

A Pilot Binational Study of Health Behaviors and Immigration

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Abstract In the US, Mexican immigrant women often have better health outcomes than non-Hispanic white women despite a greater health risk profile. This cross-sectional pilot study compared women living in Chavinda, Michoacán ($n = 102$) to women who had migrated from Mexico to Madera, California ($n = 93$). The interview gathered information on acculturation and risk behaviors including smoking, alcohol use and number of sexual partners. The results suggest that more acculturated women living in the US are more likely to consume alcohol. US residence and higher acculturation level was marginally associated with having more than one sexual partner. There were no differences between odds of smoking among Chavinda and Madera women. While results with acculturation are not consistently significant due to small sample sizes, the results are suggestive that acculturation among immigrant Hispanic women in the US may be associated with adverse health behaviors, and selective migration seems less likely to account for these differences.

Keywords Acculturation · Immigration · Hispanic · Health behaviors · Binational

Introduction

Background

Mexican immigrant women residing in the US often have better health outcomes than non-Hispanic white women; including lower rates of low birth weight and infant mortality, lower incidence and mortality rates for cancer and cardiovascular disease, and lower all-cause mortality rates [1–5]. This phenomenon is referred to as the “Hispanic Epidemiologic Paradox” [5–7]. One hypothesis to explain this paradox is “selective migration,” which suggests that immigrant women are a healthier subset of the population of origin and therefore have better than expected birth and other health outcomes because they have been positively selected by the migration process due to physical, mental or other health characteristics [1, 3–5, 8, 9]. Another hypothesis is that cultural traditions and behaviors followed in Mexico protect women for some period of time after they immigrate from risks associated with disadvantaged socioeconomic status once in the US [10–12]. These are thought to be related to cultural values and norms intrinsic to the Hispanic community such as the role of social support networks, interpersonal relationships and the importance of family [13, 14].

Negative health behaviors and impacts on health outcomes are associated with acculturation, particularly among Hispanic women [13, 15, 16]. Acculturation refers to the process of adopting new behaviors and practices when individuals come into contact with another culture. There is much evidence in the epidemiologic literature that the multifactorial, complex relationship between declining health behaviors and the process of acculturation is particularly strong among women [10, 17–20]; as women become more acculturated to a “US lifestyle,” they engage

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in less healthy behaviors, which adversely impacts their health. Therefore, the importance of examining acculturation is in measuring an indicator for potential cultural influences at work in modifying health risk behaviors.

Acculturation among US Hispanic women has been associated with increased alcohol and cigarette use [15, 17, 20–25]. In the Hispanic Health and Nutrition Examination Survey (HHANES), acculturation was found to be a major predictor of cigarette smoking among US Hispanics, with more acculturated individuals reporting higher levels of smoking. This trend was especially marked among females [2, 20, 23, 26]. In California, the prevalence of smoking and number of cigarettes smoked per day is greater among highly acculturated women than among the less acculturated Hispanics [27]. Between 2001–2003, the average prevalence of current cigarette smoking in the US among non-Hispanic white women was 21.8% versus 9.4% among Mexican-born women living in the US (acculturation level not accounted for) [28]. Similarly, data from 2003 show that 61.6% of non-Hispanic white women reported currently consuming alcohol while only 33.4% of Mexican-born women in the US reported current alcohol consumption [28]. Additionally, a much greater proportion of low-acculturated Mexican–American women reported abstaining from alcohol (87.2%) than their more highly acculturated counterparts (53.4%) [29].

Another topic of concern related to this pattern of increasing acculturation and declining health behaviors is that of high-risk sexual behaviors, such as multiple sexual partners. Multiple partners places women at higher risk for sexually transmitted diseases (STD), including HIV, [30] and more than one sexual partner may be more frequent among higher acculturated Mexican immigrants [21, 31]. In a study of 1062 Hispanic women from a northern California community, nearly 75% of low-acculturated women reported only one sexual partner during their lifetime as compared to 46% of moderately acculturated women and about 20% of highly acculturated women [21].

