HHS Public Access

Author manuscript

Arch Womens Ment Health. Author manuscript; available in PMC 2017 August 01.

Published in final edited form as:

Arch Womens Ment Health. 2016 August ; 19(4): 635–644. doi:10.1007/s00737-016-0605-9.

Effects of Acculturation on Prenatal Anxiety among Latina Women

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Abstract

Purpose—Anxiety in pregnancy has been associated with adverse birth outcomes. Relatively few studies have investigated how acculturation affects mental health in pregnancy among Latinas. The goal of this study was to determine if acculturation was associated with anxiety over the course of pregnancy in a sample of predominantly Puerto Rican women.

Methods—Women were recruited in pregnancy for participation in Proyecto Buena Salud, a prospective cohort study of Latina women (n=1412). Acculturation was measured via the Psychological Acculturation Scale (PAS), language preference and generation in the US. Anxiety was measured using the State-Trait Anxiety Instrument. Linear and logistic multivariable regression were used to investigate associations.

Results—After adjustment, women with bicultural identification had significantly lower trait anxiety scores in early pregnancy (beta −3.62, SE 1.1, p<0.001) than low acculturated women. Women with higher levels of acculturation as indicated by English language preference (β=1.41,

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SE 0.7, p=0.04) and second or third generation in the US had significantly higher trait anxiety scores in early pregnancy (β=1.83, SE 0.6, p<.01).

Conclusions—Bicultural psychological acculturation was associated with lower trait anxiety in early pregnancy, while English language preference and higher generation in the US were associated with higher trait anxiety in early pregnancy.

Keywords

acculturation; anxiety; pregnancy; Latino; Hispanic

Introduction

Stress and anxiety disorders are commonly reported in pregnancy (Fergusson 1996), and it is estimated that between 21-24% of women experience an anxiety disorder during pregnancy (Grant 2008, Sutter-Dallay 2004). A recent systematic review and meta-analysis found that maternal anxiety was associated with an increased risk of both preterm birth and low birthweight (Ding 2014). Long-term effects of maternal anxiety have also been predictive of problematic infant temperament (Austin 2005), increased rates of emotional/behavioral problems (O'Connor 2002), and long-term cognitive dysfunction (Mennes 2006). Examining the change in the pattern of anxiety over the course of pregnancy may also be important, as an increase in pregnancy-related anxiety has been shown to be a better predictor of preterm birth than individual measures of anxiety alone (Glynn 2008).

Latina women bear a higher prevalence of behavioral and demographic risk factors which place them at risk for adverse pregnancy outcomes, compared to non-Latina white women (Centers for Disease Control and Prevention 2014). Latinas are more likely to have a teen pregnancy, be late entrants to prenatal care, and to be uninsured than white women (United States Census Bureau 2013). According to birth certificate data, more than one third (36.6%) of Latina mothers have less than a high school education, compared to 8.9% of white mothers (Martin 2012). Latinas are also the largest and fastest growing ethnic group in the US (Krogstad 2014, United States Census Bureau 2011). The percentage of Latina women of childbearing age is projected to increase 92% by 2050, compared to 10% growth for black women (Centers for Disease Control and Prevention 2014). In a nationally representative sample, Puerto Ricans had the highest overall prevalence of mental illness of all Latino groups (39.0%), and nearly a third of Latina women (30.2%) had a psychiatric disorder over the course of their lifetime (Alegria 2007). However, the majority of studies on anxiety in pregnancy have been carried out among non-Latina white women.

It has been hypothesized that cultural changes due to acculturation may influence psychological health. Acculturation refers to the process of taking on attitudes, behaviors and customs of the dominant culture (Abraido-Lanza 2004). Latino immigrants face stressors related to English language acquisition, adaptation to a new culture, customs and food (Cervantes 2013, Flores 2008), and may also be exposed to discrimination and difficulty with finding housing (Umaña-Taylor 2007, Concha 2013). Several mechanisms have been studied, which demonstrate immune (Segerstrom 2004), oxidative (Epel 2004), and endocrine (Heinrichs 2003) pathways between stress and health outcomes. Others (Fox

2015) have proposed a fetal programming framework to explain the intergenerational transmission of poorer health outcomes from mother to child among Latino immigrants. They posited that the health-related effects of acculturation that already have occurred in first-generation individuals may be transmitted to the next generation individuals in a way that perpetuates and possibly amplifies these effects (Fox 2015). Latina women in the United States vary in their levels of English language fluency and maintenance of cultural traditions, and as US citizens, Puerto Ricans are internal migrants who may have distinct experiences that adversely affect mental health.

