cardiometabolic indicators among Mexican-American women, particularly diabetes (Dinwiddie, Zambrana, & Garza, 2014), abdominal obesity (Sundquist & Winkleby, 2000), and gestational diabetes (Ramadhani et al., 2011). Conversely, longitudinal evidence shows that among Mexican-American immigrants diabetes risk increases with longer residence in the US (Anderson et al., 2016). Others have also reported that US-born Mexican-American men and women have worse cardiometabolic profiles compared to Mexico-born peers (Chyu & Upchurch, 2011; Crimmins et al., 2007). Since childbearing and acculturative processes occur contemporaneously among Mexican-American women of reproductive age, examining whether these pertinent risk factors have a combined effect is critical to understanding women's cardiometabolic health.

In young women who are still mostly free of advanced chronic disease, the joint influences of the presumed "stressors" acculturation and parity may be manifested as an abnormal level of biological markers. In this context the elevated systemic inflammation biomarker, C-reactive protein (CRP), may be a useful initial measure of poor cardiometabolic status since it has been shown to be an early indicator of cardiometabolic dysfunction (Han et al., 2002; Mendivil, Robles-Osorio, Horton, Hamdy, & Caballero, 2013; Ridker, Buring, Cook, & Rifai, 2003) and has been associated with gestational diabetes complications in pregnancy (Di Benedetto et al., 2005; Di Cianni et al., 2007; Heitritter, Solomon, Mitchell, Skali-Ounis, & Seely, 2005). The aims of this study were to examine the independent association of parity status with elevated CRP among Mexican-American women of reproductive age and assess whether acculturation level modifies this association. Given the inconsistent evidence about the role of acculturation in cardiometabolic health, we do not propose a directional hypothesis in this study.

MATERIAL AND METHODS

Study Population

Data from the National Health and Nutrition Examination Survey (NHANES) 1999–2006 waves were used for this analysis. NHANES uses a complex multistage sampling design to collect sociodemographic, behavioral, dietary, laboratory, and health-related data from a nationally representative sample of civilian, non-institutionalized, U.S. residents. NHANES interviews are conducted in participants' homes, while physical examinations and laboratory measurements are performed by trained staff in the Mobile Examination Centers (MEC). Additional information about NHANES MEC procedures is available elsewhere (NHANES*,* 2014). This study included non-pregnant Mexican-American women ages 16–39 years who were examined at the NHANES MEC and who reported a previous pregnancy with a live birth (N=1,150). Pregnant women (N=248) were excluded because pregnancy is associated with adaptive CRP elevations and CRP levels vary over the course of pregnancy (Belo et al., 2005). Participants on insulin/oral diabetic medications (n=13), women reporting doctor-diagnosed diabetes but not on diabetic medications (n=10), as well as women on statin drugs (n=4) and with self-reported CVD (n=5) were also excluded. This totaled 23 participants due to overlap in these exclusion categories. After exclusions, 1,067 eligible participants had valid reproductive, acculturation, and CRP data. The analytic sample was based on 1,002 participants with complete data on the main exposure, outcome, and important covariates. This secondary data analysis study was determined to be exempt by our Institutional Review Board.

Main Variables of Interest

Parity—A categorical variable for parity was created based on the answers to two survey questions: (1) "Have you ever been pregnant?" and (2) "How many of your pregnancies/deliveries resulted in a live birth?" Participants were categorized as "parous" if they reported at least one live birth and "nulliparous" if they reported that they had never been pregnant. Participants who reported a previous pregnancy without a live birth were not included in this parity definition because data on the reasons and timing of pregnancy termination were not available.

C-reactive Protein—Serum high sensitivity CRP level was measured using latex-enhanced nephelometry. To enhance the interpretation of risk levels and enable comparisons to the previous literature, we created a categorical CRP variable based on current clinical guidelines (Ridker, 2016). Low- (<1.0 mg/L) and average-risk CRP (1.0–3.0 mg/L) values were combined into a normal category (≤3.00 mg/L) and compared to the high-risk category (3.01–10.00 mg/L).