Objectives

Given the central role of the population of origin in explaining the Hispanic Epidemiologic Paradox, an ideal study to test the two main hypotheses would compare health outcomes and risk profiles between Mexican-born women currently living in Mexico and Mexican-born women who have migrated to the US. Previous binational studies have addressed specific health issues in Mexican and Mexican–American populations such as obesity and diabetes [32], HIV/AIDS [33], and women’s health [34], but few have attempted to specifically examine the health paradox that seems to accompany migration from Mexico to the US [35].

This binational cross-sectional pilot study sought to explore the hypothesis that Mexican-born women living in Madera, California have similar health behavior profiles with regard to smoking, alcohol use and number of sexual partners as Mexican-born women (who had never lived in the US) currently living in Chavinda, Michoacán. It was also expected that this profile changes with increasing levels of acculturation.

Methods

Study Organization

Community Identification and Participant Recruitment

Chavinda, Michoacán and Madera, California were selected as communities from which to sample women currently living in Mexico and the US because previous research had shown that these communities share an established sending/receiving relationship [36]. Eligibility criteria for participants in Michoacán were defined as women between the ages of 18–49 years, born in Chavinda, Michoacán, and who had never previously emigrated. In California, the criteria were defined as women 18–45 years of age, born in Mexico or who had lived at least 10 years in Mexico, lived in the US for at least 6 months, and resided in Madera, California at the time of the interview.

In Chavinda, interviewers conducted a door-to-door enumeration of the town from a population census made between April and May 2004. The sample was selected from a population-based census of 5558 inhabitants (1538 homes). The total population of women 18–49 years of age was 1242, and of that group, 14% (174) had migrated previously and 86% (1068) had not. The study population was selected from the group of non-immigrant women and a total of 102 eligible women were randomly selected.

A household enumeration procedure for recruitment of participants living in Madera was initially planned, but a network sampling scheme proved more efficient since the primary interest was in women who had immigrated from Chavinda. However, due to funding limitations and time constraints, it was necessary to alter the original goal of selecting only residents from Chavinda and include women who had immigrated from other areas of Mexico. Initial contacts were made in the community through local health service organizations and migrant housing programs. These contacts led to a network of women within the community who linked the field team with potential participants for the study, and a total of 93 women from Madera were interviewed between July and November 2004. Just over a third (35.5%) of the Madera study sample migrated from Chavinda and the remainder were from other areas in

Mexico. There were no differences in sociodemographic characteristics or behavioral risk factors between women who migrated from Chavinda and those from other areas of Mexico. The participation rate among eligible women was 86%.

Data Collection

Data were collected in Spanish by in-person interviews in Chavinda and Madera. The questionnaire included demographic characteristics, acculturation, women's health and reproductive issues, and health behaviors including tobacco and alcohol use. All questions were developed from relevant existing survey instruments [21, 37, 38]. The research was approved by the Institutional Review Board at the University of California, Davis.

Acculturation

Acculturation scores were calculated for Madera participants using a 12-item version of the Acculturation Rating Scale for Mexican Americans-II (ARSMA-II) developed by Cuellar and colleagues [38]. The ARSMA-II instrument provides an overall acculturation score based on measures of language use and preference, ethnic identity, ethnic behaviors and ethnic interaction through the use of two subscales, a Mexican-oriented scale (MOS) and an Anglo-oriented scale (AOS). Responses to items on the MOS and AOS range from "not at all" (response score = 1) to "extremely often or almost always" (response score = 5). The MOS and AOS questions were summed separately and a mean calculated for each orientation subscale. The raw acculturation score was calculated by subtracting the MOS mean from the AOS mean. Criteria for determining levels of acculturation were based on mean and standard deviation scores from the ARSMA-II validation study [21, 38]. The ARSMA-II identified five acculturation levels and their corresponding scores as seen in Table 1. Because there were relatively few women in levels II through V, these levels were collapsed to create a "medium/high acculturation" category. The ARSMA-II is a validated multidimensional instrument used in a variety of studies

measuring relationships between acculturation and health [21, 39–44].