A review of the literature on the relationship between acculturation and anxiety in pregnancy revealed only six prior published studies (Campos 2007, Campos 2008, Zambrana 1997, Ruiz 2012, Engle 1990, Fleuriet 2014). The findings from these six studies were inconsistent; three studies found no association (Campos 2007, Campos 2008, Engle 1990), one found that higher acculturated women had lower pregnancy-related anxiety (Fleuriet 2014) and two found that higher acculturation was associated with increased anxiety (Zambrana 1997, Ruiz 2012). All of these studies were limited to Mexicans or Mexican-Americans as the primary Hispanic subgroup; none included Puerto Ricans. Five were prospective cohort studies and one was cross-sectional. Although all of the studies investigated anxiety, none examined change in anxiety over the course of pregnancy. Only one used a bi-dimensional scale to measure acculturation (Campos 2007), and none used the Psychological Acculturation Scale (PAS). The remainder of studies used uni-dimensional scales such as Szapocznik's Biculturalism Scale (1978) (Engle 1990), Cuellar's ARSMA scale (1980) (Zambrana 1997), or proxies, including maternal nativity (Campos 2008, Engle 1990, Fleuriet 2014) and generational status (Ruiz 2012) in the United States. As opposed to bi-dimensional scales, uni-dimensional scales are limited by the assumption that as a person acculturates, they lose their identification with their original culture. Bi-dimensional measures allow for identification with both cultures.

In sum, findings for the association between acculturation and anxiety in pregnancy have varied. Therefore, we evaluated the hypothesis that higher acculturation would be associated with increased anxiety in pregnancy, in a sample of predominantly Puerto Rican women.

Materials and Methods

Women were recruited for participation in Proyecto Buena Salud (PBS) from a public obstetrics and gynecology clinic at Baystate Medical Center, a large tertiary care facility located in Western Massachusetts. PBS was a prospective cohort study carried out from 2006-2011; study details have been previously published (Chasan-Taber 2010). Eligible participants had heritage from Puerto Rico or the Dominican Republic, defined as a woman who: 1) was born in Puerto Rico or the Dominican Republic, 2) had a parent born in Puerto Rico or the Dominican Republic, or 3) had two grandparents born in Puerto Rico or the Dominican Republic, and who spoke either English or Spanish. The overall goal Proyecto Buena Salud was to investigate the influence of physical activity and psychosocial stress on the onset of gestational diabetes mellitus. Women were excluded from participation if they: 1) were taking medications that can affect glucose tolerance, 2) had a multiple gestation, 3)

had a history of chronic renal disease, hypertension or heart disease, and 4) were less than 16 years old or greater than 40 years old at enrollment.

Participating women were enrolled by bilingual research staff during prenatal clinics in early pregnancy (before 20 weeks gestation), and provided written informed consent in either English or Spanish, according to their preference. Interviews were conducted face-to-face, and responses were documented on paper surveys. At the initial visit, information on socio-demographic factors, physical activity, mental health indicators, alcohol and tobacco use, and acculturation was obtained. Subsequent visits took place in mid and late pregnancy allowing information to be updated on mental health, substance use and physical activity. Study approval was received from the Institutional Review Boards of the University of Massachusetts-Amherst, Baystate Health, and Tulane University.

A total of 1575 women were enrolled in Proyecto Buena Salud. Women were excluded from the present analysis if they were missing data on all three exposure variables (Psychological Acculturation Scale (PAS) score, preferred spoken language, and generation in the US) (n=6), or all three outcome measures (anxiety measures) (n=161). Four women were missing all exposures and outcomes, resulting in a final dataset of 1412 women.