Acculturation—Similar to a previously published report (Kandula et al., 2008), an acculturation scale was constructed based on nativity status, duration of residence in the US, and predominant language used at home. First, nativity status and duration of residence in the US were scored as: 3 (US-born), 2 (Mexico-born and duration of US residence ≥ 20 years), 1 (Mexico-born and duration of US residence 10–19 years), and 0 (Mexico-born and duration of US residence < 10 years). Second, predominant language used at home was scored as: 2 (English only), 1 (English and Spanish), and 0 (Spanish only). The sum of these two scores yielded a total score (range 0–5), with lower scores indicating lower acculturation. Acculturation categories were defined as low (score 0–1), moderate (score 2–3), and high (score 4–5) (see Appendix). These category boundaries distinguish between US-born and Mexico-born women, and between those who lived in the US less than 10 years or 10 years or longer, making these categories consistent with those used in previous studies (Crimmins et al., 2007; Daviglus et al., 2012).

Covariates

Socioeconomic variables—Age in years was used as a continuous variable. Educational level was categorized as less than high school, high school/GED, and greater than high school. Annual family income was categorized as: less than $20,000 vs. greater or equal to $20,000. Access to health care was defined as a positive response to the question: "Is there a place that you usually go when you are sick or need advice about your health?" Similar to previously published methods (Bate, Dollard, & Cannon, 2010), household density was defined as the total number of persons in the household divided by the number of rooms in the house. It was categorized as "average" if a household had ≤1 person per room and "crowded" if a household had >1 person per room. Household food security for the last 12 months was assessed based on the 18-item US Household Food Security Survey Module (Bickel, Nord, Price, Hamilton, & Cook, 2000) administered during the NHANES Household Interview. Food security categories, as provided by the NHANES, included: full, marginal, low, and very low.

Lifestyle variables—Smoking status was operationalized as serum cotinine levels. Using previously published criteria (Benowitz, Bernert, Caraballo, Holiday, & Wang, 2009) participants were defined as non-smokers (serum cotinine < 3.0 ng/mL) and smokers (≥3.0 ng/mL). Dietary data were obtained from the first 24-hour dietary recall interview at the

MEC. Total intake amounts were collected using the U.S. Department of Agriculture's (USDA) computer-assisted dietary data collection instrument. Dietary data were further processed using USDA's Food and Nutrient Database for Dietary Studies, which lists typical food nutrient weights and nutritional values (NHANES, 2013). Diet was assessed using two continuous variables, daily total intakes of fat (in grams) and of fiber (in grams). Physical activity was measured in three activity domains: moderate level intensity household/yard activity, moderate intensity transportation activity, and moderate and/or vigorous intensity leisure time activity. The final derived physical activity variable represented the sum of minutes of moderate activity per week spent in all activity domains and was treated as a continuous variable.

Health-related variables—Obesity was assessed by participants' body mass index (BMI, weight in kilograms divided by the square of the height in meters) and waist circumference (centimeters). Total cholesterol (mg/dL), high density lipoprotein cholesterol (HDL-cholesterol, mg/dL), and Hemoglobin A1c (HgA1c, %) levels were measured in serum and treated as continuous variables. Hypertension was defined as systolic blood pressure ≥140 mm Hg, diastolic blood pressure ≥90 mm Hg, or a participant report of being on antihypertensive medications.

Statistical Analysis

Descriptive data were presented as means and weighted proportions. Bivariate associations of categorical and continuous covariates with parity status, acculturation, and CRP status were examined using Chi-squared statistics and linear regression. Acculturation as well as socioeconomic, lifestyle, and health-related variables that were associated with parity and CRP status at $p < 0.10$ were carried to multivariable logistic regression analysis. Although access to health care was not significantly associated with CRP status, it was still included in the multivariable analysis because access to health care has clinical importance and varies significantly across strata of acculturation. Our final multivariable logistic regression model included the main effects of parity status, acculturation, age, total cholesterol, HDL-cholesterol, Hemoglobin A1c, waist circumference, access to health care, household food security, physical activity, and a product term of parity status and acculturation.

