Published in final edited form as:
Cancer Epidemiol Biomarkers Prev. 2009 December ; 18(12): 3468–3475. doi: 10.1158/1055-9965.EPI-09-0450.

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 (U.S.), proportion of life lived in the U.S., and preferred media language (all *p*s < .05). Follow-up analyses indicated no significant relationships between abstinence and acculturation indicators among women. Among men, abstinence rates increased with years in the U.S., proportion of life in the U.S., 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.

Keywords

Latinos; acculturation; smoking cessation; gender differences

Tobacco is the leading cause of preventable death and disease among adults in the United States (U.S.)[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% vs. 21.4%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%,

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The authors do not have any conflicts of interest pertaining to this work.

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).[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 U.S., 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, but 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 three, six, or twelve months after their intervention. On the other hand, Bock and colleagues[28] split their Latino sample into two groups based on 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 three- and six-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 U.S., proportion of life spent in the U.S., 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 under-representation 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 U.S., proportion of life lived in the U.S., language use at home, language use 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.

METHODS

Participants

The current study utilized 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's Cancer Information Service (CIS; 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) via 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 one week of their initial call to the CIS 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 CIS 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).

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 U.S.* was computed as the participant's current age minus age of entry into the U.S. For individuals who were non-immigrants, age was used as the indicator of number of years in the U.S. *Proportion of life spent in the U.S.* was computed by dividing number of years spent in the U.S. by the individual's age. *Immigrant status* was computed based on participant's reported familial generation in the U.S. 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 U.S. Generational status was collapsed into "immigrant" and "non-immigrant" 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 utilized as covariates: number of cigarettes smoked per day and amount of time 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 in order 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 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 U.S., proportion of life in the U.S., immigrant status, and preferred media language were significant predictors of abstinence (Table 2). Abstinence was positively associated with increased years in the U.S., greater proportion of life lived in the U.S., non-immigrant 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 U.S., gender with proportion of life in the U.S., and gender with preferred media language (Table 2).

In order 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 U.S., proportion of life spent in the U.S., 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 U.S., greater proportion of life lived in the U.S., and greater preference for English-language media (Table 3). In order to ensure that nativity did not account for the relationship between abstinence and years in the U.S. or proportion of life in the U.S., follow-up analyses were conducted with immigrant status as an additional covariate. The effects of years in the U.S. and proportion of life in the U.S. remained significant ($p < .02$ and $p = .03$, respectively).

Figure 1 depicts the relationships between acculturation indicators and abstinence by gender. For years in the U.S. and proportion of life in the U.S., participants were divided into quartiles. The figure suggests that abstinence rates are higher for men only after a substantial amount of time in the U.S. (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 Figure 2, with immigrants having lower cessation rates than non-immigrants.

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 utilizing 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 U.S., proportion of life lived in the U.S., 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 U.S. 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 via changes in gender role expectations and social norms.[50] A comparison of smoking prevalence rates in the U.S. 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 U.S. was slight (24.6% versus 20%). That same year in Mexico, the smoking rates of men were almost three times those of women (42.2% versus 15.1%).[51, 52] Use of one Latin American country's smoking rates is not meant 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 U.S. 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 U.S., their smoking rates are already similar to those of non-Latino men in the U.S. 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%, respectively26, 41), leaving little room for acculturative processes to affect cessation rates. Among Latino men, the 2002 smoking rates of men in Mexico (42.2%51) were almost twice that of both men and women in the U.S. that same year (24.6% and 20%, respectively52). Furthermore, the quit rate (former smokers divided by ever smokers) is lower among Latino men in the U.S. (42.8%) than among non-Latino white men (47.7%).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, 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 example, 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. While 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 non-immigrants. 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 the 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 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 these possibilities, as well as the identification of other potential mechanisms underlying the gender-acculturation-smoking cessation relationships.

Acknowledgments

This research was supported by grants from the Minority Health Research and Education Program of the Texas Higher Education Coordinating Board, the National Cancer Institute (R01 CA94826, R01 CA89350, R25 CA57730), and the Centers for Disease Control and Prevention (K01DP001120-01, K01DP000086). We would like to acknowledge the National Cancer Institute's Cancer Information Service for their contributions to the original research project, Adiós al Fumar, from which our data were derived.