Assessment of Acculturation

Acculturation was measured at enrollment using the Psychological Acculturation Scale (Tropp 1999). This bi-dimensional scale measures psychological attachment to both mainstream Anglo and Latino culture via 10 items using a Likert scale from 1 to 5. The scale allows for identification with both cultures; a score of 3 defines a bicultural orientation, less than three indicates a low acculturation, and a score of 3 or greater to indicate high acculturation to the dominant white culture. Questions include which culture you feel most comfortable in, feel proud of, share beliefs and values, and know about customs. Mean responses on each item were computed to generate an overall acculturation score. The PAS has high internal consistency in Spanish (0.90) and English (0.83) in Puerto Rican populations (Tropp 1999).

Acculturation was categorized as a 3-level variable with a score of less than three indicating low acculturation, a score of three indicating bicultural acculturation, and a score of greater than three indicating high acculturation to Anglo-American culture. In addition, acculturation was dichotomized (high = greater than or equal to three, low = less than three) and was assessed as a continuous variable. Other proxy measures of acculturation were also measured at enrollment, including generation in the United States and preferred language (English or Spanish). Generation was defined as first (woman born in Puerto Rico/ Dominican Republic), second (at least one parent born in Puerto Rico/Dominican Republic) or third (at least two grandparents born in Puerto Rico/Dominican Republic).

Assessment of Anxiety

Trait anxiety was assessed in early pregnancy using the Spielberger State-Trait Anxiety Inventory (STAI) which measures relatively stable individual differences in anxiety proneness (Spielberger 1983). State anxiety was assessed in mid (18-20 weeks gestation)

and late pregnancy (24-28 weeks gestation) via the STAI which contains 20 statements about how the respondent generally feels.

Both the STAI-T and the STAI-S scales utilize a 4-point Likert-type scale, ranging from 1 (almost never) to 4 (almost always), and a composite score was calculated as the sum of the 20 responses. Scores range from 20-80, and higher anxiety is represented by higher scores. The STAI has recently been identified by a systematic review as the instrument with the highest validity and reliability to measure anxiety in pregnant women, compared to ten other commonly used instruments (Nast 2013). The STAI-T demonstrates high internal consistency (0.96) in pregnant women (Grant 2008). The Spanish version has been validated and has an internal consistency reliability of 0.87 (Spielberger 1986).

In addition, we created two change variables. The first was a continuous variable, calculated by taking the difference between the STAI-S from mid to late pregnancy. The second was a dichotomous variable which indicates the direction of change between the mid and late pregnancy STAI-S scores as either an increase (1) or decrease/no change (0).

Assessment of covariates

We considered social and demographic risk factors that could confound the relationship between acculturation and anxiety via Directed Acyclic Graphs (Textor 2011). These included age, education, parity and living with a partner. We chose not to include cigarette smoking as a covariate because it could be considered an intermediary variable (i.e., on the causal pathway) between acculturation and levels of anxiety (Rothman 2008).

Statistical Analysis

We calculated descriptive statistics (means, standard deviations and frequencies) for the acculturation exposures, anxiety outcomes, and covariates of interest. Bivariate associations were calculated using t-tests, Chi-square tests, ANOVA, or linear regression as appropriate based upon the parameterization of the variables. Unadjusted and multivariable linear regression were utilized to examine the association between acculturation and the continuous anxiety scores in early, mid, and late pregnancy and the change in continuous anxiety from mid to late pregnancy. Unadjusted and multivariable logistic regression were also employed to evaluate the association between acculturation and change in state anxiety (dichotomous increase vs. decrease or no change) from mid to late pregnancy. Sensitivity analyses were conducted to examine if results differed when excluding women with no change in state anxiety (dichotomous increase or decrease), and to investigate if women who completed all three anxiety measurements differed according to baseline characteristics from those who only had one or no state anxiety measurements. All analyses were conducted using SAS 9.3 (Cary, N.C.).

Results

Of the 1412 women in the study, the majority were young (70.2% under 24 years of age) and over half had completed high school or some college (51.9%). Approximately half of the sample were living with a partner (51.1%) and most were pregnant with their first child (41.5%) (Table 1). Women who were younger than thirty years, those with less than college

education, those who reported an annual income less than $30,000, and those who were not living with a partner had significantly higher levels of trait anxiety, on average, in early pregnancy. Women who were smokers and those who had more than two children also had higher trait anxiety levels. Age, education, income, living with a partner and parity were not associated with state anxiety measures in mid-pregnancy, while smokers continued to have significantly higher state anxiety scores at that point. There was no association between age, education, living with a partner or parity with late-pregnancy state anxiety; however, women with lower incomes and smokers continued to have higher mean state anxiety scores.

