HHS Public Access

Author manuscript

*Med Care*. Author manuscript; available in PMC 2021 March 10.

Published in final edited form as:

*Med Care*. 2015 May ; 53(5): 417–422. doi:10.1097/MLR.0000000000000337.

# Is Greater Acculturation Associated With an Increased Prevalence of Cardiovascular Risk Factors Among Latinos in South Florida?

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## Abstract

**Objective:** To examine the association of acculturation with various cardiovascular risk factors (CRFs) among Latinos with diabetes in South Florida.

**Methods:** In a cross-sectional analysis of data collected from 300 Latinos with poorly controlled diabetes we measured acculturation using the Marin Short Acculturation Scale. We examined correlations between acculturation and the following 7 CRFs: hemoglobin A1C, low-density lipoprotein, systolic blood pressure, body mass index, smoking status, physical activity, and fruit and vegetable intake.

**Results:** Cubans made up 38% of our population; no other Latino subgroup represented over 17% of the sample. Of the 8 outcomes examined, only smoking was associated with increased acculturation; 12% of Latinos in the 2 lowest acculturation groups were current smokers versus 25% in the highest acculturation group ($P$=0.02). Furthermore, Cuban Americans from our sample had over double the prevalence of smoking compared with non-Cubans in both the lowest and highest acculturation groups.

**Conclusions:** With the exception of smoking, our data does not support a link between increased acculturation and higher prevalence of CRFs in Latinos with diabetes. Smoking prevention and cessation programs targeting Latinos and particularly among Cubans are needed.

### Keywords

Hispanic; Latino; diabetes; acculturation; cardiovascular risk

Acculturation is the process of adapting to a new culture including the values, beliefs, and attitudes of a new country.[1] Among Latinos, higher levels of acculturation are associated

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The authors declare no conflict of interest.

Supplemental Digital Content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Website, www.lww-medicalcare.com.

with increased smoking,[2–4] obesity,[5] and lower intake of fruits and vegetables.[3] The term "acculturation paradox" refers to immigrants who have adapted to a more North American lifestyle suffering worse health outcomes than those who remain less acculturated. While Latinos are less likely to smoke, they are more likely to be obese, physically inactive, and have type II diabetes than Non-Latino Whites.[6,7]

The few studies that have examined the correlation of acculturation with physiological measures of cardiovascular risk factors (CRFs), such as blood pressure, cholesterol, and diabetes in Latinos have produced mixed findings. While some studies have found that higher acculturation worsens CRFs,[8,9] others have reported decreased CRFs with increased acculturation,[1,10] and others no significant associations.[11,12] In addition, Latinos are a highly diverse group.[9,13,14] Some studies suggest that the impact of acculturation on health is strongly modified by Latino subethnicity.[3] However, as few nationally representative surveys provide enough statistical power to assess cardiovascular risk in Latino subgroups,[3] the vast majority of acculturation research in Latinos has focused predominately on Latinos of Mexican ancestry.[1,3,8,10–12]

Thus, there is a need for research examining the association between acculturation and physiological measures of CRF among Latinos, particularly, among non-Mexican populations. In this analysis, we describe the relationship between acculturation and four physiological and three behavioral CRFs. Consistent with the acculturation paradox, we hypothesized that persons with increased acculturation would have poor control of CRFs.

## METHODS

### Participants

We analyzed cross-sectional data from 300 patients enrolled in the Miami Healthy Heart Initiative (MHHI).[15] As previously described,[15] MHHI was a randomized trial that evaluated the impact of a community health worker intervention among Latinos with poorly controlled type II diabetes. From 2010–2012, subjects were recruited from the outpatient primary care clinics of Miami-Dade County's main safety net hospital, Jackson Memorial Hospital (JHS). We used two recruitment strategies. First, via the electronic medical record we identified a list of age-eligible Latino patients having had at least two visits to the JHS ambulatory clinics with a diagnosis of diabetes and the most recent laboratory result for Hemoglobin A1C (A1C) being greater than or equal to 8.0%. We then contacted and enrolled 266 of these patients. Second, via physician referral we were able to contact and enroll an additional 34 patients.

