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## Acculturation and Intention to Breastfeed Among a Population of Predominantly Puerto Rican Women

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### Abstract

**Background**—Latinas have high overall breastfeeding initiation rates, yet Puerto Ricans have among the lowest exclusive breastfeeding rates. This study sought to determine if acculturation was associated with intent to breastfeed in a predominantly Puerto Rican population.

**Methods**—A cohort of Latina women were enrolled in Proyecto Buena Salud, and provided information on infant feeding intent (N=1323). Acculturation was assessed via the Psychological Acculturation Scale (PAS), language preference and generation in the US.

**Results**—Increasing acculturation as measured by English language preference (aOR 0.61, 95% CI 0.42-0.88) and second/third generation in the US (aOR 0.70, 95% 0.52-0.95) was inversely associated with odds of intending to exclusively breastfeed. Similarly, women with higher levels of acculturation as measured by the PAS (aOR 0.67, 95% CI 0.45-0.99), English language preference (aOR 0.48, 95% CI 0.33-0.70) and second or third generation in the US (aOR 0.42, 95% CI 0.31-0.58) were less likely to report intent to combination feed as compared to women with lower acculturation.

**Conclusions**—Acculturation was inversely associated with intent to exclusively breastfeed as well as intent to combination feed in this predominantly Puerto Rican sample.

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## Keywords

acculturation; Latino; Hispanic; breastfeeding; pregnancy

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Children who are breastfed have multiple long-term health benefits including lower rates of obesity, ear infections, asthma, diabetes and leukemia as compared to formula-fed babies (1). Mothers who breastfeed also may have decreased rates of ovarian cancer (2), lower risk of diabetes (3), and increased weight loss in the immediate post-partum period as well as long-term (4). Women's attitudes and decision making about whether or not to breastfeed are often established early in pregnancy, and are predictive of initiation and duration of breastfeeding (5,6).

Latina women have the highest rates of breastfeeding initiation of any ethnic/racial group in the US (80.0% have ever breastfed), higher than non-Latina whites (75.2%) and blacks (58.9%) (7). However, these data mask the fact that certain subgroups of Latinas have lower breastfeeding initiation rates compared to non-Latina whites (8,9). National surveys of breastfeeding often group all Latinos into one category and do not include country of birth, length of stay in the US or national origin (10). Puerto Rican women typically have poorer indicators for a variety of health behaviors and outcomes (11), including lower exclusive breastfeeding rates (27.6%) as compared to Central (60.0%) or South Americans (69.6%) (12). In addition, prior studies suggest that Latinas in the US have a lack of knowledge regarding breastfeeding recommendations and may believe that any breastfeeding is sufficient (13). Indeed, studies have suggested that Puerto Rican women may be more prone to supplement with formula (13).

Acculturation is the process by which immigrants take on the dominant culture's language, customs and behaviors (14). Several instruments exist to measure this construct. Linear (or uni-dimensional) acculturation scales (15,16) focus on behaviors and language and assume that identifying with a new culture simultaneously occurs with losing identification with the original culture. Bi-dimensional acculturation scales allow for bicultural identification and include other components such as media use in different languages (17). The Psychological Acculturation Scale (18) is an example of a bi-dimensional instrument that also incorporates the individual's psychological acculturation and response to cultural exposures.

A literature review of acculturation and breastfeeding identified 13 prior studies on this topic (19-31), four of which examined intent to breastfeed as a specific outcome (21,22,27,29) while the remainder examined actual breastfeeding initiation and duration. Only three (20,21,24) identified women by country of origin beyond "Latino" or "non-Mexican" and included Puerto Ricans. Study designs were cross-sectional (n=6), prospective (n=4), retrospective cohort (n=1), or randomized trials (n=2). Only two studies used validated bi-dimensional instruments to measure acculturation (24,29); all other studies used proxy measures of acculturation, most frequently language or nativity.

Therefore, the purpose of this study was to investigate if acculturation was associated with intent to breastfeed in a sample of predominantly Puerto Rican pregnant women. Our

hypothesis was that higher acculturated women would be less likely to express the intent to breastfeed their infants than women with lower levels of acculturation.

