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**The Relationship of Acculturation and All Cause Mortality Among Mexican Americans: Results  
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# The Relationship of Acculturation and All Cause Mortality Among Mexican Americans: Results from the NHANES III Mortality Follow Up

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## Abstract

### *Background*

Mexican Americans comprise the largest percentage of Hispanics in the United States, accounting for 9.5% of the population in 2006. Although more than 40% of Mexican Americans are foreign born, even individuals born in the U.S. face the process of acculturation, or the merging of Mexican and American cultures. Previous research has linked acculturation to both negative and positive health outcomes, with more acculturated Mexican Americans experiencing increased rates of substance use and abuse, asthma, and obesity, but decreased rates of physical inactivity and low self-esteem. The purpose of this study is to examine the relationship between acculturation and all-cause mortality in a nationally representative sample of Mexican Americans.

### *Methods*

Using SAS and SUDAAN, we conducted a survival analysis using data from the Third National Health and Nutrition Examination Survey (NHANES III), a nationwide, multi-stage survey conducted between 1988 and 1994. Our analytic sample consisted of 3,330 Mexican-American adults ages 25-64 years who took part in a home interview and were followed up for mortality until 2002. Language spoken at home was used to assess the level of acculturation with those speaking mostly Spanish at home identified as having lower levels of acculturation.

### *Results*

After adjusting for age, education, presence of chronic diseases and health insurance we found that acculturation was not a predictor of all-cause mortality in this group of Mexican Americans, men or women ages 25-64 years.

### *Conclusion*

These findings indicate that acculturation may have no effect on the mortality of Mexican American men and women younger than 65 years of age. Additional research needs to be conducted in order to further explore other measurements of acculturation and the full spectrum of its effects on morbidity and disease-specific mortality.

## Introduction

The Latino community has increased dramatically in the last ten years and according to recent projections by the United States Census Bureau the population is expected to triple by the year 2050 (1). According to census data from 2006, the largest segment of Latinos within the United States are Mexican Americans (2). Traditionally the Mexican American community has been largely concentrated in states such as California and Texas (1). Compared to the other major Latino groups (Puerto Ricans and Cubans) the

Mexican American population is relatively young; the median age being 25.7 years old (2). Being that over 40 percent of this population is foreign born (2) one can assume that many members of the Mexican American community will experience acculturation to some degree within their lifetimes. It would be remiss to not acknowledge acculturation when looking at the Mexican American population, particularly when it comes to health status.

Acculturation is defined as “the process by which groups or individuals integrate the social and cultural values, ideas, beliefs, and behavioral patterns of their culture of origin with those of a different culture” (3). The process of acculturation should not be seen as one single event in a person’s life but rather a long and continuous process that can positively or negatively affect the health of recent immigrants and their offspring (4, 5, 6). The process of acculturation is a multi-dimensional, long term process that has varying degrees of effect on individuals not only between different ethnic groups but within them as well (7). Therefore, research exploring the association between acculturation and health status should be continued.

While the Latino population may suffer from health disparities and low socioeconomic status, the mortality rates are similar to those of non-Hispanic Whites and much lower than non-Hispanic Blacks. This contrast is commonly referred to as the Hispanic/Latino Paradox. Extensive research has been carried out aiming to identify the factors that contribute to this paradox and what these “protective” factors may be. Current research has linked greater acculturation with obesity, smoking, erosion of diet quality, high alcohol intake, and with less physical inactivity among Mexican Americans (8, 9, 10, 11). There continues to be mixed results on the benefits of acculturation; therefore it is inherent to continue research regarding its place within the context of the Mexican American experience, as well as within other Latino groups. Obtaining this information will further contribute to our knowledge on the unique effects migration has on the Mexican American population and may assist public health professionals design more specific health programs for these communities.

In this study we examine the relationship between acculturation and all cause mortality within the Mexican American community using data from the Third National Health and Nutrition Examination Survey (NHANES III). In addition, we hope to identify acculturation constructs that may modify social determinants of health disparities in a large sample of Mexican Americans.

