

# Acculturation Differentially Predicts Smoking Cessation among Latino Men and Women

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## Abstract

**Objectives:** The current study examined the influence of gender, acculturation indicators, and their interaction on smoking cessation among Latinos.

**Methods:** Logistic regression analysis was used to examine the main effects of gender, acculturation indicators, and their interactions on self-reported 7-day abstinence at 12-week follow-up among 271 Latino smokers seeking cessation counseling.

**Results:** Analyses revealed significant main effects for several acculturation indicators and significant interactions of gender with number of years lived in the United States, proportion of life lived in the United States, and preferred media language (all *P* values <0.05). Fol-

low-up analyses indicated no significant relationships between abstinence and acculturation indicators among women. Among men, abstinence rates increased with years in the United States, proportion of life in the United States, and preferred media language of English.

**Conclusions:** Greater acculturation predicted higher abstinence rates, but this relationship was restricted to men. This study is among the first to examine the effects of gender and acculturation on smoking abstinence among Latinos. Findings highlight the need for research focused on mechanisms underlying these relationships. (*Cancer Epidemiol Biomarkers Prev* 2009;18(12):3468–75)

## Introduction

Tobacco is the leading cause of preventable death and disease among adults in the United States (1) and one third of all cancers are directly attributable to tobacco use (2). Moreover, tobacco use is a major public health problem among Latinos. Although the prevalence of smoking is lower among Latinos than among the general U.S. population (13.3% versus 21.4%; ref. 3), there is significant heterogeneity in smoking prevalence across subgroups of Latinos. For example, recent national data indicate that smoking prevalence among non-Latino whites is 23.4% versus 15.5% among Latinos of Mexican descent, 20.3% among Latinos of Puerto Rican descent, and 29.9% among Latinos of Cuban descent (4). Moreover, the adverse public health consequences of smoking among Latinos are very large, as three of the four leading causes of death among Latinos are related to smoking (i.e., cancer, heart disease, and stroke; ref. 5).

Latinos also experience notable disparities with respect to smoking cessation success (6, 7), use of cessation aides (8, 9), and proactive inquiry or counseling about smoking by their health care providers (8, 10). Moreover, little is known about the processes underlying smoking cessation that are of specific relevance to Latinos (11, 12).

Research identifying factors important to successful smoking cessation among minorities has been identified as a national health priority (13) because such knowledge can improve interventions directed at underserved populations and ultimately aid in eliminating smoking-related health disparities.

Cultural variables, such as acculturation, have received little attention in smoking cessation research among Latinos or any other underserved populations. "Acculturation" refers to the behavioral and ideological changes experienced by individuals as a result of contact between two cultures (14, 15), such as a minority individual's adoption of U.S. customs and values and identification with U.S. culture. Thus, acculturation can be considered a psychosocial process that is of particular relevance to Latinos in the United States and may have unique effects on smoking cessation. Level of acculturation has been found to be a particularly important predictor of smoking prevalence among Latinos; however, research regarding its effects on smoking cessation is lacking.

Previous research examining the prevalence of smoking has consistently yielded a gender-by-acculturation interaction among Latinos, such that acculturation is positively related to smoking prevalence among women but unrelated to prevalence among men (16–25). However, there is a paucity of research addressing the influence of acculturation on smoking cessation, with extant studies yielding mixed results. For example, in a community intervention study, Pérez-Stable and colleagues (26) dichotomized the total score of a five-item acculturation scale (27) and found no relationship between smoking abstinence and acculturation at 3, 6, or 12 months after their intervention. On the other hand, Bock and colleagues (28) split their Latino sample into two groups based on

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a single five-point language fluency question, with those who endorsed speaking "Spanish only" or "Spanish better than English" classified as "less acculturated," and those endorsing "Both languages equally," "English better than Spanish," or "English only" classified as "bicultural." They found higher abstinence rates for the less acculturated group at 3 and 6 months post-quit, suggesting that the bicultural participants had more difficulty maintaining abstinence.