## METHODS

We utilized data from Proyecto Buena Salud, a prospective study of Latina women conducted from 2006-2011 (32). Study recruitment took place at a public obstetrics and gynecology clinic and midwifery practice in Western Massachusetts, which has a Latino patient population of predominantly Puerto Rican women. The original study was designed to investigate how physical activity and psychosocial stress influenced the onset of gestational diabetes mellitus. Eligibility was restricted to women who had heritage from Puerto Rico (PR) or the Dominican Republic (DR) and who: 1) were born in PR/DR, 2) had a parent born in PR/DR, or 3) had two grandparents born in PR/DR, and who spoke either English or Spanish. Exclusion criteria included 1) current medications that could affect glucose tolerance, 2) multiple gestation, 3) history of chronic renal disease, hypertension, diabetes or heart disease and 4) age <16 years or >40 years.

Women were recruited by trained interviewers at a prenatal care visit early in pregnancy (up to 20 weeks gestation). Study participants gave informed consent in either English or Spanish according to patient preference, and were provided information on the study protocol. Bilingual recruiters minimized language barriers by recording participant's answers on paper during the face-to-face interview in the participant's preferred spoken language. At the initial study visit, acculturation, demographic, cigarette use and physical activity information was collected. Medical outcomes including obstetric history and information on feeding intent were abstracted from medical records after delivery. The study received approval from the parent University and the participating hospital clinics, and the present analysis was approved by the corresponding University's Institutional Review Board.

Proyecto Buena Salud enrolled 1583 prenatal care patients between January 2006 and October 2010. Participants were then excluded from the current analysis if they: 1) were missing data on all three acculturation measures (psychological acculturation, preferred language, and generation in the United States) [n = 6], 2) were missing infant feeding intent [n = 246] largely due to not delivering at Baystate Medical Center (84%), and 3) had multiple gestations [n = 8]. This resulted in total of 1323 women contributing data to analyses.

### Assessment of Acculturation

The Psychological Acculturation Scale (18) was used to measure acculturation at the time of enrollment. This scale measures psychological attachment to both Anglo and Latino culture, via a questionnaire with ten Likert-type questions. Scores ranged from 1 to 5 per question, and a lower score indicates less psychological attachment to Anglo culture. Each participant's acculturation score was created based on mean responses for all questions. The Psychological Acculturation Scale has been validated in Puerto Rican populations and has shown high internal consistency (18). Psychological acculturation (PAS score) was also examined as a dichotomous variable (high  $\geq 3$  or low <3) and categorical variable (high >3,

bicultural=3 and low<3). Other proxies of acculturation, including preferred spoken language for reading (i.e., English, Spanish) and speaking, as well as generation in the United States, were also collected. First generation was defined as the participant herself being born in Puerto Rico/Dominican Republic, second generation was defined as having at least one parent born in Puerto Rico/Dominican Republic, and third generation was defined as having grandparents born in Puerto Rico/Dominican Republic. We created a dichotomous generation variable with first generation compared to second and third generation, and a three-level generation variable with first, second and third generation categories.

### **Assessment of Intent to Breastfeed**

Feeding intent was abstracted from the medical record. Women reported either before or immediately after delivery whether they planned to breastfeed exclusively, breast and formula feed, or formula feed exclusively. We therefore examined feeding intent as a three-level outcome: intent to exclusively breastfeed, intent to exclusively formula feed, or intent to both breastfeed and formula ('combination') feed as have others (33-35).

### **Assessment of covariates**

Information on several socio-demographic and medical risk factors which influence a mother's choice of infant feeding was collected at baseline via self-report or from the medical record (32). These included maternal age, highest level of education completed, lack of prenatal care, annual household income, parity, cigarette smoking during pregnancy, living with a partner, and depression, anxiety and stress measures (22,36). Directed Acyclic Graphs (DAGs) (37) and 10% change in estimate procedures were used to identify covariates for inclusion in multivariable models; these included age, education, living with a partner, parity and history of preterm birth.

### **Statistical Analysis**

We conducted a complete case analysis and therefore limited the dataset to women who had data on at least one of three exposure variables (i.e., psychological acculturation, language preference, generation in the United States) as well as the outcome variable (i.e., feeding intention). Covariates were examined independently via univariate analyses, and descriptive statistics including means, standard deviation and frequencies were examined for continuous and categorical variables. Chi-square and t-tests were utilized to examine bivariate associations between acculturation and infant feeding intent. A multinomial logistic regression model was fit to the three-level feeding intent variable (generalized logit) to produce separate odds ratios for predicting intent to breastfeed and intent to combination feed compared to intent to exclusively formula feed. Univariate (unadjusted) multinomial logistic regression models were run for each exposure predicting the three-level outcome, followed by multivariable (adjusted) multinomial models. Alpha was set at 0.05 to indicate statistical significance. All analyses were conducted using SAS 9.3 (Cary, N.C.).

