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Acculturation and Biobehavioral Profiles in Pregnant Women of Hispanic Origin

Generational Differences

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In Hispanics, acculturation may lead to negative health outcomes. This study used a cross-sectional design to investigate the psychosocial and biological risks in acculturating pregnant women of Hispanic origin (n = 470). Psychosocial risks—depressive symptoms, anxiety, and stress—were assessed by self-report, whereas biological measures included stress-related and reproductive hormones. Mental health deteriorated across generations, with worsening depression, anxiety, and stress with successive generations. Stress and reproductive hormone levels decreased across generations, whereas body mass index and number of sexual partners increased. These data provide potential biobehavioral explanations of the relationship between acculturation and declining health among Hispanic women in the United States.
Key words: *acculturation*, *anxiety*, *cortisol*, *CRH*, *depression*, *estriol*, *pregnancy*, *progesterone*, *stress*

ACCULTURATION is a transitional process that occurs as immigrant groups gain increasing exposure to the beliefs, traits, and lifestyles of the dominant culture. In some circumstances, acculturation may present individuals with unfavorable social conditions such as societal and financial stressors that have been linked to poor health outcomes.[1-4] In Hispanics, increasing levels of acculturation have led to a higher body mass index (BMI), higher rates of depression, substance and nicotine abuse, less exercise, and more maternal complications.[2]

The negative health outcomes associated with acculturation are particularly important to Hispanic women of Mexican origin for a number of reasons. First, Hispanics represent the fastest growing segment of the US population.[5] Moreover, Hispanics are a highly fertile population, with an increasing risk for maternal complications.[5,6] As such, declining health in this group presents a significant economic burden on the US public health system. In 1 study, the investigators examined the health of Mexican American women aged 14 to 44 years by generational status, an indicator of acculturation.[7] The women had different health profiles by generation, with the third generation having more low-birth-weight babies than the first generation. The investigators concluded that acculturation needs to be considered when planning interventions to promote healthy reproductive behaviors. Another study found that repeated adaptation to stressors contributed to the "unhealthy

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assimilation" effect seen in the US born Mexican Americans.[8] The author concluded that there was evidence of declining health in the Mexican-origin population, especially among the US born, and the evidence was clearest in neonatal mortality and pregnancy-related hypertension.[8]

While many studies have identified links between acculturation and health, few have examined the mechanisms by which this phenomenon occurs. There is some evidence that continual difficulty over an extended time adversely affects the hypothalamic-pituitary-adrenal axis (HPA), leading to poorer health outcomes.[9,10] McEwen[9] defined the capability of maintaining stability through change as *allostasis*, which is critical for survival. Adaptation to ongoing stress, however, comes at a price: allostatic load or the wear and tear subsequent to chronic overactivity of allostatic systems.[8,9] This wear and tear of chronic stress negatively impacts reproductive systems as well, a phenomenon referred to as "weathering," and is associated with the stress and depression related to acculturation.[11]

The physiological mechanisms mediating the effects of chronic stress, mental health, and pregnancy outcomes in acculturating Hispanics are not clearly understood. Chronic stress can lead to dysregulation of the HPA axis as evidenced by alterations in corticotrophin-releasing hormone (CRH) and cortisol levels.[12] Moreover, as both CRH and cortisol play key roles during parturition, these hormones may represent a physiological mechanism by which chronic stress and depression affect pregnancy outcomes.[13] In addition, progesterone and estriol are steroid hormones involved in parturition.[14] The ratio of progesterone to estriol (P:E ratio) decreases as parturition nears.[15] Importantly, acculturation is related to a decrease in the P:E ratio in Hispanics, with adverse pregnancy outcome.[16] A more recent study identified an interaction between depressive symptoms, the P:E ratio, and poor pregnancy outcomes,[17] indicating that these physiological measures may also play a role in an "unhealthy assimilation" paradigm.

