



Acculturation and Breastfeeding Among Hispanic American Women: A Systematic Review

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Abstract

Introduction Hispanic immigrants are more likely to breastfeed than are Hispanics born in the US, in part due to their acculturation. This paper aims to systematically review the existing literature on the association between acculturation and Hispanics' breastfeeding behaviors. **Methods** The systematic search used major databases such as Medline and PubMed, and it followed the PRISMA checklist. The scientific quality of the studies was rated using the Quality Assessment Tool for Quantitative Studies. **Results** We identified 1943 potential citations, of which 18 studies met the eligibility criteria. Overall, while 13 studies suggested that high-acculturated Hispanics were less likely to breastfeed compared with low-acculturated, five studies did not find significant evidence of such an association. Moreover, 12 studies used a static measure or a linear scale, which is not optimal; only three studies utilized bi/multidimensional scales to assess acculturation. Intention to breastfeed was examined in six studies, but the results were inconsistent. Breastfeeding initiation was examined in 11 studies, and two out of eight studies that examined breastfeeding duration, specifically analyzed exclusive breastfeeding at 6 months. **Discussion** Our results agree with the general hypothesis that higher acculturation is inversely related to breastfeeding rates, independently of income. Researchers used different methodologies to study acculturation and breastfeeding practices, limiting our ability to reach more detailed conclusions. Owing to the lack of a standard methodology for measuring acculturation, future studies should utilize bi/multidimensional scales when studying breastfeeding, in particular, in relation to breastfeeding intention and exclusive breastfeeding at 6 months; preferably according to Hispanic subgroups.

Keywords Acculturation · Breastfeeding · Hispanics · Systematic review

Significance

What is already known on this subject? The decrease in U.S.-Hispanics' breastfeeding behaviors might be attributed to acculturation. However, the published evidence that

associates acculturation with a decrease in Hispanics' breastfeeding behaviors is not conclusive.

What does this study add? To date a variety of methodologies have been used in lactation studies. For example, authors have used different definitions of breastfeeding, have not utilized optimal scales to assess acculturation, in multivariable analyses have missed important covariates, and not all studies differentiated between Hispanic subgroups. Future studies should utilize bi/multidimensional scales when studying breastfeeding, in particular, in relation to Hispanics' intention and exclusive breastfeeding at 6 months, and preferably by country of origin.

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Introduction

The World Health Organization (WHO) recommends that “newborns be exclusively breastfed for at least 6 months with continued breastfeeding along with appropriate

complementary foods up to 2 years of age or beyond” (WHO 2011). In the United States (U.S.), although the breastfeeding initiation rate is high (82.5%), the exclusive and long-term breastfeeding rates are low, as approximately 75% of newborns are not exclusively breastfed for at least 6 months (Centers for Disease Control and Prevention [CDC] 2014). Hispanics’ breastfeeding rates have increased in the past decade and have reached U.S. national rates; 84.8% of Hispanic children born in 2014 were ever breastfed and only 24.5% were exclusively breastfed until 6 months (CDC 2014). However, observational studies indicated that breastfeeding rates for Hispanics deteriorate with increasing years living in the U.S. (Harley et al. 2007) and that Hispanic immigrants are significantly more likely to breastfeed than are Hispanics born in the U.S. (Kimbro et al. 2008). Gibson-Davis and Brooks-Gunn (2006) found that for each additional year living in the U.S., the odds of ever breastfeeding decreased by 4% for Hispanics. Numerous studies have partly attributed this decrease to acculturation (Gibson et al. 2005; Gorman et al. 2007), a process whereby individuals from one culture adopt the beliefs and behaviors of another culture (Chakraborty and Chakraborty 2010).

Three models in the literature have attempted to conceptualize the acculturation process: the unidimensional model, which assumes a straight-line process toward assimilation; the bidimensional model, which subsumes individuals who adopt certain aspects of the host culture while continuing to value and retain the norms of their original culture (Berry 2003); and the multidimensional model, which includes cultural changes in several life dimensions such as practices, values, and identification (Chakraborty and Chakraborty 2010). In trying to assess the acculturation process in observational studies of Hispanics, several scales were developed ranging from proxy measures to more complex ones. In breastfeeding studies some scholars use proxy measures to roughly assess some degree of acculturation such as Hispanics’ language preference (Ahluwalia et al. 2012) and/or birth place (Balcazar et al. 1995), whereas other scholars assess deeper layers of acculturation, such as Hispanics’ attitudes

about their gender roles and their cultural engagement (Kimbro et al. 2008). Moreover, other researchers combined measures (Sussner et al. 2008) such as nativity, generation status, time lived in the US, and language use.

Several review studies synthesized and summarized the impact of acculturation on Hispanics’ health behaviors (Arandia et al. 2012; Lara et al. 2005), and suggested integrating cultural elements into health promotion programs and provided recommendations for future scholars. However, a summary of the current knowledge on acculturation and breastfeeding in Hispanics has not yet been published. With the goal of filling this need, we summarized all the quantitative studies that aimed to examine the association between Hispanics’ breastfeeding behaviors and acculturation, focusing on advancing our understanding of the complexity of this link, shedding light on the significant gaps in this research area, and suggesting directions for future studies.