Anxiety was assessed at mean gestational ages of 12.4 weeks (early pregnancy, n=1310), 21.2 weeks (mid-pregnancy, n=599 (45.7%)) and 30.8 weeks (late pregnancy, n=757 (57.8%)). Mean trait anxiety scores in early pregnancy were higher (39.7 ± 10.4) than mid-pregnancy state anxiety (34.1 ± 11.7) and late pregnancy state anxiety scores (32.8 ± 11.2). The majority of participants had low levels of psychological acculturation as measured by the PAS (78.9%) (Table 2), but were more highly acculturated as indicated by the proxies of language preference (75.2% preferred to speak English), and more than half were second or third generation in the US (53.3%).

In bivariate analyses, continuous and dichotomous measures of psychological acculturation were not associated with trait anxiety in early, mid or late pregnancy (Table 2). In contrast, women who preferred to speak English (higher acculturated) had significantly higher trait anxiety scores in early pregnancy than women who preferred Spanish (40.1 vs 38.6, p=0.02). Women who were second or third generation also had significantly higher trait anxiety scores than first generation women in early pregnancy (40.6 vs 38.8, p<.01). Neither preferred language nor generation in the US were significantly associated with state anxiety measurements in mid- or late-pregnancy.

We then examined the relationship between acculturation and anxiety in pregnancy using unadjusted and multivariable linear regression (Table 3). In unadjusted models, we did not observe a statistically significant relationship between psychological acculturation and trait anxiety in early, mid, or late pregnancy. After adjusting for age, education, parity and living with a partner, findings were essentially unchanged (beta= −0.69, SE 0.9, p=0.43); however, women with bicultural identification (PAS=3) had significantly lower trait anxiety scores (beta= −3.62, SE 1.1, p<.001) in early pregnancy than low acculturated women (PAS<3). In both unadjusted and adjusted models, psychological acculturation was not associated with anxiety in mid (beta=−0.17, SE 1.3, p=0.89) or late (beta=−0.00, SE 1.1, p=0.99) pregnancy. When smoking in pregnancy was added to the final multivariable model, results were slightly attenuated, indicating that it was indeed an intermediary variable.

In early pregnancy, women who preferred speaking English (beta=1.41, SE 0.7, p=0.04) or who were second or third generation in the US (beta=1.83, SE 0.6, p<.01) (higher acculturated) had higher trait anxiety scores in early pregnancy as compared to women who preferred speaking Spanish or who were first generation, respectively. Preferred language (beta 1.55, SE 1.1, p=0.17) and generation in the US (beta=0.78, SE 1.0, p=0.44) were not significantly associated with state anxiety scores in mid-pregnancy in both unadjusted and adjusted models. Similarly, English language preference (beta =−0.04, SE 1.1, p=0.96) or

second/third generation in the US (beta=0.06, SE 0.9, p=0.94) were not associated with late pregnancy state anxiety.

Next, we analyzed the association between acculturation and change in state anxiety from mid to late pregnancy as a continuous variable using linear regression (Table 4). After adjustment for important covariates, psychological acculturation was not significantly associated with change in state anxiety scores (beta=−2.58, SE 1.6, p=0.12). Higher acculturation as measured by preference for speaking English (beta=−2.59, SE 1.60, p=0.11) and second or third generation in the US (beta=−0.31, SE 1.4, p=0.83) was also not associated with change in state anxiety scores.

Finally, the association between acculturation and change in state anxiety scores from mid to late pregnancy was examined as a dichotomous variable using logistic regression (Table 4). Women with high psychological acculturation were more likely to have an increase in state anxiety (OR 1.82, 95% CI 0.97-3.42) than women with low levels, although this was not significant in either unadjusted or adjusted (aOR 1.57, 95% CI 0.80-3.08) analyses. There was the suggestion that higher acculturation as measured by English language preference (aOR 1.80, 95% CI 0.92-3.53) and second or third generation (aOR 1.10, 95% CI 0.64-1.90), was associated with an increase in state anxiety but neither finding was statistically significant.