Inclusion criteria included being 35–70 years of age, self-identification as Hispanic/Latino, having visited the clinic twice within the last year, and having their most recent A1C measuring greater than or equal to 8.0%. Patients were excluded from the study if they were diagnosed with diabetes at younger than 25 years of age, self-reported being a type I diabetic, having diabetes less than 1 year, or having a life-threatening comorbidity, or inability to be present for the duration of the study period.

## Data Collection

Before randomization, patients underwent a baseline evaluation, which included systolic blood pressure (SBP) taken as per American Heart Association (AHA) guidelines, phlebotomy to measure serum A1C and low-density lipoprotein (LDL), body mass index (BMI) estimated using a stadiometer. A 90-minute structured research interview was conducted by a research assistant in Spanish or English (95% chose to be interviewed in Spanish). Two research assistants independently entered the data, which was crosschecked for consistency.

## Measures

**Independent Variable: Acculturation Status—**In research, acculturation status has been operationalized by various measures including language use, number of generations living in the US, length of time in the US, age at the time of arrival to the US, and self-reported perceptions of acculturation level.[16–19] Numerous existing instruments incorporate multiple domains of acculturation including language, systems competency and community type.[20–22] However, in MHHI, acculturation was one of many constructs being assessed in our 90-minute interview. Thus, we prioritized selecting a validated instrument that was brief and would not result in increased respondent burden. We chose the Marin Short Acculturation Scale (MSAS),[16] which primarily focuses on the linguistic components of acculturation. This scale has been shown to have good internal reliability and be comparable with lengthier acculturation instruments.[1] It has been validated in multiple Latino populations, correlates well with measures of other aspects of acculturation, and is included in other national surveys such as the National Health and Nutrition Examination Survey (NHANES).[1]

The 6-item MSAS (Appendix Box 1, Supplemental Digital Content 1, http://links.lww.com/MLR/A882) uses a Likert scale and respondents can have a total acculturation score ranging from 6 to 30. For each subject, we calculated the total acculturation score and then based on frequency distributions, we grouped all respondents scoring six (48%) into one category we labeled as minimal acculturation. We then divided the other two groups into those scoring 7–10 as low acculturation (29%) and those scoring 11–30 as moderate acculturation (26%).

**Dependent Variables: Measures of Cardiovascular Risk—**Physiologic measures of CRFs included AIC,[23] LDL,[24] SBP,[24] and BMI.[25] Behavioral measures of CRFs included diet,[26] physical activity,[27] and active smoking.[28] For diet, rather than using lengthy comprehensive nutritional intake instruments, we used the Center for Disease Control Fruit and Vegetable Intake Questionnaire as a rough measure of diet.[29] For physical activity we used the International Physical Activity Questionnaire (IPAQ)[30] and report the proportion considered as having low physical activity defined as less than 600 Metabolic Equivalent of Task minutes per week. Metabolic Equivalent of Task minutes are minutes of exercise multiplied by a factor of 3.3 for walking, 4.0 for moderate intensity exercise, and 8.0 for vigorous intensity exercise.[31]

### Covariates

We also explored whether other potential covariates may modify the relationship between acculturation and CRFs. These include age, sex, socioeconomic status (SES) (due to most of our sample being low income we used education as our SES proxy), length of time in the US (19 respondents did not answer this question), Cuban ethnicity, as well as depression and health literacy (Table 1). Depression[32] was measured by the Euro-D Mental Health Scale, a validated scale in Latino and European Spanish speakers[33,34] with scores above 3 considered to be depressed.[35] Health literacy was measured by the 18-item Short Assessment of Health Literacy Scale- Spanish and English (SAHL-S&E) is particularly useful for identifying individuals with low health literacy.[36] Those with scores of 14 or less were considered as having low health literacy. Education was divided into less than 12 years, completed high school, and over 12 years of education.