Methods

Search Strategy

This study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses and used the PRISMA checklist, in reporting our systematic review. The PRISMA checklist was developed to provide clear, practical, and systematic guidance in researching and writing systematic reviews (Moher et al. 2015). Comprehensive electronic searches, with the help of a professional librarian to identify suitable publications, were conducted from January 9 to 11, 2018 using the main health databases: Medline-EBSCO, Academic Search Complete-EBSCO, PubMed, and other relevant databases such as PsycInfo-EBSCO, and the Cochrane library (Table 1). Additionally, we manually searched for articles published in selected professional journals, revised the list of references in selected articles, and chose the first 100 most relevant citations in Google scholar (Table 1). The main key concepts are based on

Table 1 Systematic review of the main database and key journals

Databases	Professional journals	Other resources
Academic Search-Complete	Breastfeeding Medicine	Citation lists
Cochrane library	International Breastfeeding Journal	Google Scholar
Medline	Journal of Human Lactation	
PsycINFO	Journal of Immigrant & Minority Health	
PubMed	Journal of Women’s Health	
	Maternal and child health journal	
	Maternal and Child Nutrition	
	Pediatrics	
	Women’s Health Issues	

MeSH keywords for ‘breastfeeding,’ ‘Hispanics,’ and ‘acculturation,’ which were mentioned in the title and/or abstract and/or the full text. Hispanics followed the definition of Hispanic-Americans given by MeSH: “Persons living in the U.S. of Mexican (Mexican-Americans), Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin. The concept does not include Brazilian-Americans or Portuguese-Americans”. Table 2 includes all the “search terms” that were employed by inserting them simultaneously in each of the electronic databases. Within term groups (i.e., acculturation) the search terms were divided by ‘or’, whereas the two term groups were connected by ‘and’.

Eligibility

All citations were stored in the reference manager database Refworks (Hendrix 2004). Eligibility criteria were created by all the authors (GB, AW, AP, and NH) and are presented in Table 3. After the duplicate citations were removed, the screening and selecting processes were as follows: in the first round, articles were excluded based upon their title, then, in the second round, articles were excluded based on their abstract. In the final round, full-text papers were obtained and were carefully assessed. All three rounds were conducted independently at two separate times, during November–December 2015 (at that time generating 16

reviewed articles) and during January 2018 by the leading author, GB. The selected reviewed studies and data extraction were confirmed by all the authors and any disagreement was settled by a discussion (Bown and Sutton 2010). The literature search and article selection are presented in a flow chart (Fig. 1). Overall, 1943 citations were downloaded and 686 duplicates were removed. Based on the inclusion and exclusion criteria (Table 3), 18 articles met the eligibility criteria and 1239 citations were excluded, as described in detail in Fig. 1.

Data Extraction and Quality Assessment

We developed an electronic data extraction form and extracted information from each reviewed study based on predefined data fields, as described in the headings in Table 4.

For quality assessment, we used an adapted version of the Quality Assessment Tool for Quantitative Studies developed by the Effective Public Health Practice Project (Thomas et al. 2004). This tool consists of eight key domains (Table 5) with a score ranging from low (1) to high (3). The reviewer determined an overall rating for each reviewed study: strong, moderate, or weak final scores (Table 4).

Results

Quality and Characteristics of the Reviewed Studies

The quality evaluation results are presented in Fig. 2 and Table 4. None of the reviewed papers were ranked as a ‘weak’ in their final score and therefore, they were not eliminated from the final review. The 18 reviewed studies utilized a prospective study design (nine articles), a cross-sectional design (eight articles), and one utilized a retrospective study design. Overall 12 studies employed primary data from Hispanic communities, mainly low-income communities, and six studies analyzed secondary data from national surveys. Mexican-Americans were the most studied Hispanic subgroup; 12 studies included Mexican-descent populations, four studies included also Puerto Ricans, three studies

Table 2 Search terms used for the systematic review by main key concepts

Hispanics	Acculturation	Breastfeeding
Hispanic	Acculturation	Bottle feeding
Latina/o	Alien	Breastfed
Mexican	Birthplace	Breastfeeding
Puerto Rican	Cultural assimilation	Breastfeed
Cuban	Education	Breast-milk
	Emigrant	Colostrum
	Foreigner	Human milk
	Generation	Lactate Lactation
	Immigrant	Wean
	Language use	
	Time in the US	

Table 3 Inclusion exclusion criteria for selecting potential articles for the final review

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> • The study was published in a peer-reviewed scientific journal • The study utilized acculturation scales or proxy measures of acculturation • The study aimed to analyzing the association between acculturation and breastfeeding • The study included populations of Hispanic origin 	<ul style="list-style-type: none"> • The study was published in commentaries, case reports, books, dissertations, editorials, and conference proceedings • The study was not an observational and/ or a quantitative study • The study was a qualitative or a review study • The study was not conducted in the US and/or in English