This study sought to establish a biobehavioral profile by examining generational differences related to acculturation to better understand the psychosocial and biological changes occurring in a population with potential declining health. We used Berry's model of acculturation that was modified by Myers and Rodriguez,[18] as shown in the Figure. Specifically, we sought to examine whether there were changes in perceived stress, anxiety, and depressive symptoms in successive generations of pregnant women of Hispanic origin. We also investigated the possibility of accompanying changes in CRH, cortisol, and P:E ratios with each successive generation. Finally, we examined whether there were changes in health status by generation for BMI, number of sexual partners, and gestational age and birth weight of the infants.

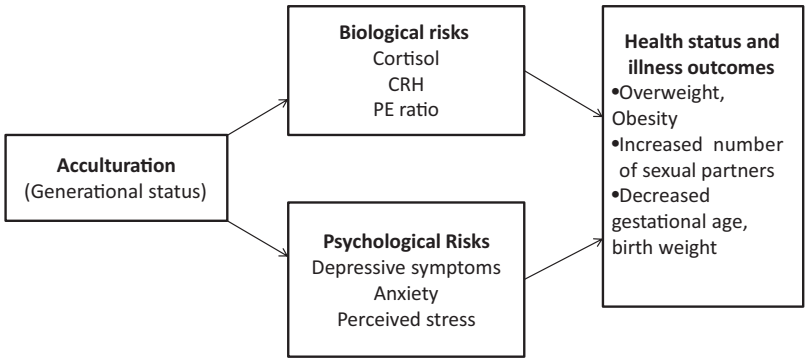

Figure. Conceptual model of the effects of acculturation on biological risks, psychosocial risks, and health status and illness outcomes in pregnant women of Hispanic origin. CRH indicates corticotrophin-releasing hormone.

MATERIALS AND METHODS

Participants

The study design was prospective. The sample consisted of 470 women enrolled at 22 to 24 weeks' gestation. The study was conducted from 2003 to 2007 at multiple sites and regions in Texas. In central Texas, women were recruited out of 5 Austin area community clinics (n = 279, 54%). The convenience sample was very easily obtained in Austin because of the incentive of an obstetrical ultrasonography they could not get otherwise, thus many of the participants were new to the United States (<10 years) and were first generation. These patients' insurance was mainly state funded and self-pay with residency status uncertain. In south Texas (San Antonio), we recruited primarily Medicaid patients from 5 private practice physicians (n = 172, 33%) with less successful recruitment, using ultrasonographies as an incentive. In the Gulf Coast region, Pasadena (the Houston area), we signed up women from 1 community clinic (n = 68, 13%). These patients were primarily state funded and self-pay.

Inclusion criteria were (1) singleton intrauterine gestation at 22 to 24 weeks, confirmed by accurate last normal menstrual period and ultrasonography, (2) self-identification as Hispanic ethnicity, (3) age 14 to 40 years, and (4) ability to read either English or Spanish. Exclusion criteria were (1) known uterine or cervical abnormalities, (2) kidney disease, (3) heart disease, (4) autoimmune disorders, (5) diabetes requiring medication, (6) asthma requiring use of steroid inhaler, (7) preeclampsia at the time of data collection, (8) oral steroids 1 month before the time of enrollment, (9) congenital anomalies as determined on a fetal ultrasonography, (10) blood group isoimmunization, (11) active cervicovaginal bleeding or placenta previa, or (12) medical diagnosis of mental disorders (major depression, generalized anxiety disorder, etc) noted in the patient's medical record. After obtaining maternal and infant outcomes, we kept women with gestational diabetes in the database only if they were diet controlled. Participants with preeclampsia were included in the analysis only if the condition occurred after data collection.

The institutional review board at the primary universities (The University of Texas Health Science Center in San Antonio and the University of Texas Medical Branch in Galveston) approved the study for the regional clinics. For Austin area clinics, the institutional review board of the Seton System approved the study. All participants gave informed consent.