In addition, two sensitivity analyses were performed. First, since multiparity has been associated with increased prevalence of metabolic syndrome (Vladutiu et al., 2016) and CVD risk (Skilton, Serusclat, Begg, Moulin, & Bonnet, 2009) and it is more common among Mexico-born than US-born Mexican-American women (Parrado & Morgan, 2008), the parity-CRP relationship was re-examined after excluding multiparous women (n=51). Multiparous women were defined as participants who reported a history of four or more live births, based on previously published definitions. Second, we excluded participants with CRP >10.0 mg/L) (n=91) as this may be indicative of an ongoing acute infection (Gabay & Kushner, 1999). In a post-hoc analysis, in order to examine whether unmeasured factors in the first year post-partum may have influenced our results, we divided the parous group into two categories: "A history of live birth within one year" and "A history of live birth more than one year ago," based on time since the last live birth. Time since the last live birth was measured as the difference between the participant's age at the time of the MEC exam and their age at the last live birth in years. Lastly, we considered the influence of a history of oral contraceptive use, which was determined by the response to the question, “Have you ever taken birth control pills for any reason?” (Yes/No).

All analyses were conducted using SAS version 9.4 (SAS Institute Inc., Cary, NC). All subpopulation analyses and variance estimates were adjusted using sample weights provided by NHANES. A combined 8-year MEC exam weight was constructed using NHANES-provided guidelines.

RESULTS

Among 1,002 women in the sample, 66.5 % were parous and 33.5% were nulliparous. Participant characteristics by parity status are listed in Table 1. Parous women were significantly older than nulliparous women ($p<0.001$). The prevalence of elevated CRP was significantly higher among parous women compared to nulliparous women (46.3% vs. 27.9%, respectively, $p<0.001$). Nearly 47% of parous women had low acculturation, whereas approximately 27% of nulliparous women had low acculturation. Parity status was significantly associated with health-related variables (BMI, waist circumference, HgA1c, total cholesterol, HDL cholesterol, hypertension), with nulliparous women showing significantly more favorable levels of these indicators. Nulliparous women had significantly higher average levels of physical activity ($p<0.001$), but lower average levels of fiber intake ($p=0.002$) compared to parous women. Parous women tended to live in households with low total family income ($p=0.010$), crowded density ($p<0.001$), and very low household food security ($p<0.001$).

Participant characteristics by acculturation level are shown in Table 2. The prevalence of low, moderate, and high acculturation was 40.5%, 14.9%, and 44.6% respectively. The prevalence of elevated CRP in low, moderate, and high acculturation groups was 38.1%, 51.2%, and 38.4% respectively ($p=0.150$). On average, women with high acculturation had lower HgA1c levels compared to women with low and moderate acculturation. Acculturation was not significantly associated with total cholesterol, BMI, waist circumference, or the prevalence of hypertension. Lower acculturation was associated with greater prevalence of socioeconomic adversity indicators (less than high school educational level, <$20,000 annual family income, no access to health care, crowded household density, and very low household food security) ($p<0.001$) but also with higher levels of fiber intake ($p\leq0.001$) and lower levels of fat intake ($p=0.009$). Women with high acculturation reported greater duration of physical activity per week (<0.001). As shown in Table 3, the overall prevalence of elevated CRP in the sample was 40.1%. Elevated CRP status was significantly (at a p-value <0.10) associated with older age, lower household food security, BMI, higher waist circumference, higher total cholesterol, lower HDL-cholesterol, higher HgA1c, and lower physical activity.

The independent association of parity status with elevated CRP was examined in the logistic regression model that adjusted for age, access to health care, household food security, total cholesterol, HDL-cholesterol, Hemoglobin A1c, waist circumference, physical activity, acculturation, and a product term of parity status and acculturation. Since the interaction term p-value was borderline significant (p=0.10), acculturation level-specific odds ratios (ORs) were estimated using a single model approach.