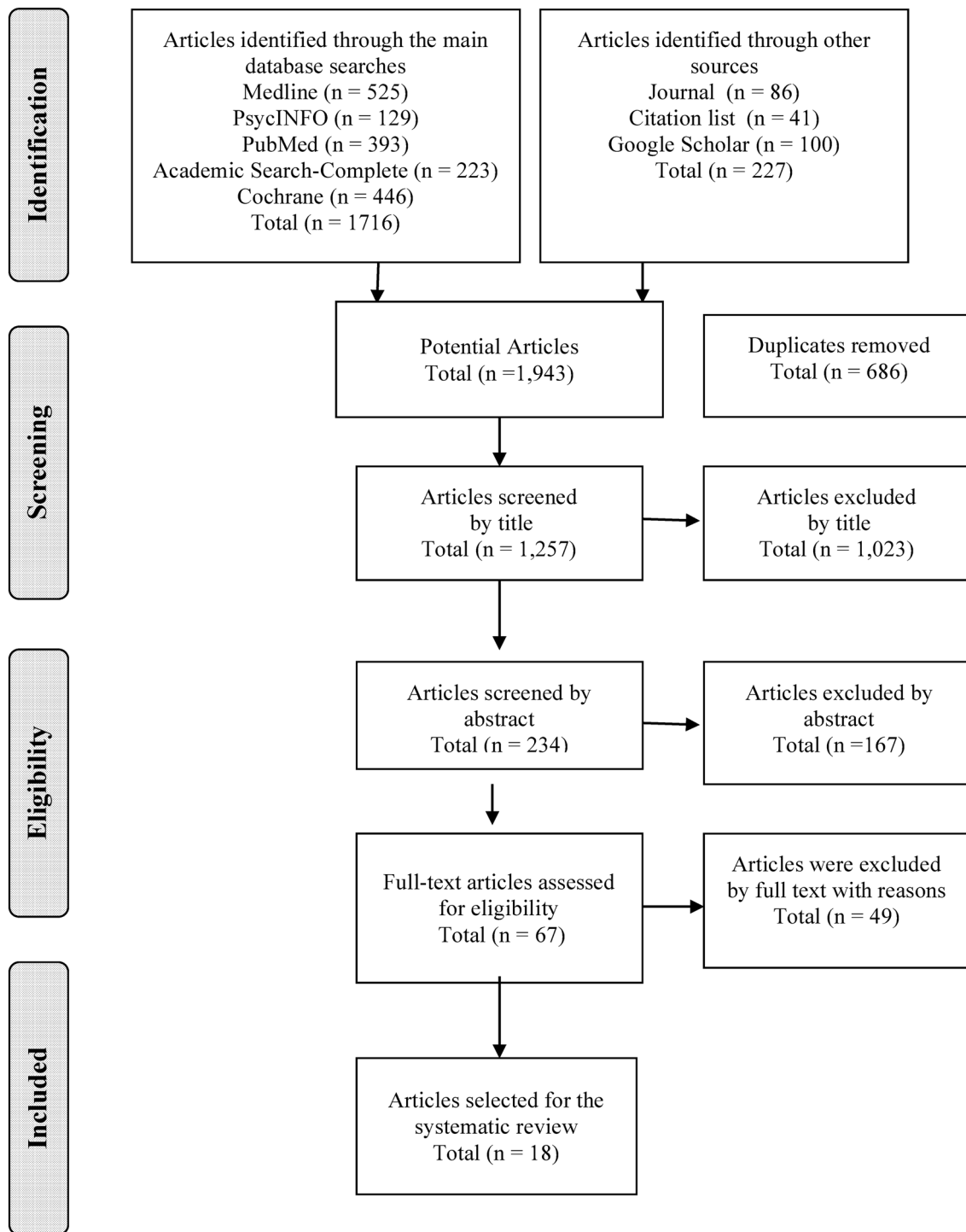


Fig. 1 Article selection process following PRISMA guidelines

included Dominicans, and three studies did not distinguish Hispanics by their country of origin.

We organized and presented the study findings (Table 4) according to proxy measures and main models of acculturation: unidimensional, bidimensional, and multidimensional, which were to some extent linked to the following

breastfeeding behaviors: intention, initiation, and duration. Overall, seven studies (39%) used proxy measures to assess acculturation and included the following items: language preferences, nativity, and years living in the U.S. or a combination of those items. The acculturation scales were designed and validated for the Hispanic-American

Table 4 Summary of studies examining the association of acculturation and breastfeeding behaviors among Hispanic Americans by acculturation proxy measure and models and their final quality assessment score

Author (year)	Sample characteristics		Methodological characteristics		Summary of the findings	Q.S.	
	Data source and (collection)	Study sample	Study design	Acculturation measures			Study covariate
Proxy measures of acculturation							
Ahluwalia et al. (2012)	Pregnancy risk assessment monitoring system N = 8942 (mailed)	Hispanic	Cross-sectional	Language use in the survey	Parity, plurality, maternal age, education, tobacco use, birth weight, hospital stay, WIC, tobacco, delivery mode, maternity care	<i>Breastfeeding initiation, duration</i> Higher acculturated were less likely to initiate breastfeeding (APR = 0.88; 95% CI 0.86–0.90) to breastfeed at least 10 weeks (APR = 0.81; 95% CI 0.75–0.87), and to exclusive breastfeed at least 10 weeks (APR = 0.69; 95% CI 0.55–0.87)	S
Balcazar et al. (1995)	National Maternal and Infant Health Survey N = 4,89 (mailed)	Mexican American and NHW	Cross-sectional	Nativity status by birthplace	Maternal and paternal age, education, working status, family income, marital status, birth place, father origin, type and No of prenatal cares, maternal BMI, parity, hospital stay health coverage	<i>Breastfeeding intention</i> Breastfeeding intention was not significantly associated with acculturation	S

Table 4 (continued)