The current study assessed the relationship of cessation with multiple indicators of acculturation, including nativity, years spent in the United States, proportion of life spent in the United States, language spoken at home, language spoken at work, and preferred media language. Use of multiple indicators in the current study is important because it allows for measurement of multiple aspects of acculturation. Research and theory indicate that acculturation is a multidimensional construct, consisting of factors relevant to language, behaviors, knowledge, attitudes/beliefs, and identity, among others (29, 30). A single indicator of acculturation is unlikely to capture more than one of these factors. The acculturation indicators used here are presumed to relate to one's identification and familiarity with U.S. cultural practices (31) and one's use and preference for the dominant culture's language across a variety of contexts (30). Further, indicators such as those used in the current study are regularly used in acculturation research more generally and have been found to be related to comprehensive measures of acculturation (27, 32-35) and predictive of health outcomes (36, 37).

With some exceptions (38-40), previous research on gender differences in smoking cessation indicates that women have more difficulty quitting than men (41-46). However, an important limitation of these studies has been the underrepresentation of racial and ethnic minorities, with most studies providing no information on the race/ethnicity of their sample (42, 44-46). Only Pérez-Stable et al. examined cessation rates by gender using an exclusively Latino sample (26). Their results indicated that men and women did not differ in abstinence rates. Thus, little can be said to date about the impact of gender on cessation among Latinos or the generalizability of gender differences in smoking cessation to racial and ethnic minorities. In addition, cessation studies have not examined the interaction of acculturation with gender. The interaction of acculturation and gender on cessation is important to consider in light of previous research that has revealed gender differences in smoking cessation rates in the general population, as well as a gender-differentiated effect of acculturation on smoking prevalence among Latinos.

**Study Purpose.** The current study examined the influence of gender and indicators of acculturation on smoking cessation among Latino smokers who called a Spanish-language smoking cessation quitline. This research expanded upon previous examinations of acculturation and smoking cessation with the use of multiple acculturation indicators, including immigrant status, number of years living in the United States, proportion of life lived in the United States, language used at home, language used at work, and preferred media language. Moreover, we examined both the main effects and the interaction effects of gender and acculturation with respect to predicting smoking cessation during a specific quit attempt.

Previous research has not found a consistent relationship between acculturation and cessation among Latinos. An inconsistent relationship between two variables is often indicative of an unidentified moderating variable at work (47). Additionally, previous research has found that gender and acculturation interact to predict smoking prevalence among Latinos, and cessation rates have been consistently found to differ by gender among non-Latino whites, all of which indicate that gender is important to consider when examining the relationship between acculturation and smoking cessation. Thus, the current study predicted that acculturation indicators would be positively related to smoking cessation in a sample of Latino smokers seeking cessation treatment. Consistent with previous research among mostly non-Latino whites, it was also predicted that gender would be related to cessation, such that men would have greater cessation rates than women. Finally, similar to previous research addressing smoking prevalence, it was hypothesized that gender and acculturation would interact to predict smoking cessation, with acculturation having a stronger effect on cessation rates among women than among men.

## Materials and Methods

**Participants.** The current study used data from a two-group randomized clinical trial that evaluated the efficacy of a culturally sensitive, proactive, behavioral treatment program for Spanish-speaking Latino smokers (48). Adult, self-identified Latino smokers residing in Texas who called the National Cancer Institute Cancer Information Service (1-800-4-CANCER) to request Spanish-language smoking cessation assistance were eligible for enrollment. Participants were recruited from several locations in Texas (e.g., Houston, San Antonio, El Paso, and the Rio Grande Valley) through paid media (television, radio, newspaper, and direct mailings).

Participants were enrolled from August 2002 to March 2004. There were 355 eligible callers during the study period. Of the 355 callers, 297 consented to participate. Of the 58 callers who did not participate, 28 declined, 3 were ineligible, 19 were unreachable, and 8 did not complete the baseline assessment. Of the 297 participants, 26 were excluded due to missing acculturation data. The final sample consisted of 271 participants.