We also conducted sensitivity analyses excluding women with no change in anxiety; results did not differ significantly. An additional sensitivity analysis was carried out to assess if women who completed all three anxiety measurements differed according to baseline characteristics from those who only had one or no state anxiety measurements; no statistically significant differences were found (data not shown).

Discussion and Conclusion

In this prospective study of predominantly Puerto Rican women, we found that women with bicultural levels of psychological acculturation had lower trait anxiety scores in early pregnancy than women who were less acculturated. In contrast, women with higher levels of acculturation as measured by English language preference and generation in the US had higher trait anxiety scores in early pregnancy. There was the suggestion, although not statistically significant, that women with higher acculturation were more likely to have an increase in state anxiety between mid- and late-pregnancy.

We observed mean trait anxiety scores of 39.7 in early pregnancy, and state anxiety scores of 34.1 for mid-pregnancy and 32.8 for late pregnancy. These are comparable to, although slightly lower than, prior studies limited to largely non-Hispanic white populations. For example, Agrati et al. (2015) administered the STAI to 159 women (90% Caucasian) from Canada between 12-24 weeks gestation, and reported mean state anxiety scores of 36.5 ± 13.2 (range 20-74). A study conducted in France among 634 pregnant women between 20-28 weeks gestation reported mean STAI trait anxiety scores of 38.8 ± 9.2 (range 20-73) (Dayan 2006). Laraia et al. (2006) also used the STAI with 606 primarily white (58%) and black (33%) low-income women before 20 weeks gestation, and observed mean trait anxiety

scores of 39 ± 11.4 (range 20-77). Lee et al. (2007) measured anxiety using the STAI in 798 participants (57% Latina) after a normal second trimester ultrasound and found state anxiety scores of 35 ± 10.

Our findings for psychological acculturation were inconsistent with prior studies that evaluated the association between psychological acculturation and prenatal anxiety (Campos 2007, Zambrana 1997, Engle 1990). For example, Zambrana, et al. (1997) conducted a prospective cohort study among a sample of 911 Mexican women from California. The authors found that higher acculturation as measured by the ARSMA, a uni-dimensional acculturation scale (Cuellar 1980), and cultural integration into U.S. society was linked to higher stress defined as a composite measure including anxiety ($r = .172$, $p<.001$), measured in late pregnancy (Zambrana 1997). In contrast, Campos et al. (2007), utilized a bidimensional acculturation scale in a sample of 1,064 Mexican women and did not find a statistically significant relationship between overall acculturation and pregnancy-related anxiety as measured by Rini's (1999) tool in early pregnancy ($r = -.01$, $p>0.05$). However, the authors found that a Mexican orientation (lower acculturation) was associated with increased anxiety ($r= 0.10$, $p<.0001$) compared to an Anglo orientation (Campos 2007). In the current study, we found that women with bicultural psychological acculturation had trait anxiety scores that were 3.6 points lower than women with low psychological acculturation. Differences in findings between our findings and these prior studies were likely due to differences in sample populations and the tools used to measure acculturation and anxiety, specifically none of these studies focused on women of Puerto Rican heritage, and none used the Psychological Acculturation Scale as a measure of acculturation.

Our findings for language preference and generation in the US were similar to two (Zambrana 1997, Ruiz 2012) of the three prior studies which evaluated these measures and risk of anxiety in pregnancy. Specifically, Ruiz et al. (2012) conducted a prospective cohort study of 470 Mexican women from Texas, and utilized the STAI to measure anxiety. The authors found significant differences between generations, as women who were second or third generation (parent or grandparent born in Mexico) had higher trait anxiety scores compared to first generation women (40.9 vs 38.5 vs 35.4, respectively, $p<.001$) between 22-24 weeks gestation (Ruiz 2012). Zambrana et al. (1997) found that women with lower acculturation had decreased stress (composite measure including anxiety) ($r=-.146$, $p<.001$). Contrary to our findings, a cross-sectional study of 292 Mexican women from Texas by Fleuriet, et al. (2014) found that Mexican-born (lower acculturated) women had higher mean pregnancy-related anxiety as measured by Rini's Pregnancy Anxiety scale than higher acculturated women (19.6 vs 15.6, $p<.001$). Finally, a prospective study of 265 Latinas (predominantly Mexican American) in California found no difference between foreign-born and US-born Latinas and pregnancy-related anxiety measured by Rini's Pregnancy-Anxiety scale in mid-pregnancy (Campos 2008). Differences in study findings are likely due to differences in Latina subgroups studied, the tools used to measure anxiety, and the fact that one study restricted participation to women who spoke English (Campos 2008).