Procedures

The recruiter reviewed prenatal medical records of possible participants who were pregnant for less than 24 weeks and then recruited participants before or after routine prenatal visits. The recruiter described the benefits and risks of the study meticulously and obtained informed consent in Spanish or English. Participants were scheduled for data collection at a time different from that of the prenatal appointment. The research nurse obtained demographic data from the prenatal medical record and administered the self-report questionnaires in the patient's language of preference. Both the recruiter and the research nurse were fluent in Spanish and in English. The research nurse assisted any patient who had difficulty reading and/or understanding the instruments. The participants were asked to complete a detailed family of origin medical record indicating country of birth for themselves as well as their parents and grandparents. The research nurse measured height and weight, acquired prepregnancy weight from the prenatal medical record to calculate BMI, and recorded any infections during the pregnancy. Afterward (approximately an hour from the beginning of the appointment), the research nurse drew a venous blood sample for hormone measurements. To control for diurnal rhythms of the hormones, blood samples were obtained only from 1 to 3 PM.

Acculturation measures

Generational status was used as a measure of acculturation. A determination was made whether the participant was born in the

United States or in Mexico; if she was born in Mexico, she was considered first generation. If her mother was born in Mexico, and the participant was born in the United States, she was considered second generation. If the maternal grandmother, the mother of the participant, and the participant were all born in the United States, the participant was considered third generation. Similar uses of generational status have been used reliably to assess the effects of acculturation health and pregnancy outcomes in Hispanics.[7,19] In addition, we also obtained data on how long the participant had lived in the United States and subtracted their age. This was used as a residence index or marker of exposure to the US culture.

Depressive symptoms

We used the Center of Epidemiological Studies Depression Index (CES-D) to evaluate depressive symptoms.[20] All questionnaires were completed during the data collection visit when the blood samples were collected. The CES-D is a 20 item, 4-point Likert scale used to assess the overall level of depression experienced in the past week; response range from *never* (0) to *most of the time* (3). Potential scores range from 0 to 60, with higher scores indicating greater depressive symptoms. The CES-D is appropriate for use in general populations, as well as in pregnant populations, and has strong psychometric properties ($\alpha = .85$).[21] We defined depressive symptoms as a CES-D score of greater than 16 since that has been used as a cutoff in studies of depression during pregnancy.[22] The research nurse notified a clinician of any scores greater than 16 for possible referral to a social worker or psychologist for follow-up.

Stress and anxiety measures

We used the Perceived Stress Scale (PSS) to measure chronic stress. This instrument consists of a 10-item, 5-point Likert scale, with responses ranging from 0 to 4. Potential scores ranged from 0 to 40, with higher scores indicating more perceived stress. The PSS measures the degree to which situations in one's life are appraised as stressful or the degree to which participants feel their lives are unpredictable, uncontrollable, and overwhelming.[23] Our previous studies found an excellent reliability α coefficient of .92 with pregnant women.[24] We used the 10-question version and the Spanish version ($\alpha = .75$).[23]

The State Trait Anxiety Inventory (STAI) has been used extensively in research and clinical practice to measure feelings of tension, apprehension, nervousness, and worry. Personality states are often transitory, but this can recur when evoked by appropriate stimuli and endure over time if the evoking conditions persist.[25] The STAI measures state and trait anxiety, assessing how subjects feel right now and how they felt at a particular time in the past. It consists of 40 items on a Likert scale from *almost never* (1) to *almost always* (4). In pregnancy, the values of Cronbach α were 0.91 for state anxiety and 0.89 for trait anxiety.[25] The STAI has been translated into Spanish for cross-cultural research and has been used in pregnancy in the Spanish version, with acceptable reliability ($\alpha = .83$).[25]

Endocrine and immune measures

The biological factors measured in the study were progesterone and estriol, 2 steroid hormones involved in pregnancy. From these, we calculated the P:E ratio, as our previous work indicated that this was a useful predictor of pregnancy health.[16] We also measured CRH and cortisol, each is a critical part of the HPA axis.