**Procedure.** Callers who agreed to participate in the study were contacted by project staff within 1 week of their initial call to the Cancer Information Service to complete a verbal, audiotaped informed consent and a baseline assessment. Participants were randomly assigned to receive one of two telephone-based counseling protocols as part of a clinical trial. Standard counseling consisted of a single counseling session conducted during the participant's initial call to Cancer Information Service and an offer of Spanish-language self-help materials. Enhanced counseling consisted of standard counseling plus three additional proactive, culturally sensitive, evidence-based behavioral counseling calls. Results of the outcome study are available elsewhere (48). The primary outcome variable in this study was abstinence assessed at the latest follow-up (12 weeks after the baseline assessment).

**Table 1. Participant characteristics by gender**

	Men (n = 149)	Women (n = 122)
	Mean (SD)	Mean (SD)
Age	40.1 (11.89)	42.23 (11.18)
Years of education	11.05 (4.0)	11.04 (4.07)
Number of cigarettes per day	10.38 (8.33)	9.66 (7.11)
Years in the United States	14.77 (13.01)	15.52 (11.95)
Proportion of life in the United States	34.86% (24.66)	35.6% (23.7)
	n (%)	n (%)
<b>Yearly household income</b>		
<10,000	<b>21 (14.4)</b>	<b>30 (25.2)</b>
10,000-19,999	<b>50 (34.2)</b>	<b>43 (36.1)</b>
20,000-29,999	<b>40 (27.4)</b>	<b>17 (25.6)</b>
30,000-39,999	<b>15 (10.3)</b>	<b>12 (10.1)</b>
40,000-49,999	<b>8 (5.5)</b>	<b>3 (2.5)</b>
≥50,000	<b>3 (6.6)</b>	<b>9 (7.6)</b>
Partner status		
Have partner	100 (67.1)	83 (68.6)
No partner	49 (48.0)	38 (31.4)
Treatment group		
Usual care	71 (47.7)	61 (50.0)
Tailored care	78 (50.6)	61 (50.0)
Time to first cigarette (min)		
≤5	19 (13.2)	20 (16.7)
≥6	125 (86.8)	100 (83.3)
Immigrant status		
Immigrant	141 (94.6)	116 (95.1)
Nonimmigrant	8 (5.4)	6 (4.9)
Language used at home		
Only/mostly Spanish	137 (91.9)	106 (86.9)
Both equally	9 (6.0)	8 (6.6)
Only/mostly English	3 (2.0)	8 (6.6)
Language used at work		
Only/mostly Spanish	85 (63.9)	44 (63.8)
Both equally	20 (19.8)	10 (14.5)
Only/mostly English	28 (21.1)	15 (21.7)
Preferred media language		
Only/mostly Spanish	93 (62.8)	87 (71.9)
Both equally	34 (23.0)	26 (21.5)
Only/mostly English	21 (14.2)	8 (6.6)

NOTE: Six individuals declined to report income, one declined to report partner status, 7 declined to report time to first cigarette, 69 declined to report language used at work or this item was not applicable, and 2 declined to report preferred media language. Bold text indicates statistically significant difference,  $P < 0.05$ .

### Measures and Variables of Interest

**Demographic Variables.** Demographic variables assessed in the current study were collected at baseline, and included gender (male or female), partner status (partner or no partner), age, number of years of completed education, and total annual household income.

**Acculturation Indicators.** Three indicators of acculturation that measure aspects of residence and nativity were used in the current study. *Number of years in the United States* was computed as the participant's current age minus age of entry into the United States. For individuals who were nonimmigrants, age was used as the indicator of number of years in the United States. *Proportion of life spent in the United States* was computed by dividing number of years spent in the United States by the individual's age. *Immigrant status* was computed based on participant's reported familial generation in the United States. First-generation individuals endorsed "I am an immigrant to the United States" and individuals of subsequent generations (i.e., generations two and higher) endorsed having been born in the United States. Generational status was collapsed into immigrant and nonim-

migrant status because there were too few participants represented in some generational categories to make meaningful comparisons. Three indicators of acculturation relating to language spoken and preference were used in the current study. To assess *language spoken at home* and *language spoken at work*, participants were asked "what language do you speak at home?" and "what language do you speak at work?" Additionally, to assess *preferred media language*, participants were asked to rate the extent to which they watched news and programs in English and Spanish. All language questions were rated on a five-point scale: "only Spanish," "more Spanish than English," "both with the same frequency," "more English than Spanish," and "only English." These five categories were collapsed into three because there were too few participants in some categories to make meaningful comparisons. The three categories were "mostly/only Spanish," "both with the same frequency," and "mostly/only English."