Author (year)	Sample characteristics		Methodological characteristics			Summary of the findings	
	Data source and (collection)	Study sample	Study design	Acculturation measures	Study covariate	Breastfeeding behaviors and their associations with acculturation	Q.S.
Byrd et al. (2001)	Public Hospital El-Paso Texas N = 3036 (Bilingual Interview)	Mexican American and Other Hispanic	Cross-sectional	Combination of languages at home, language ability, maternal country of birth, and country finished school	Maternal age and education, marital status, WIC, Prenatal care, diet, breastfed last child, parity	<i>Breastfeeding intention, M initiation</i> Born in Mexico vs. born in the US (AOR = 1.72 95% CI 1.19–2.50) and Graduating in Mexico vs. US (AOR = 1.85 95% CI 1.09–3.12) were more likely to intend to breastfeed. Bilingual vs. English speakers, were more likely to initiate breastfeeding (AOR = 3.28 95% CI 1.15–9.35)	
Flores et al. (2016)	El-Paso N = 300 (Bilingual questionnaire)	Mexican American	Cross-sectional	Language preferences and years living in the US	Maternal age, education and occupation marital status cohabitate, insurance, delivery mode	<i>Breastfeeding intention, M initiation</i> Breastfeeding intention and initiation were not significantly associated with acculturation	
Gorman et al. (2007)	Low-income community in San Diego N = 1635 (medical records and Bilingual questionnaire)	Mexican American and NHW	Cross-sectional	Combination of spoken language and race/ethnicity	Maternal age and education, parity, marital status, length stay, preterm delivery, delivery place	<i>Breastfeeding initiation, S</i> Less acculturated were more likely to breastfeed exclusively upon discharge (AOR = 1.36, 95% CI 1.01–1.84)	

Table 4 (continued)

Author (year)	Sample characteristics		Methodological characteristics			Summary of the findings
	Data source and (collection)	Study sample	Study design	Acculturation measures	Study covariate	
Harley et al. (2007)	Center of Salinas N = 490 (Bilingual interviewer)	Mexican descent population	Prospective	Years residing in the US	Maternal age, education, parity, marital status, family income, returned to work, type of work, delivery mode	Breastfeeding initiation, duration Lifelong residents were 2.4 times more likely to stop breastfeeding, and 1.5 times more likely to stop exclusive breastfeeding than immigrants who had lived in the U.S. up to 5 years
Hawkins et al. (2014)	Registry of Vital Records and statistics N = 1,067,375 (birth certificates)	Puerto Rico Salvador Mexican	Cross-sectional	A combination of maternal country of birth and language preference	Maternal age and education, marital status, plurality, parity, delivery mode, year of birth payment source, prenatal care	Breastfeeding initiation Foreign-born women who were English (AORs = 1.22–6.52) or non-English speakers (AORs = 1.35–10.12) were more likely to initiate breastfeeding than U.S.-born women
Unidimensional model of acculturation						
Anderson et al. (2004)	Acculturation and nutrition needs assessment Connecticut N = 161 (Bilingual interviewer)	Puerto Ricans only	Retrospective	A 37-items: language and mass media preferences, birth place, migration patterns, family values, religious and political beliefs	Respondent's age, education, language of interview, marital status, parity, employment status, birth place, food stamps, WIC	Breastfeeding initiation No association was found between acculturation and breastfeeding initiation among women of Puerto Rican origin studied

Table 4 (continued)

Author (year)	Sample characteristics		Methodological characteristics		Summary of the findings	Q.S.
	Data source and (collection)	Study sample	Study design	Acculturation measures		
Barcelona de Mendoza et al. (2016)	Proyecto Buena Salud Massachusetts N = 1323 (Bilingual interviewer)	Puerto Rican or Dominican	Prospective	3-measures: Psychological acculturation Scale (PAS) Linguistic acculturation and generation status	Marital age and education, household income, living with a partner, smoking status parity, preterm birth	<i>Breastfeeding intention</i> S Women with English language preference (AOR = 0.61 95% CI 0.42– 0.88) and second or third generation in the US (AOR = 0.70 95% CI 0.52– 0.95) were inversely associated with intending to exclusively breastfeed. Psychological acculturation was not associated with intent to exclusively breastfeed
Gibson et al. (2005)	NHANES N = 460 (Bilingual interviewer)	Hispanic and NHW	Cross sectional	Short Acculturation Scale (Spanish language usage)	Maternal education and age, household poverty-income-ratio	<i>Breastfeeding duration</i> S Higher acculturated were less likely to breastfeed all their children for at least 1 month than less acculturated (AOR = 0.23 95% CI 0.14–0.40)
Glassman et al. (2014)	New-York N = 209 (Bilingual interviewer and phone follow-up)	Dominican and other Hispanic	Prospective	Short Acculturation Scale and Acculturation Scale for Hispanics	Maternal age, and education, ethnicity, WIC insurance type, intent to return to work/ school within 6 months	<i>Breastfeeding duration</i> S Any and exclusive breastfeeding in the first 4–6 weeks were not significantly associated with acculturation

Table 4 (continued)

Author (year)	Sample characteristics		Methodological characteristics			Summary of the findings	Q.S.
	Data source and (collection)	Study sample	Study design	Acculturation measures	Study covariate		
Rassin et al. (1993)	Texas-Mexico Border N = 206 (Bilingual interviewer)	Mexican origin	Prospective	A 20-item scale measured language, heritage, and associates	Maternal age and education, marital status, household size and income, parental characteristics	<i>Breastfeeding initiation</i> Acculturation was associated with breastfeeding up to 2–3 weeks postnatal (AOR = 0.63, p-value = 0.007)	M
Rassin et al. (1994)	Texas-Mexico Border N = 840 (Bilingual interviewer)	Mexican origin	Prospective	A 20-item scale measured language, heritage, and associates	Maternal age and education, marital status, household size and income, parental characteristics	<i>Breastfeeding initiation, initiation</i> Higher acculturated were less likely to intend to breastfeed (AOR = 0.69 95% CI 0.53–0.89) and to initiate breastfeeding up to 2–3 weeks (AOR = 0.66 95% CI 0.52–0.83)	S

Table 4 (continued)