Results of multivariable analyses are shown in Table 4. Among women with low acculturation, parous women had significantly higher odds of elevated CRP compared to nulliparous women after adjustment for covariates (OR: 2.26, 95% CI: 1.07–4.80). Similarly, among women with moderate acculturation, parous women had significantly higher odds of elevated CRP compared to nulliparous women after adjustment for covariates (OR: 2.79, 95% CI: 1.16–6.73). Among women with high acculturation, the same association was not statistically significant (OR: 1.30, 95% CI: 0.69–2.48). Results were similar when we used BMI as a measure of obesity instead of waist circumference. In sensitivity analyses, removal of multiparous participants and participants with high CRP levels had no appreciable effects on the associations between parity and elevated CRP, save the loss of significance for some estimates owing to a reduced sample size (not shown).

In a post-hoc analysis, creating a separate category for women with a live birth within one year produced largely consistent results. Among women with low acculturation, women with a live birth within one year and women with a live birth more than one year ago had higher odds of elevated CRP compared to nulliparous women (OR: 4.52, 95% CI: 1.61–12.64 and OR: 1.87, 95% CI: 0.74–4.69, respectively). In the moderate-acculturation group, these associations were OR: 1.62, 95% CI: 0.34–7.80 and OR 3.05, 95% CI: 1.24–7.50, respectively. In the high-acculturation group, they were OR: 1.06, 95% CI: 0.50–2.26 and OR 1.35, 95% CI: 0.67–2.69, respectively. The addition of the history of oral contraceptive use variable in the adjusted model also did not influence our main findings.

DISCUSSION

This study examined the association between parity and elevated CRP, and assessed the role of acculturation as a modifier of this relationship among Mexican-American women of reproductive age. Our results reveal an interaction between parity and acculturation with elevated CRP. Parity showed a strong association with the odds of elevated CRP among Mexican-American women with low or moderate acculturation, i.e., mostly Mexico-born, after adjustment for age, access to health care, household food security, total cholesterol, HDL-cholesterol, Hemoglobin A1c, waist circumference, and physical activity. We observed no significant association between parity and elevated CRP among Mexican-American women with high acculturation, 99% of whom were US-born.

The immigrant status-delimited pattern of these associations suggests that compared to US-born parous Mexican-American women, Mexico-born parous women may experience additional physiological demand due to their immigrant experience. These findings are consistent with the growing literature linking lower levels of acculturation with poor cardiometabolic indicators among Mexican-American women. In an NHANES-based study, immigrant Mexican-American adult women who lived in the US between 5 and 19 years had three-fold higher odds of diabetes compared to immigrant Mexican-American women who lived in the US for 20 or more years (Dinwiddie et al., 2014). In a California-based study of low-income, middle-aged, Mexican-American women those who more strongly identified with Mexican culture had significantly higher odds of meeting the criteria for metabolic syndrome compared to those who more strongly identified with Anglo cultures (Espinosa de Los Monteros, Gallo, Elder, & Talavera, 2008). Two-fold greater odds of gestational diabetes have been reported among foreign-born Hispanic women compared to US-born Hispanic women (Ramadhani et al., 2011) and among immigrant Mexican-American women living in ethnic enclaves compared to immigrant Mexican-American women who were not (Janevic, Borrell, Savitz, Echeverria, & Rundle, 2014).

These collective observations lead us to hypothesize a potential role of unmeasured acculturation stress. Previous literature has supported the role of chronic stress-mediated pathways in the development of metabolic dysfunction (Pasquali, 2012) and accelerated weight gain among women (Vicennati, Pasqui, Cavazza, Pagotto, & Pasquali, 2009). A previous study based in the US Virgin Islands reported a stronger relationship between psychological stress and insulin resistance among diabetes-free young and middle-aged African immigrants compared to native-born African Americans (Tull, Thurland, LaPorte, & Chambers, 2003). It is possible that immigrant women may be exposed to comparatively greater levels of stress during childbearing and therefore may be more prone to an earlier accumulation of metabolic risk via stress-associated mechanisms. The peripartum period has been associated with psychological stress in women worldwide (Bener, Gerber, & Sheikh, 2012; Lara et al., 2015; Navarro et al., 2008). Mexican-American immigrant women, specifically, report significant psychological stress related to the loss of culturally valued family ties (Martinez-Schallmoser, MacMullen, & Telleen, 2005; Sanchez-Birkhead, Kennedy, Callister, & Miyamoto, 2011). Mexican cultural traditions elevate motherhood, however, the Western cultural expectations, e.g. work-family roles, challenge these values, leading to stress among Mexican American women (Lagana, 2003). Several theories, including the "weathering" hypothesis (Geronimus, Hicken, Keene, & Bound, 2006) and The Reserve Capacity Model (Gallo & Matthews, 2003), predict accelerated physiological deterioration among those who are challenged to meet multiple psychological and socioeconomic demands in the context of resource-poor environments. Further elucidation of the unique demands or restricted resources that may disproportionately burden immigrant women, e.g., poor coping, exposure to domestic or community violence, or disadvantaged physical neighborhood environment is needed to build our understanding of accelerated cardiometabolic risk in this group of women.