**Tobacco Use and Dependence Indicators.** Two indicators of tobacco use and dependence were used as covariates: number of cigarettes smoked per day and amount of time

**Table 2. Summary of analyses predicting abstinence at 12-week follow-up**

	Adjusted OR (95% CI)	P
Gender (male)	1.91 (0.96-3.81)	0.07
<b>Years in the United States</b>	<b>1.04 (1.01-1.07)</b>	<b>0.02</b>
<b>Proportion of life in the United States</b>	<b>1.02 (1.002-1.03)</b>	<b>0.02</b>
<b>Immigrant status (nonimmigrant)</b>	<b>4.25 (1.26-14.32)</b>	<b>0.02</b>
Language spoken at home	1.49 (0.72-3.06)	0.28
Language spoken at work	1.04 (0.66-1.62)	0.88
<b>Preferred media language</b>	<b>1.67 (1.05-2.64)</b>	<b>0.03</b>
<b>Gender × years in the United States</b>	<b>1.08 (1.02-1.15)</b>	<b>0.01</b>
<b>Gender × proportion of life in the United States</b>	<b>1.03 (1.002-1.062)</b>	<b>0.04</b>
Gender × immigrant status	11.03 (0.58-208.66)	0.11
Gender × language spoken at home	0.75 (0.19-2.96)	0.68
Gender × language spoken at work	0.77 (0.30-1.99)	0.59
<b>Gender × preferred media language</b>	<b>3.43 (1.07-10.97)</b>	<b>0.04</b>

NOTE: Each line of this table represents an individual logistic regression analysis. Analyses were adjusted for treatment group, age, education, income, marital status, number of cigarettes smoked per day and time to first cigarette. Bold text indicates statistically significant effect. Abbreviations: OR, odds ratio; 95% CI, 95% confidence interval.

lapsed after awakening before smoking the first cigarette of the day. Time to first cigarette was coded as a dichotomous variable where "5 minutes or less" was coded "0" and "6 minutes or more" was coded "1."

**Abstinence.** Smoking abstinence was defined as a self-report of not smoking during the previous 7 days at the 12-week follow-up assessment. "Not abstinent" was coded "0" and "abstinent" was coded "1." Missing outcome data for 42 participants were coded as "not abstinent," as is standard for "intent to treat" analyses in smoking cessation.

**Data Analysis.** A series of logistic regression analyses were conducted to examine the main effects of gender and each acculturation indicator on abstinence at 12-week follow-up, as well as the interaction of gender with each acculturation indicator. Analyses were adjusted for treatment group, age, education, income, partner status, number of cigarettes smoked per day, and time to first cigarette. These covariates were selected to isolate the effects of gender and acculturation over commonly reported demographic and dependence influences, as well as to control for any effect of treatment type. Upon finding significant interaction effects involving gender, additional logistic regressions were conducted with women and men separately. Analyses were conducted using a sample of 271 individuals where those lost to follow-up were coded as "not abstinent" (i.e., intent-to-treat analysis), as well as with a sample of 229 where those lost to follow-up were excluded from analysis (i.e., completers-only analysis). These two data-analytic strategies produced nearly identical results. Thus, only results from the intent-to-treat analyses are detailed below.

## Results

**Participant Characteristics.** Participant characteristics by gender are shown in Table 1. Men and women differed significantly only in yearly household income, where more women were represented in the lowest income bracket.