References

1. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. J Amer Med Assoc 2004 Mar 10;291:1238–1245.
2. Ries, LAG.; Melbert, D.; Krapcho, M.; Stinchcomb, DG.; Howlader, N.; Horner, MJ., et al. SEER Cancer Statistics Review. 1975–2005. Retrieved January 12, 2009, from http://seer.cancer.gov/csr/1975_2001/
3. Centers for Disease Control and Prevention. Cigarette Smoking Among Adults--United States, 2007. Mor Mortal Wkly Rep 2008;57:1221–1226.
4. Howe HL, Wu X, Ries LAG, et al. Annual report to the nation on the status of cancer, 1975–2003, featuring cancer among U.S. Hispanic/Latino populations. Cancer 2006 Oct 15;107:1711–1742. [PubMed: 16958083]
5. Centers for Disease Control and Prevention. National Center for Health Statistics. Hayattsville, MD: Department Health Human Services; [cited 2009 January 12]. Available from: http://www.cdc.gov/nchs/datawh/statab/unpubd/mortabs.htm
6. CDC. Cigarette smoking among adults - United States, 2000. Morb Mortal Wkly Rep 2002;51:642–645.
7. Levinson AH, Perez-Stable EJ, Espinoza P, Flores ET, Byers TE. Latinos report less use of pharmaceutical aids when trying to quit smoking. Am J Prev Med 2004 Feb;26:105–111. [PubMed: 14751320]
8. Cokkinides VE, Halpern MT, Barbeau EM, Ward E, Thun MJ. Racial and ethnic disparities in smoking-cessation interventions: analysis of the 2005 National Health Interview Survey. Am J Prev Med 2008 May;34:404–412. [PubMed: 18407007]
9. Thorndike AN, Biener L, Rigotti NA. Effect on smoking cessation of switching nicotine replacement therapy to over-the-counter status. Am J Public Health 2002 Mar;92:437–442. [PubMed: 11867326]
10. Houston TK, Scarinci IC, Person SD, Greene PG. Patient smoking cessation advice by health care providers: the role of ethnicity, socioeconomic status, and health. Am J Public Health 2005 Jun; 95:1056–1061. [PubMed: 15914833]
11. Fiore, MC.; Bailey, WC.; Cohen, SJ., et al. Treating Tobacco Use and Dependence: Clinical Practice Guideline. Rockville, MD: U.S. Department of Health and Human Services; 2000.
12. Fiore, MC.; Jaén, CR.; Baker, TB., et al. Clinical Practice Guideline. Rockville, MD: U.S. Department of Health and Human Services; 2008. Treating Tobacco Use and Dependence: 2008 Update.
13. Centers for Disease Control and Prevention. Healthy People 2010 Volume 2: 27. Tobacco Use. [cited 2009 April 20]. Available from: http://www.healthypeople.gov/Document/HTML/Volume2/27Tobacco.htm#_Toc489766222