In this study the prevalence of elevated CRP was highest among Mexico-born women with moderate acculturation. Higher odds of elevated CRP associated with parity were also observed in Mexico-born women. A lack of agreement with previous studies showing worse cardiovascular and metabolic risk indicators in US-born compared to Mexico-born Mexican-American men and women (Chyu & Upchurch, 2011; Crimmins et al., 2007; Kershaw, Greenlund, Stamler, Shay, & Daviglus, 2012) may be due to more generous age inclusion criteria and/or the use of combined biomarker measures in those analyses. The country of birth differences in cardiometabolic health have been found to be narrower in younger Mexican American women compared to older counterparts (Chyu & Upchurch, 2011). It is possible that the inflammatory mechanisms, previously found to be sensitive to chronic stress among pregnant and non-pregnant women (Christian, Glaser, Porter, & Iams, 2013; Coussons-Read, Okun, & Nettles, 2007), may best typify physiological reactions to the complex socio-behavioral adaptations during the period of childbearing. The hypothesis about developmental timing of acculturation effects warrants examination in future research.

This study has several strengths. First, the study adds new knowledge about the patterns of cardiometabolic dysfunction in the Mexican-American female population. Second, the study contributes to the current theoretical knowledge of acculturation by showing that the immigrant health advantage of lower acculturation observed in some biological health indicators does not extend to a critical inflammation marker among Mexican-American women of reproductive age. A lack of data on pre-conception and intra-pregnancy CRP levels constitutes the main limitation of the study, because the temporal sequence of pregnancy and live birth before elevations in CRP levels cannot be established. CRP served as a proxy for cardiometabolic dysregulation; metabolic syndrome was not used in this study because fasting indicators of metabolic syndrome, e.g., fasting glucose and triglycerides, were not available for all women. Finally, imperfect measurement of study covariates may introduce residual confounding, for example, from the limited measurement of dietary intake.

Implications for Practice and/or Policy

Increased vulnerability to systemic inflammation found among immigrant Mexican-American women indicates that culturally and risk level-appropriate health services for Mexican-American women of reproductive age are needed to alter the adverse health risk trajectory of this population. Further reinforcing the urgency of clinical and policy interventions in this population is the possibility of maternal transmission of chronic cardiometabolic conditions. This is supported by results of studies showing that mothers exhibiting cardiometabolic conditions during childbearing years, such as obesity and gestational diabetes, are significantly more likely to have diabetic or obese offspring (Desai, Beall, & Ross, 2013; Marco et al, 2012). The cardiometabolic profile at six months-1 year postpartum appears to have predictive validity for future health risk trajectory among women with or without pregnancy complications (Rooney, Schauberger, & Mathiason, 2005; Smith, Pudwell, Walker, & Wen, 2012). Greater utilization of maternal/women's health clinical settings for early cardiometabolic screening and educational interventions may be prudent and likely to reach great numbers of vulnerable immigrant women. Our understanding of health risks among immigrant Mexican-American women still needs to improve as these risks have been underestimated due to underdiagnosis of chronic conditions (Barcellos, Goldman, & Smith, 2012), inadequate health risk factor screening (Guendelman, Ritterman-Weintraub, Fernald, & Kaufer-Horwitz, 2013), underutilization of preventive health care (Azofeifa, Yeung, Alverson, & Beltran-Aguilar, 2014) and socioeconomic-related barriers to receiving timely prenatal health care (Bryant, Worjoloh, Caughey, & Washington, 2010) in this population. Recent improvements in health insurance accessibility among U.S. Hispanic/Latinos as a result of the Affordable Care Act (The ACA is working for the Latino community, 2016) offer opportunities for researchers and clinicians to access new data on health risks in this rapidly increasing population.