**Main Effects of Gender and Acculturation.** Of the six acculturation indicators examined, number of years in the

United States, proportion of life in the United States, immigrant status, and preferred media language were significant predictors of abstinence (Table 2). Abstinence was positively associated with increased years in the United States, greater proportion of life lived in the United States, nonimmigrant status, and greater preference for English-language media. Gender, language spoken at home, and language spoken at work were not related to abstinence (Table 2).

**Interaction Effects of Gender and Acculturation.** Another set of analyses examined the interaction of gender with each acculturation indicator separately. Significant interactions were found for gender with number of years lived in the United States, gender with proportion of life in the United States, and gender with preferred media language (Table 2).

To determine the nature of the interaction between gender and each of the three significant acculturation indicators, separate analyses were conducted for men and women. Like in all previous analyses, treatment group, age, education, income, partner status, number of cigarettes smoked per day, and time to first cigarette were used as covariates.

Among women, none of the acculturation indicators significantly predicted abstinence (i.e., years in the United States, proportion of life spent in the United States, or preferred media language; Table 3). Among men, each of these three acculturation indicators significantly predicted abstinence. Specifically, the odds of abstinence increased with more years lived in the United States, greater proportion of life lived in the United States, and greater preference for English-language media (Table 3). To ensure that nativity did not account for the relationship between abstinence and years in the United States or proportion of life in the United States, follow-up analyses were conducted with immigrant status as an additional covariate. The effects of years in the United States and proportion of life in the United States remained significant ( $P < 0.02$  and  $P = 0.03$ , respectively).

Figure 1 depicts the relationships between acculturation indicators and abstinence by gender. For years in the United States and proportion of life in the United States, participants were divided into quartiles. The figure suggests that abstinence rates are higher for men only

after a substantial amount of time in the United States (i.e., 23-76 years of life or 50-100% of their life). Men's abstinence rates are also higher when their preference for English-language media exceeds their preference for Spanish-language media. The main effect of immigrant status is shown in Fig. 2, with immigrants having lower cessation rates than nonimmigrants.

## Discussion

Acculturation differentially affects abstinence rates in treatment-seeking Latino smokers during a quit attempt. More specifically, acculturation is positively associated with smoking abstinence in Latino men and is unrelated to abstinence in Latina women. This effect was consistent across three indicators of acculturation and was not accounted for by demographic characteristics, type of treatment, or tobacco use and dependence. To the best of our knowledge, the current study is among the first to examine the interactive effects of gender and acculturation on smoking cessation among Latinos. In addition, there was a main effect of immigrant status on smoking cessation, with immigrants having lower cessation rates than non-immigrants.

The current study found a significant effect for four of six indicators of acculturation. Language preference, but not language use, predicted abstinence. Although both language preference and language use are examples of acculturative behavior, disparate results could reflect different "motivators." For example, "preference" may reflect a desire to communicate in a particular language because of a greater sense of personal identity with the culture using that language, whereas "use" may reflect the necessity of communicating in a particular language due to the language proficiencies of other individuals in the environment. As such, language preference might better reflect identification with the culture, which could account for its association with abstinence.

The remaining significant indicators of acculturation (i.e., number of years lived in the United States, proportion of life lived in the United States, and immigrant status) are often considered proxies for the level of exposure to majority society. This exposure may allow one increased familiarity and knowledge of gender role expectations and social norms around smoking, and may help explain the gender-differentiated effects of acculturation on smoking prevalence and cessation. Because Latina women in the United States smoke at a much lower rate than non-Latina white women (17, 49), acculturation may cause smoking prevalence rates

among Latina women to move toward those of non-Latina white women through changes in gender role expectations and social norms (50). A comparison of smoking prevalence rates in the United States and Mexico is consistent with this difference in the social acceptability and social norms for smoking for each gender in each culture. In 2002, the difference in smoking rates for men and women in the United States was slight (24.6% versus 20%; ref. 51). That same year in Mexico, the smoking rates of men were almost three times those of women (42.2% versus 15.1%; ref. 52). Use of one Latin American country's smoking rates is not meant to imply that this one country is representative of all Latin American cultures, but the comparison is appropriate for the current sample, of which two thirds are Mexican immigrants, and is useful considering that two thirds of the U.S. Hispanic population is of Mexican origin (53). Latina women in the United States might experience this difference in social norms between the mainstream culture and the culture of origin as an indicator of more freedom to engage in a behavior that was previously more typical of men. Among Latino men in the United States, their smoking rates are already similar to those of non-Latino men in the United States. As such, acculturation may increase smoking prevalence among Latina women and have little effect on smoking prevalence among Latino men.