Author (year)	Sample characteristics		Methodological characteristics		Summary of the findings	Q.S.	
	Data source and (collection)	Study sample	Study design	Acculturation measures			Study covariate
Sussner et al. (2008)	North-East US (Boston area) N = 1052 (Bilingual interviewer)	Hispanic	Prospective	Combination of nativity, women's parents' nativity, years in the US and Marin's acculturation scale	Maternal age and education, BMI tobacco, marital/partner status, working status, maternal and parents' nativity, prenatal visits, parity, emotional support, self health rating	<i>Breastfeeding initiation, duration</i> Native speakers were more likely to initiate breastfeeding and breastfed at 6 months compared with non-native speakers (AOR = 2.07 95%CI: 1.11–3.87). Women whose parents' nativity was foreign vs. US were more likely to breastfeed at 6 months (AOR = 2.18 95%CI: 1.18–4.04). However, years of US residence and maternal nativity were not significantly associated with the breastfeeding initiation or duration	M
Thiel de Bocanegra (1998)	Maternity Infant Care Family Planning Project New-York N = 962 (Self Administered Bilingual Questionnaire)	Dominican, Mexico, south America	Cross-sectional	Acculturation Scale for Hispanic Americans consisted language proficiency, social interaction, lifestyle choices	Maternal age and education, tobacco, country of birth, parity, perceived US feeding norms, medical problems, birth weight, family and social support scale	<i>Breastfeeding intention</i> The influence of acculturation decreased when the predictor variables of "support by friends and family members" and "tobacco use" were included in the regression analysis	S

Table 4 (continued)

Author (year)	Sample characteristics		Methodological characteristics		Summary of the findings	Q.S.
	Data source and (collection)	Study sample	Study design	Acculturation measures		
Bidimensional model of acculturation						
Chapman et al. (2013)	Hartford CT N = 114 (phone interview and medical records)	Puerto Rico, Mexican, and other Hispanic	Prospective	Modified ARSMA-II To measure linear and multi-dimensional acculturation. Ten items assessed American orientation and ten items assessed Hispanic orientation	Maternal education, delivery mode, WIC participation, birth place employment status, length of time in the US, history of being breastfed as an infant	<i>Breastfeeding duration</i> S Women from the integrated-low-group were less likely to stop any breastfeeding compared to women from the traditional-Hispanic group (AHR = 0.29 95% CI 0.09–0.97) from the assimilated-group (AHR = 0.23 95% CI 0.08–0.79) and from the integrated-high group (AHR = 0.16 95% CI 0.05–0.55). No significant association was found between acculturation, as measured in a linear scale and any and exclusive breastfeeding duration
Luecken et al. (2017)	Prenatal clinics in Arizona N = 322 (Bilingual interviewer)	Mexican origin women	Prospective	Birth place, language proficiency and subscale of ARSMA-II	Socioeconomic, maternal age and education, Economic Hardship Scale, birth weight, maternal BMI, gestational age, gestational diabetes	<i>Breastfeeding duration</i> S Less acculturated were more likely to breastfeed at 3 months (ARR = 1.16, p-value = 0.003)

Table 4 (continued)

Author (year)	Sample characteristics		Methodological characteristics		Summary of the findings	Q.S.
	Data source and (collection)	Study sample	Study design	Acculturation measures Study covariate		
Multidimensional model of acculturation						
Kimbro et al. (2008)	Fragile Families and Child Wellbeing Study N = 3626 (interview)	Mexican origin, NHW, and NHB	Prospective	Acculturation domains: preferred language use, attitudes on gender roles, religiosity, and cultural engagement	Race/ethnicity and nativity, maternal age, education, WIC participation, parity, married or cohabiting with the baby's father	M <i>Breastfeeding initiation, duration</i> Women who were holding traditional gender views were less likely to initiate breastfeeding (AOR = 0.93) and were less likely of quitting breastfeeding after 1 month (AOR = 0.94) than women who did not. Women who were frequently attending church were more likely to initiate breastfeeding (AOR = 1.18) and were less likely of quitting breastfeeding after 1 month (AOR = 0.94) than women who were not. More cultural engaged were more likely to initiate breastfeeding than women who were not (AOR = 1.08). Completing the interview in Spanish was not significantly associated with breastfeeding initiation

Q.S. quality score, S strong, M moderate, NHANES National Health and Nutrition Examination Survey, NHW Non-Hispanic Whites, NHB Non-Hispanic Black, ARSMA-II Acculturation Rating Scale for Mexican Americans-II, WIC special supplemental nutrition program for women, infants, and children participation, BMI Body Mass Index, AOR adjusted odds ratio, ARR adjusted relative risk, CI confidence interval, HR hazard ratio, APR adjusted prevalence ratio, No number