Health Risk Outcomes

The selected outcome variables included smoking, alcohol use and number of sexual partners and were chosen because of their relationship to acculturation and public health importance. Because of small sample sizes and low numbers of positive responses for many categories, we dichotomized outcomes as follows: ever having smoked defined as smoked at least 100 cigarettes during lifetime, ever having consumed alcohol defined as more than 12 alcoholic beverages during lifetime, and number of sexual partners defined as one partner (reference group) or more than one partner. Although levels of smoking and alcohol use assessed were low and may not be directly attributable to adverse health outcomes, they were included in analysis because they illustrated behavioral changes that occur within this population. Having more than one sexual partner however, is associated with increased risk for sexually transmitted infections, especially human papillomavirus (HPV) [45, 46].

Data Analysis

Associations between place of residence (Mexico vs. US), acculturation level (low vs. medium/high) and the selected health risk outcomes were first evaluated by bivariate analyses, followed by multiple logistic regression analyses. Bivariate analyses compared the outcomes of interest with place of residence and acculturation level; chi-square and Fisher's exact tests were used to assess these comparisons across groups. Factors such as age, marital status and education level were assessed for effect modification and confounding. Crude and adjusted odds ratios and 95% confidence intervals were calculated for the main outcomes using multivariate logistic regression models that included age, education level and place of residence or acculturation level. Data analysis was performed using SAS[®] software, Version 9.2 of the SAS system for Windows[®] (SAS Institute Inc., Cary, NC).

Table 1 Scores for determining acculturation level of Madera, CA participants using ARSMA-II

Acculturation level	Description	ARSMA-II acculturation score ^a	Number of women (<i>n</i> = 93)
Level I	Very Mexican oriented	< -1.33	77
Level II	Mexican oriented to approximately balanced bicultural	≤ -1.33 and ≤ -0.07	7
Level III	Slightly Anglo oriented bicultural	> -0.07 and < 1.19	8
Level IV	Strongly Anglo oriented	≥ 1.19 and < 2.45	1
Level V	Very assimilated; Anglicized	> 2.45	0

^a scores from Cuellar et al. [38]

Results

Sociodemographic Characteristics

Data were analyzed for 195 study participants; 102 women living in Chavinda, Mexico and 93 women living in Madera, California. The ages of study participants ranged from 18 to 49, with a mean age of 32, which did not differ by study location. Overall, almost 80% of women were married or living with a partner with 74.5% of Mexican residents, 89.6% of low-acclulturated US residents and 56.3% of medium/high-acclulturated US residents reporting married/living together status (Table 2). The average age at immigration for women in Madera was 19 years (median: 19; 25–75th percentile: 15–24 years) and the average length of time in the US was 13 years (median: 13; 25–75th percentile: 7–16 years). Women living in Mexico were less educated than women living in the US, only 30.4% had achieved greater than primary education (approximate 6th grade equivalent). Among US women, low-acclulturated women were less likely to have achieved greater than a primary education than their medium/high-acclulturated counterparts (54.6% vs. 93.8%) (Table 2).

Among US women, age at immigration and the number of years living in the US were strongly associated with acculturation level. The average age at which low-acclulturated women migrated to the US was 21 years (median: 20; 25–75th percentile: 17–25 years) and they had lived in the US an average of 11 years (median: 10; 25–75th percentile: 6–15 years). Medium/high-acclulturated women came to the US at about age 10 (median: 8.5; 25–75th percentile: 5.5–12.5 years) and had lived in the US on average for 21 years (median: 20.5; 25–75th percentile: 14.5–27 years). Low-acclulturated women living in

the US were more likely than their medium/high-acclulturated counterparts to be married but less likely to have achieved higher than a primary education (Table 2).

Health Risk Behaviors

There was no difference in smoking prevalence between Mexican and US residents, but the overall prevalence of smokers was very low in both groups (Table 3). Logistic models adjusted for age and level of education did not show any significant association between place of residence or acculturation level with odds of smoking (Table 4).