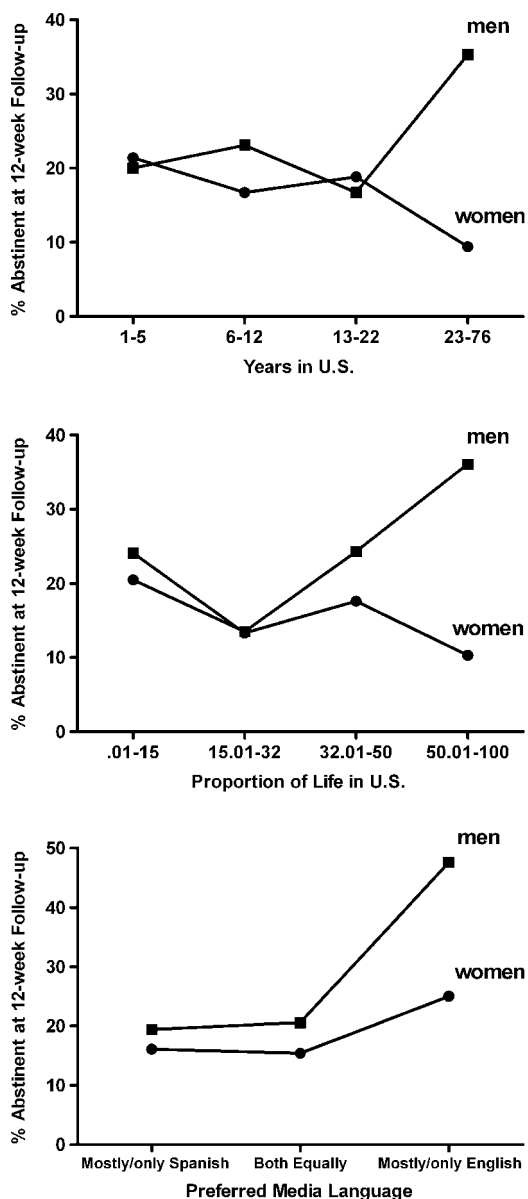
Similarly, cessation rates of Latina women during a specific quit attempt are roughly equivalent to those of non-Latina White women (22% versus 25%, respectively; refs. 26, 41), leaving little room for acculturative processes to affect cessation rates. Among Latino men, the 2002 smoking rates of men in Mexico (42.2%; ref. 52) were almost twice that of both men and women in the United States that same year (24.6% and 20%, respectively; ref. 51). Furthermore, the quit rate (former smokers divided by ever smokers) is lower among Latino men in the United States than among non-Latino white men (42.8% versus 47.7%; ref. 54). These differences in smoking prevalence and cessation between the majority U.S. culture and the culture of origin might create pressure and social norms for Latino men to adopt more mainstream health behaviors (i.e., quit smoking) as they acculturate. Nevertheless, future research on the effect of population level quit rates and quit attempts is needed to help shed light on the discrepancies in the effects of acculturation and gender on smoking prevalence versus cessation among Latinos.

The current study failed to find a significant main effect of gender in predicting abstinence for this exclusively Latino sample. These results are consistent with Pérez-Stable

**Table 3. Acculturation indicators predicting abstinence at 12 weeks by gender**

	Adjusted OR (95% CI)	P
Men		
Years lived in the United States	<b>1.08 (1.03-1.13)</b>	<b>0.001</b>
Proportion of life in the United States	<b>1.03 (1.01-1.05)</b>	<b>0.002</b>
Preferred media language	<b>2.61 (1.41-4.82)</b>	<b>0.002</b>
Women		
Years in the United States	0.95 (0.88-1.03)	0.18
Proportion of life in the United States	0.99 (0.96-1.02)	0.43
Preferred media language	0.60 (0.17-2.06)	0.41

NOTE: Each line of this table represents an individual logistic regression analysis. Analyses were adjusted for treatment group, age, education, income, marital status, number of cigarettes smoked per day, and time to first cigarette. Bold text indicates statistically significant effect.