Overall, our findings for the association between acculturation and anxiety differed in direction of effect according to measure of acculturation, with bicultural psychological acculturation associated with decreased trait anxiety scores, while proxies of higher

acculturation (English language preference and 2nd or 3rd generation in the United States) were associated with higher trait anxiety scores. This difference in findings may have been due to the incongruence between length of time spent in the US and psychological attachment to the home culture. Indeed, while the majority of the participants had low psychological attachment to the Puerto Rican culture (as most of the sample had low PAS scores), the majority of the sample preferred English and were second or third generation in the US. Some have posited that, in contrast to other acculturation measures, English language proficiency is a marker for mental health risk, as it indicates loss of positive cultural factors (Alegria 2007). Among the previous studies on acculturation and anxiety in pregnancy, none used multiple measures of acculturation (Campos 2007, Campos 2008, Zambrana 1997, Ruiz 2012, Engle 1990, Fleuriet 2014).

There are strengths and limitations to our study. This prospective study provided a large sample of predominantly Puerto Rican pregnant women, and contributes to the sparse literature on this understudied subgroup of Latinos. Limitations include missing data on state anxiety for some participants; however, as sensitivity analyses showed no differences in descriptive characteristics between women who were missing later anxiety measures and those who were not, the impact of this missing data is likely minimal. Similarly, analyses limited to women with anxiety scores at each of the three time periods did not differ from those from the primary analyses.

Conclusions

In conclusion, we found that women with bicultural psychological acculturation as measured by PAS had lower trait anxiety in early pregnancy than less acculturated women, while proxies of higher acculturation (English language preference and 2nd or 3rd generation in the US) were associated with higher trait anxiety scores in early pregnancy. Future studies should consider using multiple measurements of acculturation when studying mental health risks in pregnancy, until a gold standard can be established.

Acknowledgments

This project was supported by the Training Grant in Reproductive Epidemiology from the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development at the National Institutes of Health (T32 HD057780), and the Maternal and Child Health Epidemiology Doctoral Training Program, HRSA/MCHB (T03MC07649). Proyecto Buena Salud was supported by a National Institutes of Health grant (NIH R01DK064902).

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Table 1

Characteristics of study participants according to measures of anxiety, Proyecto Buena Salud, 2006-2011

	Total Sample (n=1412)		Anxiety measure: Trait (early pregnancy)			State (mid-pregnancy)			State (late-pregnancy)		
	n	%	*mean*	*sd*	p-value	*mean*	*sd*	p-value	*mean*	*sd*	p-value
Age											
16-19	441	31.2	39.8	9.8	0.02	33.5	10.8	0.59	32.4	10.0	0.82
20-24	551	39.0	40.2	10.2		33.7	11.1		32.7	11.2	
25-29	255	18.1	40.1	11.3		35.2	13.0		33.1	11.8	
≥30	165	11.7	37.4	10.9		34.9	14.2		33.6	13.3	
Education											
< High School	646	48.1	39.7	10.1	<.0001	34.8	11.5	0.43	33.9	11.5	0.05
High School graduate	429	31.9	41.0	10.7		33.4	11.8		32.9	11.3	
Some college/graduate	268	20.0	36.6	9.5		34.1	12.0		31.0	10.4	
Annual household income											
≤$15,000	400	57.6	41.7	11.1	<.0001	35.9	12.7	0.15	34.0	11.4	<.01
>$15,000-$30,000	202	29.1	38.3	9.8		33.0	10.2		31.0	10.8	
>$30,000	92	13.3	35.8	8.6		33.4	11.7		29.5	9.4	
Living with partner											
No	650	48.9	40.7	10.7	<.01	34.4	11.9	0.43	33.9	11.5	0.02
Yes	679	51.1	38.9	10.0		33.6	11.6		32.0	10.9	
Any smoking during pregnancy											
No	1144	83.9	38.9	10.1	<.0001	33.2	11.2	<.001	31.9	10.6	<.0001
Yes	220	16.1	44.7	11.0		38.1	13.3		37.3	13.3	
Parity											
Nulliparous	571	41.5	38.9	10.0	<.01	33.2	10.9	0.36	31.7	10.4	0.03
1	424	30.8	39.4	10.1		34.6	12.1		32.5	10.6	
>2	380	27.6	41.2	11.2		34.6	12.4		34.4	12.7	