Blood samples were centrifuged at 2000 rpm for 10 minutes. Shortly afterward, the serum and plasma were aliquoted into polypropylene tubes and stored at −80°C. All biomarkers of interest, with the exception of CRH, were measured by enzyme-linked immunosorbent assay and read spectrophotometrically using a μ-Quant R 141 reader (Bio-Tek Instruments, Inc, Winooski, Vermont). Progesterone was assayed with a kit from MP

Biomedicals (Irvine, California). Estriol was assayed with a kit from Labor Diagnostika Nord (Nordhorn, Germany). Cortisol was assayed with a kit from Diagnostic System Laboratories (Webster, Texas). Corticotrophin-releasing hormone was detected in plasma samples collected with Aprotonin 500 IU/mL, using a radioimmunoassay from Phoenix Pharmaceuticals Incorporated (Belmont, California). It was extracted from 1 mL of plasma by using a methanol method as described previously.[26] The radioimmunoassay is based on the competition binding of I^{125}-conjugated CRH and CRH. The radioimmunoassay was run on a Perkin Elmer Wizard gamma counter (model 1470, Shelton, Connecticut). To control for potential differences in laboratory technique, the same laboratory technician conducted the analyses blinded to subject names and histories.

Infant outcomes

Birth outcomes were obtained from the medical record at delivery. Gestational age was confirmed by ultrasonography and last normal menstrual period from the prenatal record.

Data analysis

A power analysis revealed that this sample size gave a power of 0.80, with the capability to detect moderate effects, at a significance of .05. We analyzed the data using several strategies. First, we used analysis of variance to examine differences in biological measures by generation status. Post hoc analyses were conducted to determine which generation groups differed significantly from each other in each of the biological outcomes, and the Bonferroni correction was used to minimize the error that may result when multiple comparisons are made. Second, we conducted analysis of covariance to examine differences in biological measures after controlling for several covariates, including age, marital status, BMI, and gravidity. Finally, we used the analysis of variance to examine differences in perceived stress, anxiety, and depression by generation.

RESULTS

Sample characteristics

Table 1 displays the sample characteristics. For country of birth, 31% of the sample was born in the United States whereas the remainder (69%) was foreign born. For the foreign-born participants, 91% reported Mexico as their country of birth, with the remaining 9% consisted of individuals born in Ecuador, El Salvador, Guatemala, Honduras, Nicaragua, or Panama. The average age of the participants differed significantly by generation, with the mean age being significantly younger for the second generation than for the first generation. Body mass index increased significantly from the first generation to the third generation, with the mean of the third generation approaching obesity. The proportion of participants who were single also increased significantly from the first generation to the second and third generations. In the second and third generations, the majority of the women were single and had increasingly more lifetime male sexual partners. Table 1 also includes data on generational differences in pregnancy outcomes. Compared with the first generation, the second and third generations had slightly lower gestational ages at delivery and lower infant birth weights.

Differences in stress, anxiety, and depression by generation status

Using analysis of variance, we compared generational differences in mean scores on the emotional distress measures of depression, stress, and anxiety (summarized in Table 1). The scores on depression, anxiety, and stress grew significantly worse as the generations progressed. This was particularly true of the stress scores. On the CES-D, the first generation had a mean of 12.9 (95% confidence interval [CI], 12.0-13.8), the second generation had a mean of 16.6 (95% CI, 13.5-19.7), and the third generation had a mean of 14.8 (95% CI, 12.9-16.5); $F_{2,463} = 4.69$; $P < .01$. The first generation had a mean state anxiety score of 33.0 (95% CI, 32.1-34.06), the second generation had a mean of 36.77 (95% CI,