## **RESULTS**

The majority of study participants reported low psychological acculturation (mean PAS score <3), but preferred to speak and read in English. Slightly more than half of the

participants were born in the continental US (second or third generation) (Table 1). Most women expressed intent to breastfeed, followed by formula and combination (breast/formula) feeding. Overall, women were young (under the age of 24), pregnant with their first child and just over half had completed high school or greater education.

In bivariate analyses, psychological acculturation was not associated with feeding intent (Table 1). However, proxies of acculturation as measured by language preference for reading and writing, as well as by generation in the US were both associated with significant differences in feeding intention (Table 1). Participants with at least some college education and those of higher income were significantly more likely to intend to exclusively breastfeed than combination or formula feed. Similarly nonsmokers and nulliparous women were also significantly more likely to intend to exclusively breastfeed. Age and living with a partner were not associated with feeding intention.

Multinomial logistic regression was then performed to investigate the effects of acculturation on odds of reporting intent to exclusively breastfeed or combination feed versus intent to formula feed (Table 2). High psychological acculturation as measured by 2-level (aOR 0.81, 95% CI 0.56-1.16) or 3-level (aOR 0.77, 95% CI 0.49-1.19) variables were not significantly associated with the odds of intent to exclusively breastfeed vs intent to formula feed. However, English language preference (higher acculturation) was associated with decreased odds of intent to breastfeed exclusively (aOR 0.61, 95% CI 0.42-0.88). Similarly, women who were second or third generation (parent or grandparents born in Puerto Rico/Dominican Republic) were significantly less likely to report intent to exclusively breastfeed than women who were first generation (aOR 0.70, 95% CI 0.52-0.95).

Higher psychological acculturation was significantly associated with decreased intent to combination feed vs. formula feed as measured by the 2-level (aOR=0.67, 95% CI 0.45-0.99) and continuous (aOR 0.78, 95% CI 0.61-0.99) but not the 3-level (aOR=0.66, 95% CI 0.41-1.06) variables (Table 2). Women who preferred to speak English (higher acculturation) were significantly less likely to report intent to combination feed (aOR 0.48, 95% CI 0.33-0.70). Similarly, women who had parents or grandparents born in the US (higher acculturated) were significantly less likely to report intent to combination feed (aOR 0.42, 95% CI 0.31-0.58) as compared to first generation women.

A total of 252 participants were excluded from the current analysis because they were missing data on all three acculturation measures and missing infant feeding intent largely due to not delivering at Baystate Medical Center. Therefore, we compared characteristics of women missing acculturation and infant feeding measures (16% of the original sample) to those who had this data. Women missing information did not differ from those not missing information in terms of generation in the US, age, income, living with a partner, smoking, or parity. However, those missing information were more likely to have higher levels of education as compared to women in the final analytic dataset (28.4% vs. 18.8% had greater than high school, respectively,  $p=0.01$ ).

## DISCUSSION

In this analysis of a prospective cohort study of predominantly Puerto Rican women, women with higher levels of acculturation as measured by preferred language and generation in the US were approximately 30-40% less likely to report intent to exclusively breastfeed than formula feed. In addition, higher acculturation was associated with approximately 35-55% decreased risk of intent to combination feed versus formula feeding, as measured by psychological acculturation, preferred language and generation in the United States.

We found that while the majority of women in our study reported low psychological acculturation, they preferred to speak and read in English. Two explanations for this apparent contradiction include the limitations of proxy measurement and the unique case of Puerto Ricans. First, proxy measures such as language and generation have limited scope and sensitivity (38) and may measure other constructs that are unrelated to acculturation (39). For example, preferred language may be strongly influenced by a patient's access to health care and language of service provision (40). In addition, some have suggested that English language proficiency may be associated with low psychological acculturation (41,16) as a person's relationship networks are fluid and are inadequately measured by such proxies (39) given that acculturation is a complex process. Second, few studies have investigated acculturation in Puerto Rican women (39). Puerto Ricans are unique among Hispanic subgroups in that their island is legally recognized as a US territory with the official languages of English and Spanish reflecting the influence of US culture (42,43). Therefore, multiple measures of acculturation are recommended as it is a complex phenomenon (44).