14. Berry, JW. Acculturative stress. In: Organista, PB.; Chun, KM.; Marin, G., editors. Readings in ethnic psychology. Florence, KY: Taylor & Frances/Routledge; 1998. p. 117-122.
15. Berry JW. Acculturation: Living successfully in two cultures. Int J Intercult Rel Special Issue: Conflict, negotiation, and mediation across cultures: Highlights from the fourth biennial conference of the International Academy for Intercultural Research 2005;29:697–712.
16. Acevedo MC. The role of acculturation in explaining ethnic differences in the prenatal health-risk behaviors, mental health, and parenting beliefs of Mexican American and European American at-risk women. Child Abuse Negl 2000 Jan;24:111–127. [PubMed: 10660014]
17. Maher JE, Boysun MJ, Rohde K, et al. Are Latinos really less likely to be smokers? Lessons from Oregon. Nicotine Tob Res 2005 Apr;(7):283–287.
18. Cantero PJ, Richardson JL, Baezconde-Garbanati L, Marks G. The association between acculturation and health practices among middle-aged and elderly Latinas. Ethn Dis 1999 Spring–Summer;9:166–180. [PubMed: 10421079]
19. Coonrod DV, Balcazar H, Brady J, Garcia S, Van Tine M. Smoking, acculturation and family cohesion in Mexican-American women. Ethn Dis 1999;9:434–440. [PubMed: 10600066]
20. Coreil J, Ray LA, Markides KS. Predictors of smoking among Mexican-Americans: findings from the Hispanic HANES. Prev Med 1991 Jul;20:508–517. [PubMed: 1871079]
21. Palinkas LA, Pierce J, Rosbrook BP, et al. Cigarette smoking behavior and beliefs of Hispanics in California. Am J Prev Med 1993 Nov–Dec;9:331–337. [PubMed: 8311982]
22. Perez-Stable EJ, Ramirez A, Villareal R, et al. Cigarette smoking behavior among US Latino men and women from different countries of origin. Am J Public Health 2001 Sep;91:1424–1430. [PubMed: 11527775]
23. Samet JM, Howard CA, Coultas DB, Skipper BJ. Acculturation, education, and income as determinants of cigarette smoking in New Mexico Hispanics. Cancer Epidemiol Biomarkers Prev 1992 Mar–Apr;1:235–240. [PubMed: 1306108]
24. Sundquist J, Winkleby MA. Cardiovascular risk factors in Mexican American adults: a transcultural analysis of NHANES III, 1988–1994. Am J Public Health 1999 May;89:723–730. [PubMed: 10224985]
25. Wilkinson AV, Spitz MR, Strom SS, et al. Effects of nativity, age at migration, and acculturation on smoking among adult Houston residents of Mexican descent. Am J Public Health 2005 Jun;95:1043–1049. [PubMed: 15914831]
26. Perez-Stable EJ, Sabogal F, Marin G, Marin BV, Otero-Sabogal R. Evaluation of "Guia para Dejar de Fumar," a self-help guide in Spanish to quit smoking. Public Health Rep 1991 Sep–Oct;106:564–570. [PubMed: 1910191]
27. Marin G, Sabogal F, Marin BV, Otero-Sabogal R, et al. Development of a short acculturation scale for Hispanics. Hispanic J Behav Sci 1987 Jun;9:183–205.
28. Bock BC, Niaura RS, Neighbors CJ, Carmona-Barros R, Azam M. Differences between Latino and non-Latino White smokers in cognitive and behavioral characteristics relevant to smoking cessation. Addict Behav 2005;30:711–724. [PubMed: 15833576]
29. Cabassa LJ. Measuring acculturation: Where we are and where we need to go. Hispanic J Behav Sci 2003;25:127–146.
30. Kim C, Laroche M, Tomiuk MA. A measure of acculturation for Italian Canadians: Scale development and construct validation. Int J Intercult Rel 2001;25:607–637.
31. Schwartz SJ, Pantin H, Sullivan S, Prado G, Szapocznik J. Nativity and Years in the Receiving Culture as Markers of Acculturation in Ethnic Enclaves. J Cross Cult Psychol 2006;37:345–353. [PubMed: 16799700]
32. Cuellar I, Arnold B, Maldonado R. Acculturation Rating Scale for Mexican Americans-II: A revision of the original ARSMA scale. Hispanic J Behav Sci 1995;17:275–304.
33. Marin G, Gamba RJ. A new measurement of acculturation for Hispanics: the Bidimensional Acculturation Scale for Hispanics (BAS). Hispanic J Behav Sci 1996 Aug;18:297–316.
34. Rodriguez N, Mira CB, Paez ND, Myers HF. Exploring the complexities of familism and acculturation: central constructs for people of Mexican origin. Am J Community Psychol 2007 Mar; 39:61–77. [PubMed: 17437189]