Table 1. Sample Characteristics

	First Generation (n = 323)	Second Generation (n = 48)	Third Generation (n = 99)	*F* or χ^2
Demographics				
Age, mean, y	25.4	20.8	23	26.65[a]
Nativity, %				348.79[a]
US-born	4.6	87.5	92.9	
Foreign-born	95.4	12.5	7.1	
Years in the United States, mean	6.2	18.5	21.4	329.44[a]
BMI, mean	25.9	25.9	28.4	7.28[b]
Gravidity	2.5	2.1	2.6	NS
No. lifetime sex partners, mean	1.8	3.9	6.1	35.43[a]
Marital status, %				16.24[a]
Married	56	33	44	
Single	44	67	56	
Pregnancy outcomes				
Infant birth weight, mean, g	3391.8	3212	3299.8	4.87[c]
Gestational age at delivery, mean, wk	39	38.5	38.5	4.46[a]
		Mean (95% CI)		
Psychological variables				
Depressive symptoms				
CES-D	12.9 (12.0-13.8)	16.6 (13.5-19.7)	14.8 (12.9-16.5)	4.69[c]
Anxiety				
State Anxiety	33 (32.1-34.1)	36.8 (33.2-40.4)	33.4 (31.2-35.7)	2.88[d]
Trait Anxiety	35.4 (34.3-36.50	40.9 (37.5-44.3)	38.5 (36.4-40.7)	8.42[a]
Perceived stress				
PSS	16.9 (16.2-17.6)	19.4 (17.5-21.3)	19.7 (18.5-20.9)	10.43[a]

Abbreviations: BMI, body mass index; CES-D, Center of Epidemiological Studies Depression Index; PSS, Perceived Stress Scale.
[a] $P < .001$.
[b] $P < .01$.
[c] $P < .05$.
[d] $P < .06$.

33.16-40.38), and the third generation had a mean of 33.45 (95% CI, 31.22-35.67); $F_{2,466} = 2.87$; $P < .06$. In contrast, the mean trait anxiety score for the first generation was 35.42 (95% CI, 34.3-36.47), the second generation had a mean of 40.91 (95% CI, 37.53-44.29), and the third generation had a mean of 38.53 (95% CI, 36.36-40.72); $F_{2,466} = 8.42$; $P < .0001$. The mean PSS score for the first generation was 16.88 (95% CI, 16.22-17.55), the mean PSS for the second generation was 19.38 (95% CI, 17.47-21.29), and the mean for the third generation was 19.71 (95% CI, 18.50-20.94); $F_{2,412} = 10.43$; $P < .0001$.

Differences in biological measures by generation status

Table 2 illustrates the mean levels of the biological variables measured by generation.

Table 2. Raw and Adjusted Means for Biological Measures by Generational Status

	First Generation		Second Generation		Third Generation		
	Mean	Estimated Mean	Mean	Estimated Mean	Mean	Estimated Mean	*F*
Cortisol	19.23	19.13	12.36	12.45	10.95	11.24	16.17[a]
P:E ratio	7	7	3.93	3.82	3.7	3.76	26.67[a]
CRH	29.33	28.75	23.24	24.37	21.95	23.1	6.09[b]

Abbreviations: CRH, corticotrophin-releasing hormone; P:E, progesterone to estriol ratio.
Estimated means are adjusted for age, marital status, body mass index, and gravidity.
[a]$P < .001$.
[b]$P < .01$.

Cortisol levels ranged from 4.98 to 59.42 μL/dL, median 16.67 μL/dL, and fell into the expected concentration range for the second trimester of pregnancy.[27] The levels of CRH ranged from 2.50 to 132.24 pg/mL, with a median of 21.00 pg/mL, which falls into the expected range for the second trimester of pregnancy.[28] Estriol levels ranged from 0.67 to 32.43 ng/mL, with a median of 9.6 ng/mL, and progesterone levels ranged from 9.34 to 211.85 ng/mL, with a median of 36.68 ng/mL. The P:E ratio ranged from 1 to 13.94, with a median of 4.1.