Table 5 Quality assessment tool for quantitative studies

Domain	Scoring items
(1) Study design	1. Experimental 2. Observational 3. Other method/did not state
(2) Representativeness The study sample is likely to represent the wider population	1. Very likely 2. Somewhat likely 3. Not likely 4. Can't tell 5. Not applicable
(3) Were inclusion/exclusion criteria specified and the number of exclusions reported?	1. Criteria and number of exclusions reported 2. Criteria or number of exclusions not reported 3. Criteria and number not reported
(4) Withdrawals and dropouts reported in terms of numbers and reasons per group? (a prospective study)	1. Numbers and reasons were provided 2. Numbers but no reasons were provided 3. Can't tell (if longitudinal data exist) 4. Not applicable (if cross-sectional data exist or if an existing database is used and authors refer to the original? Article)
(5) Confounders Were analyses appropriately adjusted for confounders?	1. For most confounders 2. For some confounders 3. No or can't tell
(6) Were validity, reliability, or appropriateness of the data collection tools discussed	1. Both validity and reliability were discussed 2. a. Validity or reliability were discussed 3. b. A national dataset was used and the authors provided adequate information to find information regarding the validity and reliability 4. None of them were discussed
(7) Were appropriate statistical analyses conducted (including correction for multiple tests where applicable)?	1. Statistical methods were described and were appropriate and comprehensive – a sophisticated approach 2. Statistical methods were described and were appropriate and comprehensive – a simple approach 3. Statistical methods were described and were less appropriate 4. No description of statistical methods or inappropriate methods
(8) Reporting	
Are the hypotheses/aim/objectives of the study clearly described?	1. Yes 2. No
Are the main outcomes to be measured clearly described?	1. Yes 2. No
Are the main findings clearly described?	1. Yes 2. No
Have actual probability values been reported	1. Yes 2. No

Quality assessment tool for quantitative studies developed by the effective public health practice project (Thomas et al. 2004)

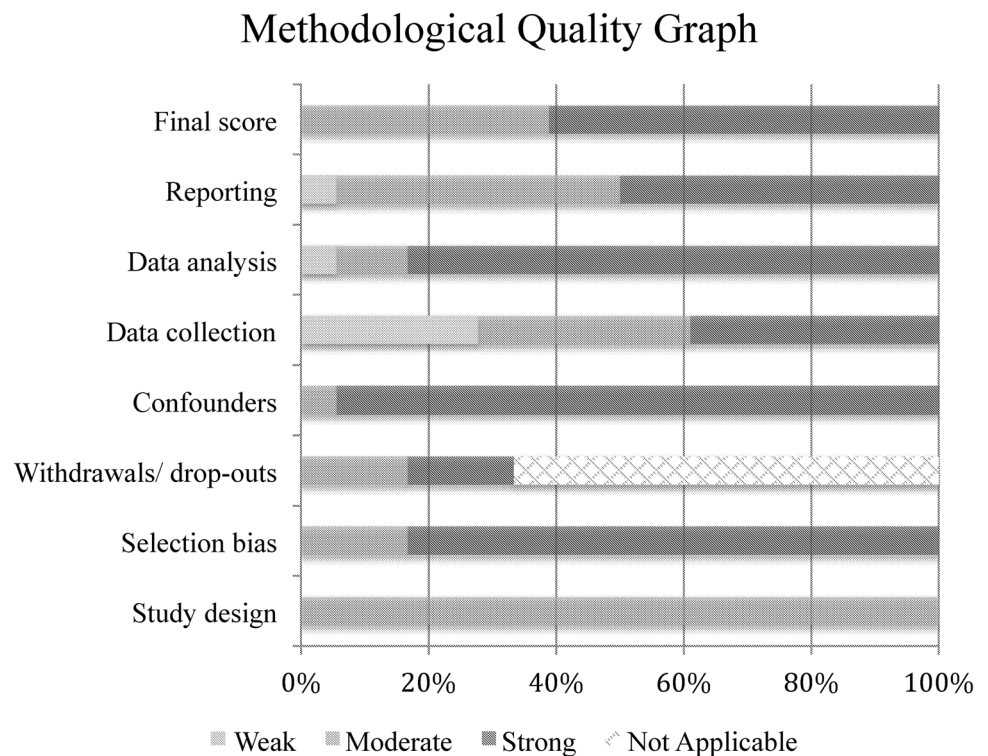
Main domains and scoring items

population and were assessed as a unidimensional model in eight studies (44%); two studies (11%) assessed the bidimensional model, and only one study (6%) employed the multidimensional model of acculturation.

In the multivariable models the majority of the reviewed studies included well-established covariates such as maternal age and education, parity, marital status, delivery mode, and household income or other associated factors such as receiving food stamps or participating in the Special Supplemental Nutrition Program for Women Infants and Children (WIC). Some studies also included the type of prenatal care and the number of visits, birth weight, working status, and

smoking experience (Table 4). Overall, 13 studies (73%) showed a significant association between acculturation and at least one of the following breastfeeding behaviors: intention, initiation, and duration. However, five studies (27%) did not reveal any significant associations, of those studies; two studies included predominantly Dominican-Republicans (Glassman et al. 2014; Thiel de Bocanegra 1998), and one comprised only Puerto-Ricans (Anderson et al. 2004).

Fig. 2 Review of authors’ judgments about each methodological quality item presented as percentages across all included studies



Study Findings

Acculturation and Breastfeeding Intention

Hispanics’ intention to breastfeed and their relationship with acculturation was examined in six studies: three studies used the unidimensional model of acculturation, three studies examined a proxy measure, and none utilized the bi/multidimensional models. Among the three studies that found that high-acculturated women were significantly less likely to intend to breastfeed compared to low-acculturated women, two studies also revealed mixed findings when acculturation was assessed utilizing more than one measure. For example, Byrd et al. (2001), who utilized four separate proxy measures to assess acculturation among Mexican-origin women, found that women’s nativity and the country in which they completed their formal education were associated with their intention to breastfeed, whereas language proficiency was not significantly associated with intention to breastfeed. Barcelona de Mendoza et al. (2016), who conducted a study among Puerto Rican women, only obtained significant findings when acculturation was measured as a proxy measure (e.g., generation status, language proficiency) but not when acculturation was assessed as a unidimensional scale.