Percents may not sum to 100 due to rounding.

P-values generated from one-way ANOVAs and t-tests

Table 2

Bivariate associations of covariates by continuous measures of anxiety, Proyecto Buena Salud, 2006-2011

			Anxiety measure								
	Total Sample		Trait (early pregnancy)			State (mid-pregnancy)			State (late-pregnancy)		
	n	%	*mean*	*sd*	p-value	*mean*	*sd*	p-value	*mean*	*sd*	p-value
Continuous Psychological Acculturation score[^] (beta, SE)	2.4	0.65	−0.4	0.5	0.4	−0.2	0.8	0.81	0.2	0.7	0.78
Psychological Acculturation Scale (PAS)											
Low <3	1014	78.9	39.8	10.4	0.39	34.1	11.6	0.77	32.8	11.2	0.65
High ≥3	271	21.1	39.2	10.4		33.7	11.7		33.3	11.2	
Low (<3)	1014	78.9	39.8	10.4	0.01	34.1	11.6	0.53	32.8	11.2	0.25
Bicultural (3)	101	7.9	36.8	10.3		32.1	11.1		31.6	11.9	
High (>3)	170	13.2	40.6	10.2		34.7	12.0		34.6	10.5	
Language preference for speaking/reading											
Spanish	333	24.8	38.6	11.1	0.02	33.5	12.2	0.44	33.2	12.3	0.70
English	1009	75.2	40.1	10.2		34.4	11.5		32.8	10.9	
Generation in the United States											
First generation	639	46.7	38.8	10.5	<.01	33.9	11.7	0.60	32.8	11.7	0.97
Second or third generation	730	53.3	40.6	10.2		34.4	11.7		32.9	10.8	
Generation in the United States											
First generation	639	46.7	38.8	10.5	0.001	33.9	11.7	0.74	32.8	11.7	0.89
Second generation	649	47.4	40.9	10.4		34.5	11.9		32.8	10.8	
Third generation	81	5.9	38.4	8.9		33.3	10.4		33.7	10.5	

Percents may not sum to 100 due to rounding.

*First generation: born in Puerto Rico/Dominican Republic, Second generation: at least one parent born in Puerto Rico or Dominican Republic, Third generation: Grandparents born in Puerto Rico/ Dominican Republic

[^]P-values generated from linear regression, t-tests and one-way ANOVAs

Table 3

Unadjusted and multivariable linear regression results for effects of acculturation on trait and state anxiety scores, Proyecto Buena Salud, 2006-2011.