Cortisol

Cortisol levels differed by generation status, $F_{2,467} = 16.17$; $P < .001$. A linear trend was found, suggesting that the cortisol level was lower for mothers of the second and third generations, $F_{2,467} = 27.65$; $P < .0001$. Post hoc analyses revealed significant differences between the first-generation ($M = 2.75$; SD $= 0.78$) and second-generation mothers ($M = 2.42$; SD $= 0.42$) at the .01 level and between the first- and third-generation mothers ($M = 2.33$; SD $= 0.44$) at the .001 level. Differences in cortisol levels by generation status remained after adjusting for covariates, $F_{2,443} = 3.23$; $P < .05$. However, only differences between the first- and third-generation mothers were significant after controlling for age, marital status, residence index, BMI, and gravidity. None of the covariates were significantly related to cortisol measures.

Progesterone to estriol ratio

Differences in the P:E ratio were also found between the 3 generation groups, $F_{2,465} = 26.67$; $P < .001$. Follow-up tests revealed that the P:E ratio measures for the first-generation mothers ($M = 1.63$; SD $= 0.70$) differed significantly from those of both second-generation ($M = 1.12$; SD $= 0.61$) and third-generation mothers ($M = 1.18$; SD $= 0.05$). These results were significant at the $P < .0001$ level. In addition, a nonlinear trend was detected, $F_{2,465} = 7.97$; $P < .010$. After adjusting for covariates, generation status was marginally associated with differences in the P:E ratio, $F_{2,441} = 3.20$; $P < .04$, although significant differences were found only between the first- and second-generation mothers ($P < .04$). The residential index was significantly related to the P:E ratio, $F_{2,441} = 7.12$; $P < .01$, which suggests that the longer the woman resided in the United States, the lower the P:E ratio.

Corticotrophin-releasing hormone

There was a significant difference between groups in CRH, $F_{2,462} = 6.09$; $P < .01$. A significant linear trend was also found, $F_{2,462} = 10.33$; $P < .01$, suggesting that CRH levels were higher for the first-generation mothers but lower for the second- and third-generation mothers. In addition, CRH levels for the first-generation mothers ($M = 3.14$; SD $= 0.61$) differed significantly from levels of the third-generation mothers ($M = 3.07$; SD $= 0.64$). Differences in CRH by generation were

eliminated when adjustments were made for covariates. However, BMI was significantly associated with CRH, $F_{2,439} = 4.11$; $P < .01$, suggesting that as BMI increased, CRH levels declined. In addition, CRH was significantly related to generational decreases in infant birth weight, $F_{1,452} = 5.99$; $P < .05$, and gestational age at delivery, $F_{2,452} = 4.54$; $P < .05$.

CONCLUSIONS

This research examined differences in indicators of declining health in pregnant women of Mexican origin by generational status, a marker of acculturation. An analysis comparing differences by generations was conducted for pregnancy outcomes, emotional distress measures, the HPA axis, and the P:E ratio. The results indicated declining infant birth weight and gestational age at birth, increasing BMI, worsening emotional distress, particularly between the first and second generations, and an increasing number of lifetime sexual partners.

Perceived stress increased with each generation, indicating exposure to prolonged stress. These findings are consistent with an older study[29] using language spoken and ethnic identification as acculturation measures and the CES-D as a measure of emotional distress. In that study, as acculturation increased, depression scores increased in the young adults. In 2 other studies, acculturation predicted greater risk of psychiatric disorders in Mexican Americans, associated with substance abuse.[30,31] However, in 1 study, highly acculturated Mexican American women reported less depression.[32] That study used only 3 questions to measure acculturation, which may partially explain the difference in results.