Acculturation and Breastfeeding Initiation

The association between acculturation and Hispanics’ breastfeeding initiation was examined in 11 studies; four studies

utilized the unidimensional model, six studies used proxy measures, and only one study used the multidimensional model to assess acculturation. Overall, eight studies showed significant and similar results, namely, that high-acculturated Hispanic women were less likely to initiate breastfeeding compared with their low-acculturated counterparts. However, the breastfeeding initiation definition varied between studies. For example, Rassin et al. (1993) defined breastfeeding initiation as success in breastfeeding up to 2–3 weeks after the delivery, whereas Gorman et al. (2007) defined breastfeeding initiation as exclusive breastfeeding upon discharge from the hospital, and another defined breastfeeding initiation as having breastfed the last infant once (Hawkins et al. 2014). Some studies showed mixed results when more than one measure of acculturation was examined. For example, Sussner et al. (2008) showed that Hispanic women who spoke only in their native language were more likely to initiate breastfeeding compared with Hispanic women who did not, whereas the years of U.S. residence and women’s nativity were not significantly associated with breastfeeding initiation. Kimbro et al. (2008), who employed the multidimensional model in a Mexican–American sample, found that women who had a higher score in cultural engagement and church attendance were more likely to initiate breastfeeding, whereas women who held more traditional gender views were less likely to initiate breastfeeding, and no significant differences were observed in breastfeeding initiation rates between women who completed the interview in Spanish vs. English.

Acculturation and Breastfeeding Duration

Acculturation and its association with breastfeeding duration by Hispanic women was evaluated in eight studies: acculturation was assessed in three studies as a bi/multidimensional model, and four studies used the unidimensional or proxy measures. Seven studies showed that shorter breastfeeding duration could be attributed to acculturation. For example, Gibson et al. (2005) used the Short Acculturation Scale to assess the unidimensional model of acculturation in which Hispanic women were categorized as having either a low or high acculturation level. After controlling for maternal education, age, and the household poverty income ratio, high-acculturated women were 77% less likely to breastfeed, compared with low-acculturated women. In addition, the duration of exclusive breastfeeding, in accordance to the WHO definition (WHO 2008), meaning that the infant received only breast milk, was analyzed in four of the studies reviewed (Ahluwalia et al. 2012; Chapman and Perez-Escamilla 2013; Glassman et al. 2014; Harley et al. 2007), and of these, only two examined exclusive breastfeeding up to 6 months (Chapman and Perez-Escamilla 2013; Harley et al. 2007). Furthermore, Chapman and Perez-Escamilla (2013) assessed acculturation among low-income Hispanics in two ways: as a unidimensional and bidimensional model utilizing the Acculturation Rating Scale for Mexican-Americans (ARSMA-II). In the unidimensional model, ARSMA-II was modified to a linear score and no significant findings were found. However, when ARSMA-II was divided into four distinct subgroups to assess the bidimensional model, breastfeeding duration rates varied significantly between the following subgroups: integrated high (23.7%, $n = 27$), traditional Hispanic (36.8%, $n = 42$), integrated low (12.3%, $n = 14$), and assimilated (27.2%, $n = 31$). Similar findings were observed when the bidimensional model was utilized by Luecken et al. (2017) to assess the relationship with breastfeeding at 3 months for a Mexican-origin population.

Discussion

The current systematic review is the first study to summarize all the published literature and the quantitative evidence explicitly aimed at examining the relationship between acculturation and breastfeeding behaviors in Hispanics. We retrieved 18 studies that met the eligibility criteria, and with the exception of five studies, all other reviewed studies reported overall similar findings; high-acculturated Hispanic women were less likely to intend to or breastfeed their newborn, compared with low-acculturated Hispanic women. Our review is in line with other diet and nutritional reviews, which repetitively demonstrated the cultural transition that Hispanics experience while immigrating to the

U.S., which results in decreased consumption of healthy and nutritional foods in favor of fatty and processed foods (Arandia et al. 2012; Lara et al. 2005). We assume that the impact of acculturation on breastfeeding might be partially explained as a result of Hispanics' widespread exposure to substitutes for human-milk via the American media and/or through indirect promotion of formula feeding in hospitals, which highly acculturated Hispanics might perceive as the preferred American infant feeding method (Office of the Surgeon General 2011). Other aspects that could be contributing and deserve further consideration are job-related demands and the availability of family and/or peer support.

However, a closer look at the reviewed studies, in particular, at the methods and findings, raised some issues and suggestions that we would like to address. First, these studies assessed acculturation in various ways, challenging our ability to completely understand the mechanisms by which acculturation influences Hispanics' decision to breastfeed and for how long. In addition, 15 studies used a static measure (proxy measure) or a unidimensional model (linear-scales), which is not optimal, and only three studies captured more comprehensive aspects of acculturation by utilizing the bi/multidimensional scales. Recent studies have criticized the unidimensional model, claiming that it does not differentiate between individuals who are equally acculturated to both their origin and host cultures and individuals who are acculturated to neither culture (Berry 2003). Andrews et al. (2013), with the aim of studying the most appropriate model of acculturation in Hispanics, found that the bi/multidimensional models are a better fit for describing the acculturation process than is the unidimensional model.

Second, most of the reviewed studies that adopted a multivariable model, in which household income and other associated factors were controlled for, concluded that the impact of acculturation on breastfeeding could not be attributed to improved socioeconomic status, as it might be argued among other scholars. However, the studies did not adjust for other key risk factors or confounders such as previous breastfeeding experience, social support from practitioners and family members, prenatal education about breastfeeding, and preterm delivery.