	Trait anxiety score						State anxiety score (mid-pregnancy)						State anxiety score (late-pregnancy)					
	Unadjusted			Adjusted			Unadjusted			Adjusted			Unadjusted			Adjusted		
	β	*SE*	*p-value*	*β*	*SE*	*p-value*	*β*	*SE*	*p-value*	*β*	*SE*	*p-value*	*β*	*SE*	*p-value*	*β*	*SE*	*p-value*
Psychological Acculturation Scale (PAS)																		
PAS - 2 level																		
Low (<3)	Referent						Referent			Referent			Referent			Referent		
High (≥3)	−0.62	0.7	0.39	−0.93	0.7	0.19	−0.37	1.3	0.77	−0.17	1.3	0.89	0.48	1.0	0.65	0.00	1.1	0.99
PAS - 3 level																		
Low (<3)	Referent						Referent			Referent			Referent			Referent		
Bicultural (3)	−3.03	1.1	<.01	−3.62	1.1	<.001	−1.92	1.9	0.31	−1.49	1.9	0.44	−1.26	1.5	0.40	−1.68	1.5	0.27
High (>3)	0.79	0.9	0.36	0.69	0.9	0.43	0.60	1.5	0.70	0.66	1.6	0.67	1.76	1.3	0.18	1.27	1.3	0.34
Continuous PAS Score (mean, SD)	−0.40	0.5	0.38	−0.55	0.5	0.22	−0.18	0.8	0.81	−0.24	0.8	0.76	0.19	0.7	0.78	0.05	0.7	0.95
Language preference for speaking/reading																		
Spanish	Referent						Referent			Referent			Referent			Referent		
English	1.53	0.7	0.02	1.41	0.7	0.04	0.84	1.1	0.44	1.55	1.1	0.17	−0.39	1.0	0.70	−0.04	1.1	0.96
Generation in the United States*																		
First generation	Referent						Referent			Referent			Referent			Referent		
Second or third generation	1.84	0.6	<.01	1.83	0.6	<.01	0.51	1.0	0.60	0.78	1.0	0.44	0.07	0.8	0.93	0.06	0.9	0.94
Generation in the United States*																		
First generation	Referent						Referent						Referent			Referent		
Second generation	2.1	0.6	<.001	2.10	0.6	<.001	0.65	1.0	0.52	0.85	1.0	0.42	−0.06	0.8	0.95	0.03	0.9	0.97
Third generation	−0.31	1.3	0.81	−0.41	1.3	0.75	−0.57	2.1	0.78	0.19	2.2	0.93	0.92	2.0	0.64	0.35	2.0	0.86

*Adjusted model included age, education, parity and living with a partner

*First generation: born in Puerto Rico/Dominican Republic, Second generation: at least one parent born in Puerto Rico or Dominican Republic, Third generation: *β*= Beta coefficient; SE= Standard Error

Table 4

Unadjusted and multivariable linear and logistic regression results for the association between acculturation and change in state anxiety from mid to late pregnancy, Proyecto Buena Salud, 2006-2011.

			Continuous change in state anxiety						Increase in state anxiety			
			Unadjusted			Adjusted			Unadjusted		Adjusted	
	n	%	*β*	*SE*	*p-value*	*β*	*SE*	*p-value*	OR	95%CI	OR	95%CI
Psychological Acculturation Scale (PAS)												
PAS - 2 level												
Low (<3)	201	80.4	Referent						Referent			
High (≥3)	49	19.6	−3.11	1.6	0.05	−2.58	1.6	0.12	1.82	0.97-3.42	1.57	0.80-3.08
PAS - 3 level												
Low (<3)	201	80.4	Referent						Referent			
Bicultural (3)	25	10.0	−1.72	2.1	0.42	−1.15	2.2	0.59	0.91	0.38-2.15	0.72	0.28-1.82
High (>3)	24	9.6	−4.55	2.2	0.03	−4.10	2.2	0.07	3.91	1.55-9.86	3.72	1.40-9.90
Continuous PAS Score (mean, SD)	2.3	0.7	−2.02	1.0	0.04	−1.45	1.0	0.15	1.55	1.04-2.31	1.46	0.95-2.24
Language preference for speaking/reading												
Spanish	61	24.9	Referent						Referent			
English	184	75.1	−1.94	1.6	0.22	−2.59	1.6	0.11	1.36	0.75-2.48	1.80	0.92-3.53
Generation in the United States*												
First generation	121	48.2	Referent						Referent			
Second or third generation	130	51.8	−0.38	1.4	0.79	−0.31	1.4	0.83	1.04	0.63-1.72	1.10	0.64-1.90
Generation in the United States*												
First generation	121	48.2	Referent						Referent			
Second generation	121	48.2	−0.47	1.4	0.74	−0.28	1.4	0.84	1.04	0.62-1.73	1.11	0.63-1.93
Third generation	9	3.6	−1.05	3.8	0.78	−0.66	3.7	0.86	1.14	0.29-4.45	1.03	0.25-4.27

OR= Odds ratios; CI= Confidence Intervals

*Adjusted model included age, education, parity and living with a partner

*First generation: born in Puerto Rico/Dominican Republic, Second generation: at least one parent born in Puerto Rico or Dominican Republic, Third generation: Grandparents born in Puerto Rico/ Dominican Republic