### Statistical Analysis

The statistical significance of associations between acculturation and continuous outcomes (including A1C, SBP, LDL, and BMI) were examined using analysis of variance. Categorical variables were examined using $\chi^2$ including percent with fruit and vegetable consumption 3 or greater, percent with low physical activity by IPAQ, and percent active smokers. For any outcomes found to be significantly correlated with acculturation status in bivariate models, we examined multivariate models to determine if the relationship remained robust after adjusting for potential covariates. These included age, sex, depression, years of education, and ethnicity. We calculated odds ratios (ORs) and 95% confidence intervals (95% CI). All analyses were performed using SPSS and with statistical significance level set at an alpha of 0.05.

## RESULTS

The baseline characteristics of our study population are shown in Table 1. Although persons born in Cuba made up approximately 38% our sample, the rest came from a large variety of regions of Latin America including at least 10 persons born in Nicaragua, Colombia, Dominican Republic, Puerto Rico, Peru, and the mainland United States. Although over 80% of our sample had been residing in the United States for over 10 years, in general most of our respondents had very low levels of acculturation. For example, while 69% of Cubans had been living in the United States for over 10 years, 85% had minimal or low acculturation. In general, more acculturated Latinos had greater educational attainment and were more likely to have higher health literacy scores.

With respect to CRFs (Table 2), we did not find any statistically significant associations between acculturation level and SBP, LDL, AIC, BMI, fruit and vegetable intake, or physical activity. Of the 7 outcomes we examined, the only one that was statistically significantly associated with acculturation was smoking. We found 25% of Latinos in the highest acculturation group were current smokers versus 12% of Latinos in the 2 lowest acculturation groups ($P = 0.02$). This relationship remained robust after adjusting for age, sex, Cuban ethnicity, depression, and years of education (Table 3). We report the OR of the minimal acculturation group compared with low (unadjusted OR = 0.98; 95% CI = 0.43,

2.24; $P = 0.95$; adjusted OR = 1.04; 95% CI = 0.42, 2.58; $P = 0.93$) and moderate (unadjusted OR = 2.52; 95% CI = 1.21, 5.26; $P = 0.01$; adjusted OR = 2.77; 95% CI = 1.18, 6.46; $P = 0.02$).

Among Latino subgroups, Cubans had double the proportion of active smokers as compared with non-Cubans (28% vs. 12%) ($P = 0.01$). Among Cubans with minimal acculturation, 20% were smokers versus 4% of non-Cubans ($P < 0.05$). Among Cubans with moderate acculturation 41% were smokers versus 20% of non-Cubans ($P < 0.05$).

## DISCUSSION

The acculturation paradox posits that increased acculturation is associated with worse health outcomes. Thus, we originally hypothesized that increased acculturation would lead to worsening CRF such as A1C, LDL, SBP, and BMI. However, we found that higher levels of acculturation were not associated with worsening of any of these CRFs in Latinos with diabetes. Our findings of a lack of association between acculturation with physiological CRFs, are similar to a recent report from NHANES but that included mostly Latinos of Mexican origin.[1]

The only finding supporting our original hypothesis was smoking. We found that more acculturated Latinos had nearly double the proportion of smokers than those least acculturated. As smoking is the largest modifiable contributor to mortality in the United States, 400,000 excess cardiovascular deaths annually,[37] this finding is critically important. Although data from NHANES did not report a link between acculturation and smoking,[1] several other regional studies have found that acculturation is associated with increased smoking among Latinos.[3,38–40] Some have theorized that Latinos smoke as a method of coping with the stress of acculturation.[39] In addition, the tobacco industry has designed specific marketing campaigns targeting Latinos. Examples include heavy promotion of cigarette products with names such as “Rio” and “Dorado” and advertising in Latino print media.[41] In addition, the tobacco industry actively sought to establish itself within Latino communities by funding scholarships, hosting cultural events, and supporting Latino art.[41] These slick marketing strategies may contribute to increased smoking among more acculturated Latinos.

Although smoking increased in both Cubans and non-Cubans with higher acculturation, Cubans had double the rate of smoking as compared with non-Cubans. Hispanic Health and Nutrition Examination Survey (HHANES, 1982–1984) also found that Cubans had a higher prevalence of smokers than other Latinos.[42] In addition, HHANES found that among Latino smokers, Cubans smoked a greater quantity of cigarettes than other Latino groups. The high prevalence of smoking among Cuban Americans may be the result of a high prevalence of smoking in Cuba where approximately 30% of the population smokes.[43] Thus, important research is needed to identify tobacco prevention and cessation interventions that are effective for Latinos and particularly among Cubans.