## **Methods**

Data for this study was drawn from NHANES III, conducted between 1988 and 1994 by the Centers for Disease Control and Prevention's National Center for Health Statistics. National data was collected on the health and nutritional status of 33,994 citizens aged two months and older, excluding those residing in institutionalized settings (military personal and prisons), through in person interviews and physical examinations. NHANES III oversampled the two largest racial/ethnic minority groups in the US, Mexican Americans and African Americans, in order to generate statistically reliable results during analysis. Weights were assigned to each participant allowing their responses to represent the racial/ethnic group they identify within the US. Participants were interviewed in their homes by trained bilingual (Spanish/English) interviewers. Our final sample size consisted of 3,330 self identified Mexican Americans between 25 and 64 years of age.

## *Measures*

Through the NHANES III at home questionnaire, participants were asked what their primary language spoken at home was. Language mainly spoken at home (Spanish, Spanish/English, and English) was used as the measurement of acculturation. Those who spoke mainly Spanish at home were defined as being the least acculturated and those who spoke mainly English at home were defined as being the most acculturated. Information on all-cause mortality, our dependent variable, was obtained through the National Death Index (NDI), a repository of all death certificates in the United States, Puerto Rico and all US territories. NHANES III records were linked to the NDI in 2000 creating the NHANES III linked mortality file allowing the study of associations between health and risk factors with mortality. Other variables of interest included were: age, education, presence of chronic disease and health insurance. Wanting to focus on those who would have been

less likely to have insurance and on the young immigrant population our participants were between the ages of 25-64 (12). Education was measured as: <8 years, 9-11 years, 12years, 13 years  $\geq$ . Participants were identified with having chronic disease if they responded “yes” to having any of the following diseases: arthritis, bronchitis, stroke, asthma, congestive heart failure, emphysema, heart attack, osteoporosis, cancer, or back pain. To assess if participants had health insurance they were questioned if they had been covered by any type of health insurance in the past month. Acceptable forms of health insurance were Medicare, Medicaid, military health care, privately obtained insurance, or insurance through a current or former employer or union.

#### *Data Analysis*

SUDAAN (Research Triangle Institute, Research Triangle Park, NC) was used in order to calculate the frequency and percentage of the participants’ demographic information. Due to the complex nature of the NHANES III sampling design, SUDAAN incorporated sampling weights that adjusted for the unequal sample size in the Mexican American population. Further frequency distribution data was analyzed for those “Assumed Alive” and “Assumed Deceased”. We also used SAS, Version 9.1 (SAS Institute Inc, Cary, NC), to estimate the hazard ratio for acculturation and all cause mortality in men and women respectively. Sampling weights were also used to adjust for small sample size and discrepancies in selection probabilities.

## Results

The descriptive analysis presented in Table 1, describes the participants' demographics by age, education, income, work status, place of birth, years in the US, and preferred language at home. Our cohort of Mexican American men and women was nearly equally divided at 50.1% and 49.8% respectively. A majority (65%) of our cohort had less than 12 years of education. Of our participants 23.7% of the men and 22.09% of the women were born in Mexico and 26.21% of men and 27.98% of women were born in the United States. For purposes of this study results were adjusted by age, education (<8y, 9-11 y, 12 y, 13>), insurance (yes, no), and the presence of chronic disease (yes, no).

Measurement of acculturation was based on language preference at home. Approximately 59% of our participants preferred to speak Spanish at home, with approximately 37% of our participants preferring to speak English at home and 3.81% of them spoke both at home. Participants who spoke both Spanish and English at home were not included in the study due to insignificant sample size. At the time the NHANES III linked mortality file was created, 66 of female participants and 94 male participants were assumed dead.