Mexican residents were less likely than US residents to have consumed at least 12 alcoholic beverages in their lifetimes (8.8% vs. 24.7%, $P = 0.0027$). However, models adjusted for age and education comparing Mexican residents to low-acclulturated US residents did not statistically differ with regard to alcohol use (Table 4). In comparisons between low-acclulturated and more highly acculturated Mexican-born women residing in the US, those in the medium/high-acclulturated group were 3.5 times more likely (CI 1.1–11.5) to have consumed at least 12 alcoholic beverages in their lifetime (Table 4). Education was independently associated with greater odds for alcohol use regardless of place of residence or acculturation level (results not shown).

Women living in Mexico were less likely to report more than one sexual partner in their lifetimes than US residents (3.9% vs. 15.1%, $P = 0.0073$). Both crude and models adjusted for age and education comparing Mexican residents and low-acclulturated US residents were of borderline significance and suggested that Mexican residents were a third less likely (CI 0.1–1.0) to have more than one lifetime

Table 2 Demographic characteristics of Mexican and US women by place of residence and acculturation level

	Mexican resident (<i>n</i> = 102) <i>n</i> (%)	US resident		<i>P</i> value
		Low-acclulturated (<i>n</i> = 77) <i>n</i> (%)	Medium/high-acclulturated (<i>n</i> = 16) <i>n</i> (%)	
Demographic				
Age				
18–27 years old	37 (36.3%)	22 (28.6%)	6 (37.5%)	0.6718 ^a
28–36 years old	29 (28.4%)	28 (36.4%)	6 (37.5%)	
37–49 years old	36 (35.3%)	27 (35.1%)	4 (25.0%)	
Greater than primary education	31 (30.4%)	42 (54.6%)	15 (93.8%)	<0.0001 ^a
Married/living together	76 (74.5%)	69 (89.6%)	9 (56.3%)	0.0033 ^b
Age at immigration, <i>M</i> (SD)	N/A	21.1 (7.3)	9.6 (5.2)	<0.0001 ^c
Years in the US, <i>M</i> (SD)	N/A	11.2 (6.6)	20.8 (7.2)	<0.0001 ^c

^a Based on Fisher’s exact test

^b Based on Pearson’s chi-square test

^c Based on Student’s *t*-test

Table 3 Risk behavior characteristics of Mexican and US women by place of residence and acculturation level

	Ever smoked		Alcohol use		More than one sexual partner	
	<i>n</i> (%)	Crude OR (95% CI)	<i>n</i> (%)	Crude OR (95% CI)	<i>n</i> (%)	Crude OR (95% CI)
Mexican residents	5 (4.9%)	1.9 (0.4–10.2)	9 (8.8%)	0.4 (0.2–1.0)	4 (3.9%)	0.3 (0.1–1.0)
Low-acculturated US residents ^a	2 (2.6%)	1.0	15 (19.5%)	1.0	9 (11.7%)	1.0
Medium/high-acculturated US residents	1 (6.3%)	2.5 (0.2–29.4)	8 (50.0%)	4.1 (1.3–12.8)	5 (31.3%)	3.4 (1.0–12.2)

^a Reference category

Table 4 Adjusted odds ratios (95% CI) of risk behaviors by country of residence and acculturation status

	Adjusted OR (95% CI)		
	Ever smoked	Alcohol use	More than one sexual partner
Education level			
Primary or less ^a	1.0	1.0	1.0
Greater than primary education	0.3 (0.0–2.4)	2.5 (0.9–6.4)	0.8 (0.2–2.7)
Age	1.0 (0.9–1.1)	1.1 (1.0–1.1)	1.0 (0.9–1.1)
Place of residence/acculturation level			
Mexican residents	1.6 (0.3–8.7)	0.5 (0.2–1.2)	0.3 (0.1–1.0)
Low-acculturated US residents ^a	1.0	1.0	1.0
Medium/high-acculturated US residents	4.5 (0.3–67.0)	3.5 (1.1–11.5)	3.8 (1.0–15.0)

Models were adjusted for age and education

^a Reference category

sexual partner (Tables 3, 4). Comparisons by acculturation level approached significance with medium/high-acculturated US residents being 3.8 times as likely (CI 1.0–15.0) to have more than one sexual partner in adjusted models (Table 4).