An important limitation of our findings is that while our sample consisted of a highly diverse Latino population with most having resided in the United States for long periods of time, the

overall levels of acculturation were low. A comparison with national samples using the same acculturation scale suggests our cohort had much lower acculturation levels than Latinos in other areas. For example, in NHANES 32% of Hispanics had the highest acculturation score, [1] whereas in our study <1% of respondents had a score above 25, which may have been due to our focus on low-income Latinos receiving care at a safety net clinic. However, a regional study in San Francisco also using the MSAS reported that 77% of the Latinos had low acculturation scores.[44] In addition, in a county such as Miami-Dade where 64% of the population is Latino[45] the overall concept of "acculturating" particularly as it relates to language may be different than in other parts of the United States. In Miami, minimal changes may be needed to integrate into a society that retains many of the customs and language of Latin America. Further, the conceptualization of acculturation in such areas may be better construed as one emphasizing a more reciprocal biculturalism model. In this model, selective adoption of traits and behaviors from the new culture while maintaining certain values from the original culture leads to an increased social mobility among immigrants.[3,46] For example, in many areas, Latino parents now place a high value in fostering bilingualism and biculturalism in their children.[47] The MSAS is a unidirectional scale of acculturation that does not account for biculturalism that is increasingly important in our diverse nation.

In addition, the "westernization" of health habits occurring across Latin America is important to consider as a limitation in understanding the results. As these countries modernize and develop more western lifestyles, the traditional patterns of nutrition, physical activity, and lifestyle have undergone dramatic shifts. As a result, the disease profiles of many of these countries now increasingly reflect those of North America. As one example, Mexico now exceeds the United States in rates of obesity.[48] Thus, many immigrants to the United States may already to some extent be more westernized when they arrive in the United States than they were several decades ago when the classic immigrant paradox phenomenon was originally observed.

In conclusion, in our analysis of acculturation and CRFs among Latinos with poorly controlled diabetes in South Florida, we found that smoking was the only CRF associated with acculturation. This finding suggests that culturally appropriate programs targeting smoking prevention and cessation would likely be most useful in mitigating the potential impact of increased acculturation on modifiable cardiovascular disease risk factors among Latinos with diabetes in Miami-Dade County.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## Acknowledgments

Supported by the National Heart, Lung, and Blood Institute (R01 HL083857) and a training grant from Health Resources and Services Administration (D55HP23209).

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**TABLE 1.**

Baseline Characteristics for Participants by Acculturation Status

| Characteristics | All (N = 300) | Acculturation | | |
|---|---|---|---|---|
| | | Minimal [143 (48%)] | Low [86 (29%)] | Moderate [71 (24%)] |
| Age (y) | | | | |
| Mean (SD) | 55 (7.0) | 55 (7.3) | 55 (6.7) | 53 (6.6) |
| Median (Q1, Q3) | 56 (50, 61) | 56 (51, 61) | 56 (52, 61) | 54 (50, 59) |
| Min, Max | 36, 69 | 37, 69 | 37, 69 | 36, 68 |
| Female [n (%)] | 165 (55) | 85 (59) | 43 (50) | 37 (52) |
| Cuban [n (%)] | 115 (38) | 70 (49) | 28 (33) | 17 (24) |
| Length of time in the US> 10 y * [n (%)] | 231 (82) | 103 (79) | 77 (91) | 52 (96) |
| Education <12y of schooling [n (%)] | 125 (42) | 85 (59) | 25 (29) | 15 (21) |
| Depressed by the Euro-D Scale [n (%)] | 212 (71) | 102 (71) | 56 (65) | 54 (76) |
| Literate by SAHL-S&E literacy scale [n (%)] | 255 (85) | 111 (78) | 81 (94) | 63 (89) |

* Only 281 of the participants answered the question about length of time in the United States.

Max indicates maximum; Min, minimum; US, United States.