Conclusions

Parity was associated with higher odds of elevated CRP among Mexican-American women of childbearing age with low and moderate acculturation levels but not among Mexican-American women with high acculturation levels. Acculturation-related factors contributing to cardiometabolic dysregulation among Mexican American immigrant women require further study.

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Appendix. Brief Description of Acculturation Levels

Acculturation Level	Country of Birth	Duration of residence in the US (if Mexico-born)	Predominant language at home
Low (Score 0–1) n= 337	100% Mexico-born	43% < 5 years 34% 5–<10 years	89% Spanish only 9% mostly Spanish
Moderate (Score 2–3) n=139	84% Mexico-born	56% 10–<20 years 42% ≥20 years	20% Spanish only 38% mostly Spanish
High (Score (4–5) n=526	99% US-born	n=2 ≥20 years	43% English only 25% mostly English

Table 1

Mexican-American Women's Characteristics by Parity Status (n=1,002 [*])

	Parous n=471 Weighted % 66.5	Nulliparous n=531 Weighted % 33.5	
Variables	**%/Mean(SE)**	**%/Mean(SE)**	**P-value[†]**
Age	29.6(0.3)	21.8(0.3)	<0.001
Educational level			0.187
< High school	54.4	45.5	
High school/GED	20.4	22.1	
> High school	25.2	32.3	
Annual family income			0.010
<$20,000	44.8	33.6	
≥$20,000	55.2	66.4	
No access to health care	30.0	30.3	0.940
Crowded household density	36.2	24.3	<0.001
Household food security			<0.001
Full	51.6	68.3	
Marginal	14.1	13.6	
Low	28.7	14.5	
Very low	5.6	3.6	
Acculturation Level			<0.001
Low	47.4	26.7	
Moderate	16.8	11.3	
High	35.8	62.0	
CRP>3.0 mg/L	46.3	27.9	<0.001
BMI	28.0(0.4)	26.1(0.4)	0.001
Waist circumference	91.4(0.8)	86.4(1.0)	0.001
Hemoglobin A1C	5.2(0.0)	5.1(0.0)	0.013
Total cholesterol	181.3(2.1)	168.7(2.1)	<0.001
HDL-cholesterol	51.8(0.8)	54.1(1.0)	0.063
Hypertension	3.3	0.5	0.023
Smoker	11.9	13.3	0.645
Total fat	71.6(2.1)	69.3(1.9)	0.423
Fiber	16.6(0.4)	13.9(0.7)	0.002
Physical activity	247.6(18.6)	521.5(34.3)	<0.001

[*] n=973 for educational level; n=967 for annual family income; n=750 for hypertension; n=996 for smoker; n=981 for fiber; n=981 for total fat.

SE - standard error.

[†] Based on the Rao-Scott Modified Chi-Square test for categorical variables and linear regression for continuous variables.

Table 2

Mexican-American Women's Characteristics by Acculturation Level (n=1,002 *)