Results showed that women who consumed alcohol were more likely to smoke cigarettes. Effect modification between place of residence (US or Mexico) and alcohol consumption with smoking was not significant. It is likely that persons who drink are more likely to smoke, regardless of place of residence.

Discussion

The goal of this pilot study was to explore the two main hypotheses (selective migration and protective cultural traditions) frequently suggested to explain the Hispanic Epidemiologic Paradox. This pilot binational study compared women living in Mexico to Mexican-born women living in the US. If selective migration best explains the paradox, we expected that Mexican immigrant women living in the US would report better health risk behavior profiles than women living in Mexico, because women who migrate represent a healthier selection of the population of

origin. However, the results of this pilot study do not support this explanation because comparisons between Mexican and US residents indicated that US residents did not have healthier risk behavior profiles but rather may be more likely to consume alcohol and have more than one lifetime sexual partner.

Conversely, if protective cultural traditions is a better explanation for the paradox, then women residing in Mexico would look similar to low-acculturated women residing in the US with regard to health risk behaviors, but as Mexican women living in the US become more accultured, the effect of these protective cultural traditions would decline. In this study, Mexican residents were less likely than low-acculturated US residents to use alcohol and have more than one sexual partner, but these results were marginally significant. However, among low-and medium/high-acculturated women in the US, increasing levels of acculturation were significantly associated with increased risk of alcohol use. Higher acculturation was marginally associated with more than one lifetime sexual partner. While these findings suggest that protective cultural traditions may help to protect low-acculturated immigrant women from adopting unhealthy behaviors, we cannot rule out that some elements of selective migration may also play a role in explaining the paradox. A full

exploration of this question requires a prospective assessment of a population residing in Mexico with comparisons of those who chose to migrate and not to migrate.

No statistically significant trends related to smoking behaviors were observed, but this is likely due to the fact that there were very few smokers in the study. Although the study did not find that Mexican-born women residing in the US were more likely to have ever smoked, the fact that US residents are significantly more likely to consume alcohol is of concern due to the strong association between alcohol use and smoking [47].

The ARSMA-II acculturation measure used in this study setting may have limitations due to the lack of variability in acculturation level observed in our small sample. While associations between acculturation and the outcomes of interest were observed, this population of primarily rural farmworking women may possess different characteristics than other Latino populations in California and the United States, thus limiting the generalizations that we are able to make.

The original goal of the pilot study was to compare a community of origin in Mexico (Chavinda, Michoacán) with a receiving community in the US (Madera, California) to evaluate the selective migration and protective health behaviors hypotheses. While previous research suggested a relationship between the communities [36], a network sampling technique used to locate Chavinda women currently residing in Madera, California was not successful due to time constraints and funding limitations. To increase the number of participants, the eligibility criteria for the Madera sample was amended to include women who had migrated to the US from anywhere in Mexico. This sampling limitation may have influenced our ability to measure the impact of the population of origin and its relationship to changes in behavioral risk factors and associated disease. These concerns are somewhat minimized because there were no statistically significant differences with regard to sociodemographic characteristics or behavioral risk factors between women who migrated from Chavinda vs. other areas of Mexico. The potential for selection bias in studies utilizing a network sampling scheme limits the generalized inferences that can be made, but the explorative nature of this study provides an initial examination of specific hypotheses related to the Hispanic Epidemiologic Paradox [48].

A major strength of this effort was the unique opportunity to conduct a binational study and collect data from women living in Chavinda who have never traveled to the US, as well as from women who have migrated to the US from Chavinda and other areas of Mexico. Through this study we developed a working relationship between institutions in Mexico and California.

Another strength of the study is its focus on women, especially regarding investigation of health and sexual

behaviors that are difficult to measure and have not been widely explored in other studies. It is widely recognized in the literature that Mexican men and women acculturate differently when they immigrate to the US; however, many of the negative changes observed with increasing acculturation tend to occur to a greater degree in women [2, 17, 26, 49]. While restricting the study population to women limits our ability to generalize the results of the study to all Mexican immigrants, overall, it provided greater power to assess the relationship between immigration, acculturation and adverse health risk behaviors in the group in which we are most likely to observe change. Although this was a small study on a specific population, these results may be relevant to other Hispanic immigrant populations because studies in other populations have shown similar relationships between acculturation and health risk behaviors [50–53].