**TABLE 2.**

Measures of Cardiovascular Risk by Acculturation Status

| Characteristics | All (n = 300) | Acculturation | | |
|---|---|---|---|---|
| | | Minimal [143 (48%)] | Low [86 (29%)] | Moderate [71 (24%)] |
| Physiological measures * | | | | |
| A1C | | | | |
| Mean (SD) | 9.3 (2.00) | 9.2 (2.12) | 9.6 (1.43) | 9.4 (2.07) |
| Median (Q1, Q3) | 9.0 (7.9, 10.4) | 8.9 (7.6, 10.5) | 9.1 (8.0, 10.4) | 9.0 (8.0, 10.2) |
| Min, Max | 5, 17 | 5.0, 17.3 | 6.2, 12.7 | 6.3, 15.7 |
| LDL | | | | |
| Mean (SD) | 105 (39) | 105 (36) | 98 (31) | 105 (47) |
| Median (Q1, Q3) | 101 (77, 135) | 103 (77, 132) | 101 (77, 135) | 101 (64, 141) |
| Min, Max | 13, 270 | 13, 218 | 41, 191 | 23, 270 |
| SBP | | | | |
| Mean (SD) | 133 (19) | 135 (19) | 129 (13) | 131 (18) |
| Median (Q1, Q3) | 131 (119, 142) | 133 (121, 147) | 129 (118, 141) | 131 (118, 139) |
| Min, Max | 91, 203 | 96, 203 | 91, 184 | 98, 188 |
| BMI | | | | |
| Mean (SD) | 32.3 (7.4) | 32.7 (8) | 31.3 (7) | 32.9 (8) |
| Median (Q1, Q3) | 30.9 (27.2, 35.2) | 30.8 (27.9, 36.0) | 29.6 (26.3, 34.2) | 32.0 (26.9, 36.8) |
| Min, Max | 20.1, 72.8 | 20.1, 72.8 | 21.2, 50.4 | 21.8, 61.2 |
| Behavioral measures | | | | |
| Eat ≥ 3 servings of fruit and vegetables/d | 90 (30.0) | 37 (25.9) | 26 (30.2) | 27 (38.0) |
| Low physical activity (<600 MET min/wk) | 88 (29.3) | 37 (25.9) | 32 (37.2) | 19 (26.8) |
| Active smoker ** | 45 (15.0) | 17 (11.9) | 10 (11.6) | 18 (25.4) |

Formula: weight (kg)/[height (m)]$^2$.

*All *P*-values for physiological measures >0.05 from 1-way analysis of variance.

**$P<0.05$ by $\chi^2$ analysis.

A1C indicates hemoglobin A1C or glycosylated hemoglobin; BMI, body mass index; LDL, low-density lipoprotein; Max, maximum; Min, minimum; MET, metabolic equivalent of task; SBP, systolic blood pressure.

**TABLE 3.**

A Multivariate Logistic Regression Model for Smoking (Active Smoker Versus Nonsmoker)

| Covariates | Adjusted OR (95% CI) | *P* |
|---|---|---|
| Acculturation * | | |
| Minimal | 1 | |
| Low | 1.04 (0.42, 2.58) | 0.93 |
| Moderate | 2.77 (1.18, 6.46) | 0.02 |
| Age (y) | 0.97 (0.92, 1.01) | 0.20 |
| Sex | | |
| Male | 1 | |
| Female | 0.59 (0.29, 1.19) | 0.14 |
| Cuban | | |
| Non-Cuban | 1 | |
| Cuban | 2.82 (1.36, 5.86) | 0.01 |
| Depressed † | | |
| No | 1 | |
| Yes | 1.46 (0.66, 3.23) | 0.35 |
| Education (y) | | |
| <12 | 1 | |
| 12 | 1.70 (0.74, 3.92) | 0.21 |
| >12 | 1.61 (0.66, 3.97) | 0.30 |

*Acculturation is minimal if Marin Short Acculturation Score equals 6, low if Marin Short Acculturation Score equals 7–10, and moderate if Marin Short Acculturation Score equals 11–30.

†Depressed if Euro Depression Scale is >3.

CI indicates confidence interval; OR, odds ratio.