We found that high psychological acculturation, English language preference and greater generation in the US were all associated with a decreased risk of intent to combination feed vs. formula feed. Our findings for the association between acculturation feeding intention are consistent with several (19,21-26,28-31) but not all (20,27) previous studies on acculturation and Latina women as a group. Among the studies that looked at feeding intent instead of initiation or duration (21,22,27,29), only two (21,29) provided more than a dichotomous choice of intent to exclusively breastfeed versus formula feed, limiting inferences regarding intent to combination feed. No previous studies used the PAS to measure psychological acculturation, however, and most did not include Puerto Ricans as a majority of their sample. To our knowledge, only three of these prior studies (20,21,24) identified women by country of origin beyond "Latino" or "non-Mexican" and included Puerto Ricans.

In the first of these three studies to include Puerto Rican women, Anderson, et al. conducted a cross-sectional study of 161 women (93.1% had Puerto Rican heritage) in Connecticut. They found no association between acculturation and breastfeeding initiation (no effect estimate reported), but reported that women with higher social capital were more likely to breastfeed (OR= 2.25, 95% CI 1.02-4.95) (20). The second study was also cross-sectional, and included 382 women of all ethnicities (31% Puerto Rican) in New York. In that study, Bonuck et al. reported that in general, foreign born women were more likely to intend to breastfeed than US born women (OR 2.23 95% CI 1.22-4.43) (21). Consistent with this

finding, we found that women who were born in the mainland US (second or third generation) were significantly less likely to report intent to breastfeed than women who were not born in the mainland US (first generation) (aOR 1.43, 95% CI 1.05-1.92). Finally, Chapman et al. conducted a randomized controlled trial of 114 Latina women (51.6% Puerto Rican) in Connecticut and found that based on a bi-dimensional acculturation scale, lower acculturative-type women were significantly less likely to stop breastfeeding than higher acculturative-type (HR 0.16, (0.05-0.55)) (24). No proxy measures of acculturation were included in these studies.

There are several strengths to the present study, including its comprehensive measurement of acculturation, large sample size and high response rates. Limitations include a lack of information on family relationships that influenced a woman's decision on infant feeding. Our outcome measure was prenatal report of breastfeeding intention, as opposed to postnatal report of breastfeeding initiation. However, studies estimate that 82% to 97% of women make their decision about breastfeeding prior to delivery (45), and there is strong correlation between breastfeeding intention and actual initiation and duration (46-49). Research also suggests that Hispanic women are more likely to make feeding decisions either before or during pregnancy (21).

There is also the possibility of residual confounding as information on previous breastfeeding behaviors was not available. Social desirability bias may also be present, as women were likely interviewed about infant feeding by health care providers, and may have wanted to give the "correct" answer, however this type of misclassification would result in biasing our results toward the null. Study findings may not be generalizable beyond Puerto Rican women outside of the Northeast, as migration patterns and health behaviors may differ. Women missing information on acculturation and infant feeding (16% of sample), and therefore not included in this dataset, did not differ in terms of psychological acculturation, language, generation, age, income, living with a partner, smoking or parity, but were more likely to have higher levels of education as compared to women in the final dataset. To the extent that education is associated with both acculturation and infant feeding, this may have biased results towards the null.

It is important to note that women may have several different intentions when they declare an intention to combination feed. Major factors influencing this decision have been found to include: the perceived health aspects of both breast milk and formula, the anticipated discomfort and embarrassment associated with breastfeeding, as well as family and cultural beliefs (50).

In conclusion, we found that breastfeeding behaviors may differ based on acculturation status. Future research in this area should include a comprehensive assessment of generational status, country of origin and acculturation for Latinas as well as a comprehensive assessment of breastfeeding behaviors, ideally in a longitudinal study. Practitioners can encourage breastfeeding among Latinas by improving education in prenatal settings on the benefits of long term, exclusive breastfeeding.

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**Table 1**

Bivariate (unadjusted) associations between covariates and feeding intention, Proyecto Buena Salud, Massachusetts, 2006-2011.