The small sample size of this pilot study limits the generalizability and conclusions that can be drawn with regard to relationships of acculturation with smoking and sexual partners as reflected in the strength of associations observed and wide confidence intervals. This study was designed as a pilot for initial examination of these important questions and the suggestive nature of the findings have implications for future research. Acculturation is a normal process with immigration, and it is an essential concept that summarizes a variety of epidemiologic factors that influence behavioral changes accompanying migration from Mexico to the US. While we cannot make any inferences about the trajectory or speed of the acculturative process among immigrant women, the findings from this study will be useful for guiding the design of a larger, multi-community binational investigation. Ultimately, a prospective cohort study will provide the most information to elucidate factors that may be responsible for the behavioral health risks associated with acculturation in this large and crucial population.

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References

- Abraido-Lanza AF, Dohrenwend BP, Ng-Mak DS, Turner JB. The Latino mortality paradox: a test of the “salmon bias” and healthy migrant hypotheses. *Am J Public Health*. 1999;89:1543–8.
- Coreil J, Ray LA, Markides KS. Predictors of smoking among Mexican-Americans: findings from the Hispanic HANES. *Prev Med*. 1991;20:508–17.
- Fuentes-Afflick E, Hessol NA, Pérez-Stable EJ. Maternal birthplace, ethnicity, and low birth weight in California. *Arch Pediatr Adolesc Med*. 1998;152:1105–12.
- Fuentes-Afflick E, Hessol NA, Pérez-Stable EJ. Testing the epidemiologic paradox of low birth weight in Latinos. *Arch Pediatr Adolesc Med*. 1999;153:147–53.
- Markides KS, Coreil J. The health of Hispanics in the southwestern United States: an epidemiologic paradox. *Public Health Rep*. 1986;101:253–65.
- Franzini L, Ribble JC, Keddie AM. Understanding the Hispanic paradox. *Ethn Dis*. 2001;11:496–518.
- Markides KS, Eschbach K. Aging, migration, and mortality: current status of research on the Hispanic Paradox. *J Gerontol B Psychol Sci Soc Sci*. 2005;60(2):68–75.
- Fuentes-Afflick E, Lurie P. Low birth weight and Latino ethnicity. Examining the epidemiologic paradox. *Arch Pediatr Adolesc Med*. 1997;151:665–74.
- Landale NS, Oropesa RS, Gorman BK. Migration and infant death: assimilation or selective migration among Puerto Ricans? *Am Sociol Rev*. 2000;65:888–909.
- Black SA, Markides KS. Acculturation and alcohol consumption in Puerto Rican, Cuban-American, and Mexican-American women in the United States. *Am J Public Health*. 1993;83:890–3.
- Guendelman S, Abrams B. Dietary intake among Mexican-American women: generational differences and a comparison with white, non-Hispanic women. *Am J Public Health*. 1995;85:20–5.
- Scribner R. Paradox as paradigm—the health outcomes of Mexican Americans. *Am J Public Health*. 1996;86:303–5.
- de la Torre A, Estrada AL. *Mexican Americans and Health: ¡Sana! ¡Sana*. Tucson: The University of Arizona Press; 2001.
- McGlade MS, Saha S, Dahlstrom ME. The latina paradox: an opportunity for restructuring prenatal care delivery. *Am J Public Health*. 2004;94:2062–5.
- Lara M, Gamboa C, Kahramanian MI, Morales LS, Bautista DE. Acculturation and Latino health in the United States: a review of the literature and its sociopolitical context. *Annu Rev Public Health*. 2005;26:367–97.
- Vega WA, Amaro H. Latino outlook: good health, uncertain prognosis. *Annu Rev Public Health*. 1994;15:39–67.
- Bethel JW, Schenker MB. Acculturation and smoking patterns among hispanics—a review. *Am J Prev Med*. 2005;29:143–8.
- Campos B, Dunkel-Schetter C, Walsh JA, Schenker M. Sharpening the focus on acculturative change: ARSMA-II, stress, pregnancy anxiety, and infant birthweight in recently immigrated Latinas. *Hisp J Behav Sci*. 2007;29:209–24.
- Markides KS, Krause N, Mendes de Leon CF. Acculturation and alcohol consumption among Mexican Americans: a three-generation study. *Am J Public Health*. 1988;78:1178–81.