Table 1-Descriptive Demographics

	<u>Men</u>		<u>Women</u>		<u>Assumed Alive</u>		<u>Assumed Deceased</u>	
	n	%	n	%	n	%	n	%
<b>Age y</b>								
25-34 y	638	19.16	621	18.65	1229	36.93	30	0.9
35-44y	457	13.72	501	15.05	918	27.58	40	1.2
55-64 y	304	9.13	269	8.08	479	14.39	94	2.82
<b>Education y</b>								
≤8y	761	23.11	707	21.47	1348	40.96	120	3.65
9 -11y	251	7.62	277	8.41	497	15.1	31	0.94
12y	325	9.87	387	11.75	690	20.97	22	0.67
13y≥	311	9.44	274	8.32	564	17.14	19	0.58
<b>Income</b>								
<20,000	706	21.97	749	23.31	1350	42.04	105	3.27
20-34,999	394	12.26	356	11.08	716	22.3	34	1.06
>35,000	507	15.78	501	15.59	957	29.8	49	1.53
<b>Work Status</b>								
Employed	1358	41.4	867	26.43	2131	65.01	92	2.81
Unemployed	118	3.6	73	2.23	176	5.37	15	0.46
Not in Labor Force	172	5.24	692	21.1	778	23.73	86	2.62
<b>Place of Birth</b>								
Mexico	756	24.48	705	22.83	1375	44.56	86	2.79
United States	779	25.23	848	27.46	1521	49.29	104	3.37
<b>Years in U.S. y</b>								
<5 y	205	6.64	229	7.42	396	12.83	38	1.23
5-19 y	115	3.72	101	3.27	211	6.84	5	0.16
10-19 y	275	8.91	234	7.58	487	15.78	22	0.71
20+ y	161	5.21	141	4.57	281	9.11	21	0.68
Born in U.S.	779	25.23	848	27.46	1521	49.29	104	3.37
<b>Language</b>								
Eng at Home	589	17.83	626	18.95	1159	35.11	54	1.64
Span at Home	1010	30.58	952	28.82	1829	55.41	133	4.03
Eng/Span at Home	58	1.76	68	2.06	119	3.6	7	0.21
Eng at Work	771	33.83	568	24.92	1292	56.74	46	2.02
Span at Work	486	21.33	276	12.11	718	31.53	44	1.93
Eng/Span at Work	115	5.05	63	2.76	172	7.55	5	0.22



**Table 2**  
 Acculturation and All Cause Mortality in Mexican American Men and Women aged 25-64 years (Main language at home).

<b>Women</b>	<b>HR</b>	<b>95% CI</b>
English	1	(Reference)
Spanish	1.37	0.69-2.72
<b>Men</b>	<b>HR</b>	<b>95% CI</b>
English	1	(Reference)
Spanish	0.81	0.46-1.45

Note: HR=Hazards Ratio. CI = Confidence Interval. HRs are adjusted for age ( $\leq 8y$ , 9-11y, 12 y, 13 $\geq$ ) gender (male, female), health insurance (insured, uninsured), and presence of chronic disease (yes/no).

Table 2 describes the adjusted hazard ratios and 95% confidence intervals (CIs) for acculturation and all cause mortality in Mexican American men and women separately. There was no statistically significant association between acculturation (measured by language preference in the home) and all cause mortality for both men ( $p > 0.47$ ) and women ( $p > 0.37$ ). However, acculturation and all cause mortality was statistically significant in men who were uninsured ( $p > 0.02$ ). Our study shows that they were two times more likely (HR 2.04, 95% CI 1.15-3.61) to die than men who were insured. This finding is congruent with past research done on the uninsured and all cause mortality.

Another interesting finding was that the direction of the hazard ratio calculated for men (HR 0.81, 95% CI 0.45-1.45) and women (HR 1.37, 95% CI 0.69-2.72) was incongruent. Meaning that, all cause mortality is less likely to occur in men who are less acculturated than men who are more acculturated.

**Discussion**

Our results indicate that there is no relationship between acculturation and all cause mortality. The strengths of our study lie in the well characterized standard methods used in collecting data for NHANES III as a nationally representative sample. The questionnaire used to collect the information used in this study is validated and was conducted by well trained bi-lingual interviewers. Yet, limitations exist in our acculturation measurement in that one variable such as language spoken at home is limited and is not capable of capturing the acculturation experience. Further research using NHANES III data needs to be conducted exploring other acculturation measures for this population.