35. Zea MC, Asner-Self KK, Birman D, Buki LP. The Abbreviated Multidimentional Acculturation Scale: empirical validation with two Latino/Latina samples. Cultur Divers Ethni Minor Psychol 2003 May; 9:107–126.
36. Corral I, Landrine H, Corral I, Landrine H. Acculturation and ethnic-minority health behavior: a test of the operant model. Health Psychol 2008 Nov;27:737–745. [PubMed: 19025269]
37. Lopez-Gonzalez L, Aravena VC, Hummer RA. Immigrant Acculturation, Gender and Health Behavior: a Research Note. Soc Forces 2005 Sep;84:581–593.
38. Gritz ER, Thompson B, Emmons K, et al. Gender Differences among Smokers and Quitters in the Working Well Trial. Prev Med 1998;27:553–561. [PubMed: 9672949]
39. Kabat GC, Wynder EL. Determinants of quitting smoking. Am J Public Health 1987 Oct;77:1301–1305. [PubMed: 3631364]
40. Daza P, Cofta-Woerpel L, Mazas C, et al. Racial and ethnic differences in predictors of smoking cessation. Subst Use Misuse 2006;41:317–339. [PubMed: 16467009]
41. Bjornson W, Rand C, Connett JE, et al. Gender differences in smoking cessation after 3 years in the Lung Health Study. Am J Public Health 1995 Feb;85:223–230. [PubMed: 7856782]
42. Bohadana A, Nilsson F, Rasmussen T, Martinet Y. Gender differences in quit rates following smoking cessation with combination nicotine therapy: influence of baseline smoking behavior. Nicotine Tob Res 2003;5:111–116. [PubMed: 12745512]
43. Fortmann SP, Killen JD. Who shall quit? Comparison of volunteer and population-based recruitment in two minimal-contact smoking cessation studies. Am J Epidemiol 1994 Jul 1;140:39–51. [PubMed: 8017402]
44. Swan GE, Ward MM, Carmelli D, Jack LM. Differential rates of relapse in subgroups of male and female smokers. J Clin Epidemiol 1993 Sep;46:1041–1053. [PubMed: 8263577]
45. Ward KD, Klesges RC, Zbikowski SM, Bliss RE, Garvey AJ. Gender differences in the outcome of an unaided smoking cessation attempt. Addict Behav 1997;22:521–533. [PubMed: 9290861]
46. Wetter DW, Kenford SL, Smith SS, et al. Gender differences in smoking cessation. J Consult Clin Psychol 1999 Aug;67:555–562. [PubMed: 10450626]
47. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. J Pers Soc Psychol 1986 Dec;51:1173–1182. [PubMed: 3806354]
48. Wetter DW, Mazas C, Daza P, et al. Reaching and treating Spanish-speaking smokers through the National Cancer Institute's Cancer Information Service. A randomized controlled trial. Cancer 2006 Jan 15;109:406–413. [PubMed: 17149758]
49. Perkins KA. Smoking cessation in women: special considerations. CNS Drugs 2001;15:391–411. [PubMed: 11475944]
50. Bethel JW, Schenker MB. Acculturation and smoking patterns among Hispanics: a review. Am J Prev Med 2005 Aug;29:143–148. [PubMed: 16005811]
51. Instituto Nacional de Estadística Geografía e Informática. Estadísticas a propósito del día mundial sin tabaco: Datos nacionales. México, D.F: 2005 May 31 [cited 2009 March 13]. Available from: http://www.inegi.gob.mx/inegi/contenidos/espanol/prensa/Contenidos/estadisticas/2005/tabaco05.pdf
52. National Center for Health Statistics. Current cigarette smoking among adults 18 years of age and over, by sex, race, and age: United States, selected years 1965–2005. Atlanta, GA: Centers for Disease Control and Prevention; 2008 Oct 15 [cited 2009 March 13]. Available from: http://www.cdc.gov/nchs/data/hus/hus07.pdf#063
53. United States Census Bureau. Hispanics in the United Staties. 2008 [updated 2008; cited 2009 March 30]. Available from: http://www.census.gov/population/www/socdemo/hispanic/hispanic_pop_presentation.html
54. United States Department of Health and Human Services. Tobacco Use Among U.S. Racial/ethnic Minority Groups--African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: A Report of the Surgeon General. Atlanta, GA: Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office of Smoking and Health; 1998.

55. Gulliver SB, Hughes JR, Solomon LJ, Dey AN. An investigation of self-efficacy, partner support and daily stresses as predictors of relapse to smoking in self-quitters. Addiction 1995;90:767–772. [PubMed: 7633293]
56. Mermelstein R, Cohen S, Lichtenstein E, Baer JS, Kamarck T. Social support and smoking cessation and maintenance. J Consult Clin Psychol 1986 Aug;54:447–453. [PubMed: 3745596]
57. Murray RP, Johnston JJ, Dolce JJ, Lee WW, O'Hara P. Social support for smoking cessation and abstinence: The lung health study. Addict Behav 1995;20:159–170. [PubMed: 7484310]
58. Baer JS, Holt CS, Lichtenstein E. Self-efficacy and smoking reexamined: Construct validity and clinical utility. J Consult Clin Psychol 1986;54:846–852. [PubMed: 3794032]
59. Bell RA, Alcalay R. The impact of the Wellness Guide/Guia on Hispanic women's well-being-related knowledge, efficacy beliefs, and behaviors: the mediating role of acculturation. Health Educ Behav 1997 Jun;24:326–343. [PubMed: 9158977]
60. Gwaltney CJ, Shiffman S, Balabanis MH, Paty JA. Dynamic self-efficacy and outcome expectancies: Prediction of smoking lapse and relapse. Journal of Abnormal Psychology 2005;114:661–675. [PubMed: 16351387]
61. Matheny KB, Weatherman KE. Predictors of smoking cessation and maintenance. Journal of Clinical Psychology 1998;54:223–235. [PubMed: 9467767]
62. Burnam M, Hough RL, Karno M, Escobar JI, et al. Acculturation and lifetime prevalence of psychiatric disorders among Mexican Americans in Los Angeles. J Health Soc Behav 1987 Mar; 28:89–102. [PubMed: 3571910]
63. Cinciripini PM, Wetter DW, Fouladi RT, et al. The effects of depressed mood on smoking cessation: mediation by postcessation self-efficacy. J Consult Clin Psychol 2003 Apr;71:292–301. [PubMed: 12699023]
64. Cuellar I, Bastida E, Braccio SM. Residency in the United States, Subjective Well-Being, and Depression in an Older Mexican-Origin Sample. J Aging Health 2004 Aug;16:447–466. [PubMed: 15271265]
65. Davila M, McFall SL, Cheng D. Acculturation and depressive symptoms among pregnant and postpartum Latinas. Matern Child Health J 2009;13:318–325. [PubMed: 18636323]
66. Kassel JD, Stroud LR, Paronis CA. Smoking, stress, and negative affect: correlation, causation, and context across stages of smoking. Psychol Bull 2003;129:270–304. [PubMed: 12696841]
67. Manfredi C, Cho YI, Crittenden KS, Dolecek TA. A path model of smoking cessation in women smokers of low socio-economic status. Health Educ Res 2007;22:747–756. [PubMed: 17182971]
68. Shiffman S, Waters AJ. Negative affect and smoking lapses: A prospective analysis. J Consult Clin Psychology 2004;72:192–201.
69. Perez-Stable EJ, Marin BV, Marin G, Brody DJ, Benowitz NL. Apparent underreporting of cigarette consumption among Mexican American smokers. Am J Public Health 1990 Sep;80:1057–1061. [PubMed: 2382741]