This study shows the potential effects of chronic stress on the stress system, as women in successive generations showed decreasing HPA activity. The findings of decreased levels of both CRH and cortisol are consistent with chronic stress, or possibly even posttraumatic stress disorder.[12] Similarly, Glynn and colleagues,[13] who studied ethnic differences in CRH and cortisol at multiple time points over pregnancy, found that at about 24 weeks' gestation, cortisol and CRH levels were lower for Hispanic pregnant women than for non-Hispanic white women and even for African American women.[13] They postulated, as we do from this study, that a lifetime of exposure to increased stress, adverse socioeconomic circumstances, and racism may lead to HPA axis dysregulation, resulting in decreased levels of cortisol and CRH. Lower levels of CRH might be interpreted as not constituting a risk for preterm birth since other studies have shown that with higher levels of CRH, the risk of preterm birth increases.[26] We propose, however, that CRH levels vary not only by ethnicity but also within ethnicity, such that acculturation in Hispanics must be considered in CRH prediction. In other words, the range of low to high CRH levels may vary significantly depending on the woman's generation or time spent in the United States

Both progesterone and estriol are important hormones for pregnancy and the initiation of labor.[14] The balance between them is critical, hence the use of the P:E ratio in this study.[16] Progesterone is known to maintain uterine relaxation and thus to maintain pregnancy. Progesterone disruption may lead to the full cascade of labor. Estriol is a pregnancy-related estrogen produced through an interaction between the mother and the fetus and has been implicated in normal and preterm parturition.[33-36] When progesterone withdraws (levels become lower) and estriol is expressed more (levels become higher), the ratio is lower. Our results indicate that this ratio is decreasing over 3 generations of women of Mexican origin. These results may possibly be due to the effect of acculturation on the reproductive hormones, which work in conjunction with CRH and cortisol.

This study was limited in several ways. First, there is a lack of a direct statistical link between the psychosocial and physiological variables with the measured health outcomes. However, the changes observed for each of these measures were consistent with previous findings and provide a valuable, multifactorial profile of the consequences of

acculturative stress.[2,8] Second, this study was limited by sampling the population at a single time point during pregnancy. A multiple–time point design will be used in future studies to determine potential longitudinal changes in the biobehavioral profiles of Hispanics. Third, recruiting the sample population from patients actively engaged in prenatal care may present a bias toward healthier outcomes and limit the ability to draw broad generalizations from data interpretation. Fourth, operationalization of acculturation from a proximal variable alone (in this case generational status) does not fully address the complexity of the acculturation construct. Additional use of multifactorial acculturation scales (eg, those that incorporate measures such as language preference, time spent in the United States, and family constructs) could provide a more detailed picture of health in Hispanics. Finally, we did not control for induction of labor as potentially accounting for some of the differences in the birth outcomes.

The findings presented from this study have multiple implications for nursing practice. The data suggest that the major deleterious effects on health occur especially in the second generation of Mexican origin Hispanics, suggesting more detailed assessment with these individuals may be needed. Nurses may easily screen for health risks: depression, stress, anxiety, multiple partners, and poor nutritional intake leading to increasing overweight and obesity. Assessment in these areas is particularly important in pregnancy to avoid risk to the fetus. It is vital that appropriate referrals are made to mental health care practitioners who are culturally sensitive and aware of the transition stress these women may be undergoing. Nurses need to work with women about barriers to healthy eating and ways to buy and prepare healthy meals, including negotiation of the system to obtain food stamps and other resources. In addition, counseling is important regarding the need for safe sexual practices and the dangers of sexually transmitted infections during pregnancy related to possible preterm birth.

In conclusion, the results from this study are consistent with that of a recent study on generational status stress, allostatic load, and health of Mexican immigrants.[8] The conclusion of that study was that repeated or chronic physiological adaptation to stressors is an explanation for the "unhealthy assimilation" effect seen in Mexican immigrants. To develop effective interventions for this population, it will be important to determine whether these findings observed at 22 to 24 weeks' gestation can be detected and/or differ earlier in pregnancy. Future research is needed to focus on what might mitigate the stress responses and avoid the weathering, or wear and tear on the body.

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