	Low n=337 Weighted % 40.5	Moderate n=139 Weighted % 14.9	High n=526 Weighted % 44.6	
Variables	**%/Mean(SE)**	**%/Mean(SE)**	**%/Mean(SE)**	**P -value†**
Age	28.3(0.4)	28.8(0.8)	25.3(0.4)	<0.001
Educational level				<0.001
< High school	70.4	42.8	37.4	
High school/GED	16.5	27.1	22.8	
> High school	13.1	30.1	39.8	
Annual family income				0.001
<$20,000	50.3	36.3	34.5	
≥$20,000	49.7	63.7	65.5	
No access to health care	46.8	20.3	18.1	<0.001
Crowded household density	54.2	30.2	12.9	<0.001
Household food security				<0.001
Full	43.0	55.4	70.6	
Marginal	15.6	11.8	13.2	
Low	34.0	27.7	13.6	
Very low	7.4	5.1	2.6	
Parity status				<0.001
Parous	78.0	74.7	53.4	
Nulliparous	22.0	25.3	46.6	
CRP>3.0 mg/L	38.1	51.2	38.4	0.150
BMI	26.9(0.5)	27.6(0.7)	27.7(0.3)	0.399
Waist circumference	88.9(1.0)	89.7(1.5)	90.5(1.0)	0.496
Hemoglobin A1C	5.2(0.0)	5.2(0.0)	5.1(0.0)	0.006
Total cholesterol	176.3(2.7)	182.2(3.3)	176.0(1.8)	0.229
HDL-cholesterol	50.9(0.9)	53.1(1.2)	53.9(0.8)	0.007
Hypertension	1.2	1.2	3.7	0.145
Smoker	7.4	15.8	15.7	0.018
Total fat	65.5(2.4)	70.3(3.9)	75.9(2.0)	0.009
Fiber	17.6(0.6)	15.5(0.7)	14.0(0.6)	<0.001
Physical activity	221.0(23.4)	291.8(47.7)	462.6(24.6)	<0.001

*n=973 for educational level; n=967 for annual family income; n=750 for hypertension; n=996 for smoker; n=981 for fiber; n=981 for total fat.

SE – standard error.

†Based on the Rao-Scott Modified Chi-Square test for categorical variables and linear regression for continuous variables.

Table 3

Mexican-American Women's Characteristics by C-reactive Protein Status (n=1,002*)

	Normal n=661 weighted % 59.9	Elevated n=341 weighted % 40.1	
Variables	**%/Mean(SE)**	**%/Mean(SE)**	**P-value†**
Age	26.2(0.4)	28.2(0.3)	<0.001
Educational level			0.414
< High school	49.8	53.9	
High school/GED	22.4	18.8	
> High school	27.8	27.3	
Annual family income			0.570
<$20,000	40.3	42.5	
≥$20,000	59.7	57.5	
No access to health care	30.7	29.1	0.675
Crowded household density	30.6	34.6	0.323
Household food security			0.077
Full	61.1	51.4	
Marginal	13.9	14.0	
Low	20.2	29.6	
Very low	4.8	5.0	
Acculturation Level			0.150
Low	41.9	38.4	
Moderate	12.2	19.0	
High	45.9	42.6	
BMI	24.9(0.2)	31.1(0.4)	<0.001
Waist circumference	84.4(0.5)	97.8(1.0)	<0.001
Hemoglobin A1C	5.1(0.0)	5.3(0.0)	<0.001
Total cholesterol	173.1(1.6)	182.9(2.3)	0.001
HDL-cholesterol	54.9(0.9)	49.1(0.6)	<0.001
Hypertension	2.7	1.9	0.584
Smoker	13.3	10.8	0.389
Total fat	71.9(2.2)	69.3(2.3)	0.438
Fiber	15.5(0.4)	16.0(0.6)	0.374
Physical activity	380.8(23.7)	277.5(25.2)	0.010

* n=973 for educational level; n=967 for annual family income; n=750 for hypertension; n=996 for smoker; n=981 for fiber; n=981 for total fat.

SE – standard error

† Based on the Rao-Scott Modified Chi-Square test for categorical variables and linear regression for continuous variables.

Table 4

Adjusted† Odds Ratios (OR) and 95% Confidence Intervals (95%) for Associations of Parity with Elevated C-reactive Protein among Mexican-American Women (n=1,002)

Variables	OR	95% CI
Low Acculturation		
Parous	2.26	1.07–4.80
Nulliparous	1.00	1.00
Moderate Acculturation		
Parous	2.79	1.16–6.73
Nulliparous	1.00	1.00
High Acculturation		
Parous	1.30	0.69–2.48
Nulliparous	1.00	1.00

†Model adjusted for age, household food security, access to health care, total cholesterol, HDL – cholesterol, Hemoglobin A1c, waist circumference, and physical activity.