The process of acculturation is complex and multifaceted, factors that are enhanced based on country of origin, gender, or out of home interactions (13). The process can also be further complicated based on factors such as family structure, religious beliefs, skin color, and attitudes of the majority culture (7). It is important to consider these factors when examining the health status of communities comprised of immigrants and of those whose ethnic distinctiveness may make it difficult for them to assimilate or “fit into” the dominate culture. Other factors such as age at migration and social interaction can also affect health (5). Although individuals may have been born in the United States and speak primarily English they may exist in a bi-cultural world in which they balance between Anglo and Latino identity. For example, in a recent study on immigrant status and acculturation participants identified more closely as being Latino, however the mean score was closer to “bicultural” based on Marín’s Acculturation Scale (14). Some researchers argue that acculturation should not be studied as a linear process but rather as a multicultural identity existing between cultures and that more emphasis should be placed on cultural strengths and structural risks factors (15, 17).

Within our study we found no significant association between acculturation (measured by language spoken at home) and all cause mortality. Research regarding acculturation and health continues to produce mixed and contrasting results. For example, while some studies have linked more highly acculturated Mexican Americans with greater obesity or erosion of diet quality (9, 10) others found that more highly acculturated Mexican Americans are more physically active during leisure time (8). In a recent study a majority of participants had reported that their health and overall quality of life had improved since living in the United States despite that a majority of them had also reported gaining weight (18). In regards specifically to Latinas, those who are highly acculturated have been found to have higher BMIs, smoke more and consume more alcohol than their less acculturated counter parts (11). However, they are more likely to exercise and to take preventative measures such as receiving breast cancer screenings (11, 19). While research regarding acculturation has been done to further fully understand migration and its effects on immigrant health, it has also been conducted in an attempt to identify reasons for the existence of the Hispanic/Latino Paradox.

The idea of the “Hispanic Paradox” was originally presented in *“The Health of Hispanics in the Southwestern United States: an Epidemiologic Paradox”* written by Markides and Coreil in 1986 (20,21). Over the last two decades much controversy has surrounded the Latino/Hispanic Paradox, framed by three primary explanation theories for the paradox’s existence (20, 22, 23, 24, 25). The “healthy migrant” hypothesis supposes that migrants to the United States are the healthiest members of the communities from which they come from (11). The “salmon bias” theory, suggests that mortality statistics may be skewed by Latinos returning to their countries of origin at the end of their lives to eventually die there (11). If this is the case some feel that it would create inaccuracies when calculating mortality rates however, others feel that the “salmon bias” isn’t relevant for all Latino populations (22). Finally, some researchers have argued that the Latino paradox resulted from miscalculations of mortality rates for Latinos in the United States due to incorrect identification in regards to ethnicity and race on death certificates and to inaccurate numbers for population and deaths among Latinos (26, 27).

In our study there was a significant link between acculturation and all cause mortality amongst Mexican-American men who were uninsured. Reports have shown that Latinos in the United States are less likely to possess health insurance than non-Hispanic whites, non-Hispanic blacks or non-Hispanic Asians. (28, 29, 30) A recent report on health insurance coverage by the National Health Interview Survey found that of the Latinos surveyed 1/3 were uninsured at the time of the interview or had been uninsured for at least part of the past year, and had been without insurance over a year (29). One study found that in 1999 for those who were uninsured almost half had not received needed care (i.e. doctor visit, prescribed medication, or treatments) when needed (31). While research has been done identifying cultural barriers as an issue for Latino health care other barriers appear to be more relevant to the population (32, 33, 34, 35). Estrada et al. found, using NHANES data that of their participants 33% reported encountering one or more barrier to health care and of those 73% reported that the barriers were enough for them to prevent from obtaining health care on that occasion (35). However as opposed to cultural barriers, for their participants their top five encountered barriers were costs, child care, transportation, and losing pay from work (35).

As the Latino population continues to grow surely research in this community will continue to increase. When exploring something as complex as acculturation our goal is not so much to identify a “protective factor” that has Latinos living longer but rather to recognize that the Latino community is not homogenous, not only in regards to ethnic variations but also in regards to immigration status and transitional process into life in the United States (27, 36). As well as to recognize that health in Latino communities (and all communities) should be, according to Markides, “more importantly tied to improving quality of life in these communities through education, employment, and access to care” (27). By exploring various factors existing within the Latino community researchers should continue to attempt to identify the strengths of individual ethnic communities. By doing so we will be able to build upon these strengths creating more relevant and appropriate disease prevention programs, in turn building healthier and stronger communities.

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