	Total sample (N=1323)		Feeding Intention						P-value
			Breastfeed (n=533)		Formula feed (n=415)		Combination feed (n=375)		
			n	column %	n	row %	n	row %	
Psychological Acculturation Scale (PAS)									
Low <3	895	79.3	364	40.7	264	29.5	267	29.8	0.08
High 3	234	20.7	97	41.5	83	35.5	54	23.1	
Language preference for speaking/reading									
Spanish	303	24.3	125	41.3	75	24.8	103	34.0	<.01
English	945	75.7	379	40.1	316	33.4	250	26.5	
Generation (dichotomized)*									
First generation	603	47.0	242	40.1	161	26.7	200	33.2	<.0001
Second or third generation	679	53.0	281	41.4	242	35.6	156	23.0	
Generation in the United States*									
First generation	603	47.0	242	40.1	161	26.7	200	33.2	<.0001
Second generation	604	47.1	245	40.6	218	36.1	141	23.3	
Third generation	75	5.9	36	48.0	24	32.0	15	20.0	
Age									
16-19	412	31.1	172	41.8	124	30.1	116	28.2	0.39
20-24	517	39.1	212	41.0	155	30.0	150	29.0	
25-29	235	17.8	81	34.5	82	34.9	72	30.6	
30	159	12.0	68	42.8	54	34.0	37	23.3	
Education									
< High School	579	48.5	175	30.2	218	37.6	186	32.1	<.0001
High School graduate	391	32.8	181	46.3	110	28.1	100	25.6	
Some college/graduate	224	18.8	127	56.7	46	20.5	51	22.8	
Annual household income									
\$15,000	359	58.6	136	37.9	117	32.6	106	29.5	0.01
>\$15,000-\$30,000	179	29.2	82	45.8	55	30.7	42	23.5	

	Total sample (N=1323)	Feeding Intention						P-value	
		Breastfeed (n=533)		Formula feed (n=415)		Combination feed (n=375)			
		n	row %	n	row %	n	row %		
Living with partner									
>\$30,000	75	12.2	43	57.3	22	29.3	10	13.3	
No	577	48.9	222	38.5	183	31.7	172	29.8	0.26
Yes	603	51.1	258	42.8	186	30.9	159	26.4	
Any smoking during pregnancy									
No	1019	84.1	444	43.6	285	28.0	290	28.5	<.0001
Yes	193	15.9	46	23.8	89	46.1	58	30.1	
Parity									
Nulliparous	549	41.6	273	49.7	125	22.8	151	27.5	<.0001
1	396	30.0	149	37.6	133	33.6	114	28.8	
2	375	28.4	109	29.1	156	41.6	110	29.3	

Numbers may not sum to 100 due to rounding. Subjects may not sum to 1323 due to missing values for covariates.

P-values generated from Chi-Square tests and represent overall unadjusted distribution of covariates by feeding method.

\* 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

Odds ratios and 95% confidence intervals for the effects of acculturation on infant feeding intent, Proyecto Buena Salud, Massachusetts, 2006-2011 (n=1323).

**Table 2**

	Breastfeed vs. formula feed			Combination feed vs. formula feed		
	Unadjusted OR (95% CI)	Adjusted* OR (95% CI)	Reference	Unadjusted OR (95% CI)	Adjusted* OR (95% CI)	Reference
<b>Psychological Acculturation Scale (PAS)</b>						
PAS - 2 level						
Low (<3)	Reference	Reference	Reference	Reference	Reference	Reference
High ( 3)	0.85 (0.61-1.18)	0.81 (0.56-1.16)		0.64 (0.44-0.94)	0.67 (0.45-0.99)	
PAS - 3 level						
Low (<3)	Reference	Reference	Reference	Reference	Reference	Reference
Bicultural (3)	0.79 (0.48-1.30)	0.87 (0.51-1.49)		0.63 (0.36-1.12)	0.68 (0.38-1.22)	
High (>3)	0.89 (0.59-1.33)	0.77 (0.49-1.19)		0.65 (0.41-1.05)	0.66 (0.41-1.06)	
Continuous PAS Score (mean, SD)	0.98 (0.79-1.22)	0.95 (0.75-1.20)		0.79 (0.62-0.99)	0.78 (0.61-0.99)	
Language preference for speaking/reading						
Spanish						
Reference	Reference	Reference	Reference	Reference	Reference	Reference
English						
Reference	0.72 (0.52-0.99)	0.61 (0.42-0.88)		0.58 (0.41-0.81)	0.48 (0.33-0.70)	
Generation in the United States						
First generation**						
Reference	Reference	Reference	Reference	Reference	Reference	Reference
Second or third generation**						
Reference	0.77 (0.59-1.01)	0.70 (0.52-0.95)		0.52 (0.39-0.69)	0.42 (0.31-0.58)	
Generation in the United States						
First generation**						
Reference	Reference	Reference	Reference	Reference	Reference	Reference
Second generation**						
Reference	0.75 (0.57-0.98)	0.68 (0.50-0.93)		0.52 (0.39-0.70)	0.42 (0.30-0.59)	
Third generation**						
Reference	1.00 (0.57-1.74)	0.88 (0.47-1.64)		0.50 (0.26-0.99)	0.45 (0.22-0.92)	

OR= Odds ratios; CI= Confidence Intervals

\* Adjusted for age, education, living with a partner, parity, and history of preterm birth

\*\* 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