Third, from the reviewed findings, the extent of influence that acculturation has on Hispanics' decision to breastfeed or use formula, is not yet completely clear. Future studies might consider using bi/multidimensional models of acculturation and the relationship with the intention to breastfeed, since they are likely to result in a better understanding when in the acculturation process Hispanic women decide not to breastfeed. In addition, the U.S. national rate for exclusive breastfeeding at 6 months is still low, including Hispanics (CDC 2014). Interestingly, only two scholars have explored Hispanics' exclusive breastfeeding at 6 months (Chapman and Perez-Escamilla 2013; Harley et al. 2007), which

highlights the need for more studies to investigate, preferably prospectively, the cultural barriers to exclusively breastfeed at 6 months among Hispanics.

Fourth, five reviewed studies did not show significant findings (Anderson et al. 2004; Balcazar et al. 1995; Flores et al. 2016; Glassman et al. 2014; Thiel de Bocanegra 1998) and explained their results due to the following reasons. For example, Flores et al. (2016) collected data from Mexican-Americans living in El Paso, a city on the border with Mexico, and found that in their study sample breastfeeding habits and rates were similar to breastfeeding habits and rates in Mexico compared to U.S.-Hispanics and therefore, no significant differences in breastfeeding rates appeared across levels of acculturation. Thiel de Bocanegra (1998), in their bivariate analysis, showed that high-acculturated women were two times less likely to decide to breastfeed than were low-acculturated women. However, the influence of acculturation lessened when the independent variables of “support by friends and family members” and “tobacco use” were included in the multivariable analysis. Lastly, in most of the studies that did not attribute variations in breastfeeding rates to acculturation, their study population predominantly originated from the Dominican Republic and/or Puerto Rico. We assume that Hispanic subgroups might experience a different immigrant trajectory, which has implications on their breastfeeding behaviors and therefore, requires the use of a more refined acculturation scale appropriate for the different Hispanic subgroups.

Lastly, recent studies show that U.S.-Hispanics and specifically, Mexican-Americans and Puerto Ricans, prefer their babies to be big because they consider it as a sign of having a healthy baby and therefore, do not consider exclusive breastfeeding to be a viable option for feeding their infants (Flores et al. 2016). Hispanics believe that complementary food (i.e., infant formula, and cereal) at an earlier stage is essential for ensuring that their baby will grow and develop healthily (Glassman et al. 2014). Therefore, U.S.-Hispanic women choose the ‘*los-dos*’ (“best of both”) feeding practices, which is a combination of both formula and breast milk, as being best for their babies. Combining breastfeeding with formula is a very common feeding practice among Latinas including in their countries of origin and one of the causes of the low exclusive breastfeeding rates, in Mexico for example (Gonzalez de Cosio et al. 2013). In the currently reviewed studies, however, the ‘*los-dos*’ feeding practice was explicitly analyzed in only two studies (Barcelona de Mendoza et al. 2016; Flores et al. 2016).

Strengths and Limitations

One strength of this review relates to the focus of the paper, which was to identify and review all published peer-reviewed evidence that explicitly examined the relationship between

acculturation and breastfeeding among Hispanic-Americans. The searching process was comprehensive; it used leading databases, which are all from the U.S. National Library of Medicine. Another strength of this review is that we summarized the findings according to acculturation models to reveal the lack of a standard methodology in quantifying the acculturation levels. We found that each breastfeeding behavior (intention, initiation, and duration) requires a different research method approach and that some infant feeding practices require further investigation such as the intention to breastfeed, exclusive breastfeeding at 6 months, and ‘*los-dos*’.

A limitation of this review relates to the fact that all of the reviewed studies focused only on those studies that explicitly aimed to examine breastfeeding behaviors and acculturation and excluded studies that examined an association between breastfeeding behaviors and language spoken (Lizarraga et al. 1992), nativity (Singh et al. 2007), years of U.S. residency (Gibson-Davis and Brooks-Gunn 2006), and country of education (Hendrick et al. 2017), which are all valid proxy measures for acculturation. However, since those studies were not explicitly aimed at examining the process of acculturation, they were not selected in this review. In addition, we did not include publications in Spanish that might contain important and pertinent information about breastfeeding among Hispanics. Lastly, this systematic review used a less robust strategy for study selection and data extraction (Bown and Sutton 2010), which was performed by a single researcher at two separate times, whereas the gold standard requires multiple individuals (Liberati et al. 2009). However, all the authors participated in establishing the eligibility criteria and approved the final study selection, and any discrepancies regarding data extraction, study results, and conclusions were resolved by consensus.

Conclusions

Our review supports the hypothesis that higher acculturation leads to lower breastfeeding rates, and it appears that this association is independent of income levels. Along with the Surgeon General’s call to improve national breastfeeding rates, we recommend that future lactation studies use bi/multidimensional scales while following the WHO definitions for breastfeeding, to generate more valuable findings on the association between acculturation and Hispanics’ breastfeeding behaviors. Understanding which of the cultural domains influence the following Hispanic women’s breastfeeding behaviors: intention, initiation, and duration, will help improve the design of culturally appropriate interventions tailored to prenatal care and each breastfeeding phase. In addition, further studies are needed to address acculturation with respect to breastfeeding among all the U.S.-Hispanic

subgroups in order to present an overall picture of breastfeeding rates in the U.S. Lastly, acculturation studies should address breastfeeding outcomes, particularly the intention to breastfeed, exclusive breastfeeding at 6 months, and the ‘*los-dos*’ approach which is a typical and common infant feeding practice in Hispanic women.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflicts of interest.

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