- Pérez-Stable EJ, Ramirez A, Villareal R, Talavera GA, Trapido E, Suarez L, Marti J, McAlister A. Cigarette smoking behavior among US Latino men and women from different countries of origin. *Am J Public Health*. 2001;91:1424–30.
- Kasirye OC, Walsh JA, Romano PS, Beckett LA, Garcia JA, Elvine-Kreis B, Bethel JW, Schenker MB. Acculturation in a rural Latino population and its association with health-risk behaviors. *Ethn Dis*. 2005;15:733–9.
- Balcazar H, Krull JL. Determinants of birth-weight outcomes among Mexican-American women: examining conflicting results about acculturation. *Ethn Dis*. 1999;9:410–22.
- Balcazar H, Peterson G, Cobas JA. Acculturation and health-related risk behaviors among Mexican American pregnant youth. *Am J Health Behav*. 1996;20:425–33.
- English PB, Kharrazi M, Guendelman S. Pregnancy outcomes and risk factors in Mexican Americans: the effect of language use and mother’s birthplace. *Ethn Dis*. 1997;7:229–40.
- Zambrana RE, Scrimshaw SC, Collins N, Dunkel-Schetter C. Prenatal health behaviors and psychosocial risk factors in pregnant women of Mexican origin: the role of acculturation. *Am J Public Health*. 1997;87:1022–6.
- Haynes SG, Harvey C, Montes H, Nickens H, Cohen BH. Patterns of cigarette smoking among hispanics in the United-States—results from HHANES 1982-84. *Am J Public Health* 1990; 80(Suppl):47–53.
- Marín G, Marín BV, Otero-Sabogal R, Sabogal F, Pérez-Stable EJ. The role of acculturation in the attitudes, norms, and expectancies of Hispanic smokers. *J Cross Cult Psychol*. 1989;20:399–415.
- National Center for Health Statistics. *Health, United States, With Chartbook on Trends in the Health of Americans* (DHHS Publication No. 2005-1232). Hyattsville, Maryland: US Government Printing Office; 2005.
- Marín G, Posner SF. The role of gender and acculturation on determining the consumption of alcoholic beverages among Mexican-Americans and Central Americans in the United States. *Int J Addict*. 1995;30:779–94.
- Dolcini MM, Coates TJ, Catania JA, Kegeles SM, Hauck WW. Multiple sexual partners and their psychosocial correlates: the population-based AIDS in Multiethnic Neighborhoods (AMEN) study. *Health Psychol*. 1995;14:22–31.
- Rojas-Guyler L, Ellis N, Sanders S. Acculturation, health protective sexual communication, and HIV/AIDS risk behavior among Hispanic women in a large Midwestern city. *Health Educ Behav*. 2005;32:767–79.
- Meir N, Piziak V, Zuniga M, Sanchez E, Alonso AB, Acosta-Gonzalez RI, Castillo Ruiz O, Ramírez de León JA. Establishing successful binational academic collaborations in minority health research. *Public Health Rep*. 2005;120:472–5.
- Sanchez MA, Lemp GF, Magis-Rodríguez C, Bravo-García E, Carter S, Ruiz JD. The epidemiology of HIV among Mexican migrants and recent immigrants in California and Mexico. *J Acquir Immune Defic Syndr*. 2004;37(4):S204–14.
- Guiliano AR, Denman C, de Guernsey Zapien J, Navarro-Henze JL, Ortega L, Djambazov B, Brown Mendez, de Galaz E, Hatch K. Design and results of the USA-Mexico border human papillomavirus (HPV), cervical dysplasia, and Chlamydia trachomatis study. *Rev Panam Salud Publica*. 2001;9:172–81.
- Rubalcava LN, Teruel GM, Thomas D, Goldman N. The healthy migrant effect: new findings from the Mexican family life survey. *Am J Public Health*. 2008;98:78–84.
- Alarcon R. Immigrants or transnational workers? The settlement process among Mexicans in rural California. Davis, CA: California Institute for Rural Studies; 1997.
- US Department of Labor. Findings from the National Agricultural Workers Survey (NAWS). Office of Program Economics, US Department of Labor; 1991.
- Cuellar I, Arnold B, Maldonado R. Acculturation rating-scale for Mexican-Americans II—a revision of the original ARSMA Scale. *Hisp J Behav Sci*. 1995;17:275–304.
- Johnson KL, Carroll JF, Fulda KG, Cardarelli K, Cardarelli R. Acculturation and self-reported health among Hispanics using a socio-behavioral model: the North Texas Health Heart Study. *BMC Public Health*. 2010;10:53.