**Figure 1.** Abstinence rates for men and women as a function of acculturation.

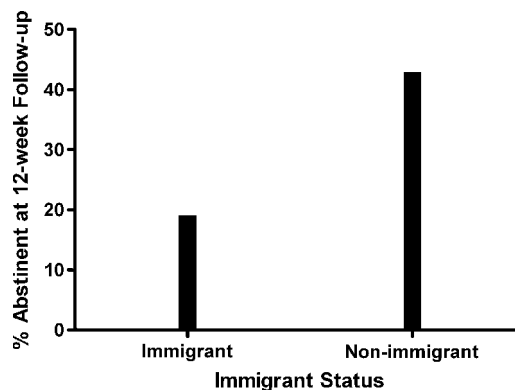
et al. (26). However, the moderating effect of gender on acculturation suggests that gender is still an important factor in predicting abstinence. Future research will need to replicate these findings.

Future research would also benefit from an examination of potential mechanisms through which acculturation might affect Latino men's and women's smoking behavior. For example, research from cultural psychology indicates that acculturation is related to variables that are relevant to successful cessation, such as social support (34, 55-57), self-efficacy (58-61), and negative affect and depression (62-68), and these variables might function as mediators. Future research would also benefit from examining other potential moderators of acculturation and gender effects on cessation, such as treatment. For exam-

ple, treatments that specifically sought to increase factors that are associated with higher acculturation, such as social support and self-efficacy, might serve to reduce the acculturation difference in cessation rates among men.

The current study has several limitations. First, this study used demographic indicators of language preference and usage, and time exposed to U.S. culture, rather than a well-validated acculturation scale. Although these variables are important to the acculturative process, they cannot directly tap into an individual's level of adoption and internalization of mainstream practices, culture, and values. Further, each indicator consisted of a single item, and the psychometric properties of a single item can be problematic (e.g., reliability). Future research on the acculturation-abstinence relationship in Latinos would benefit from use of more comprehensive, multidimensional measures of acculturation. Second, the significant main effect of immigrant status should be interpreted cautiously, in light of a small sample size of nonimmigrants. Third, the current study examined self-report of abstinence and lacked biochemical verification. Biochemical verification of abstinence may be important for Latino light smokers, as there is some evidence that a proportion of this particular subgroup of Latino smokers tend to underreport cigarette consumption (69). Fourth, the study sample was originally recruited for a study specifically targeting self-identified Latino smokers who were seeking Spanish-language smoking cessation services. This targeted recruitment resulted in a sample with little variability with respect to immigrant status (i.e., the vast majority were immigrants) and generally low levels of acculturation across the six indicators examined in the study. As such, confidence intervals were large and the findings should be interpreted with caution. Additionally, the low variability may have resulted in a weaker association between acculturation and smoking cessation than would have been found with a more heterogeneous sample. Finally, the homogeneity in acculturation level limits the generalizability of the findings to Latino smokers with low levels of acculturation. Thus, replication of these novel findings is necessary, particularly with more diverse samples of Latinos.

In sum, the current study found that greater acculturation predicted higher abstinence rates, but this relationship was restricted to men. Although the current study has limitations, it is among the first to examine both the



**Figure 2.** Abstinence rates as a function of immigrant status.

independent and combined effects of gender and acculturation on smoking cessation in Latinos. Replication of this study with more comprehensive measures of acculturation and in more diverse Latino samples is warranted. It is possible that changes in social norms or social pressure to exhibit mainstream behavior explain the relationships among acculturation, gender, and smoking cessation. However, these propositions remain to be tested. Future research would benefit from examination of these possibilities, as well as the identification of other potential mechanisms underlying the gender-acculturation-smoking cessation relationships.

### Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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