40. Unger JB, Ritt-Olson A, Soto DW, Baezconde-Garbanati L. Parent-child acculturation discrepancies as a risk factor for substance use among hispanic adolescents in Southern California. *J Immigr Minor Health*. 2009;11:149–57.
41. de Espinosa los Monteros K, Gallo LC, Elder JP, Talavera GA. Individual and area-based indicators of acculturation and the metabolic syndrome among low-income Mexican American women living in a border region. *Am J Public Health*. 2008;98:1979–86.
42. Reifsnider E, Ritsema M. Ecological differences in weight, length, and weight for length of Mexican American children in the WIC program. *J Spec Pediatr Nurs*. 2008;13:154–278.
43. Thomson MD, Hoffman-Goetz L. Defining and measuring acculturation: a systematic review of public health studies with Hispanic populations in the United States. *Soc Sci Med*. 2009;69(7):983–91.
44. Wallace PM, et al. A review of acculturation measures and their utility in studies promoting Latino Health. *Hisp J Behav Sci*. 2010;32(1):37–54.
45. Winer RL, Feng Q, Hughes JP, O'Reilly S, Kiviat NB, Koutsky LA. Risk of female human papillomavirus acquisition associated with first male sex partner. *J Infect Dis*. 2008;197:279–82.
46. Forhan SE, Gottlieb SL, Sternberg MR, Xu F, Datta D, McQuillan GM, Berman SM, Markowitz LE. Prevalence of sexually transmitted infections among female adolescents aged 14 to 19 in the United States. *Pediatrics*. 2009;124:1505–12.
47. Jackson KM, Sher KJ, Schulenberg JE. Conjoint developmental trajectories of young adult alcohol and tobacco use. *J Abnorm Psychol*. 2005;114:612–26.
48. Barendregt C, van der Poel A, van de Mheen D. Tracing selection effects in three non-probability samples. *Eur Addict Res*. 2005;11:124–31.
49. Vega WA, Alderete E, Kolody B, Aguilar-Gaxiola S. Illicit drug use among Mexicans and Mexican Americans in California: the effects of gender and acculturation. *Addiction*. 1998;93:1839–50.
50. Abraido-Lanza AF, Chao MT, Flórez KR. Do healthy behaviors decline with greater acculturation? Implications for the Latino mortality paradox. *Soc Sci Med*. 2005;61:1243–55.
51. Balcazar H, Krull JL, Peterson G. Acculturation and family functioning are related to health risks among pregnant Mexican American women. *Behav Med*. 2001;27:62–70.
52. Ebin VJ, Sneed CD, Morisky DE, Rotheram-Borus MJ, Magnusson AM, Malotte CK. Acculturation and interrelationships between problem and health-promoting behaviors among Latino adolescents. *J Adolesc Health*. 2001;28:62–72.
53. Masel MC, Rudkin LL, Peek MK. Examining the role of acculturation in health behaviors of older Mexican Americans. *Am J Health Behav*. 2006;30:684–99.