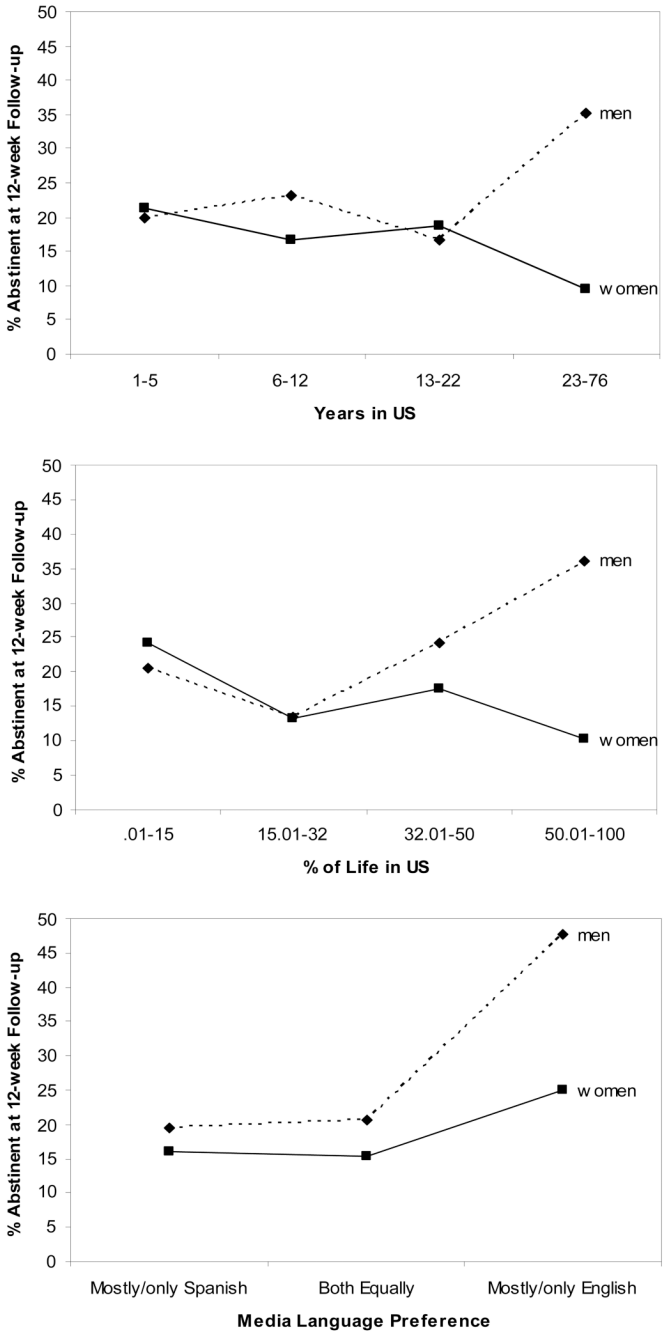

Figure 1.
Abstinence Rates for Men and Women as a Function of Acculturation

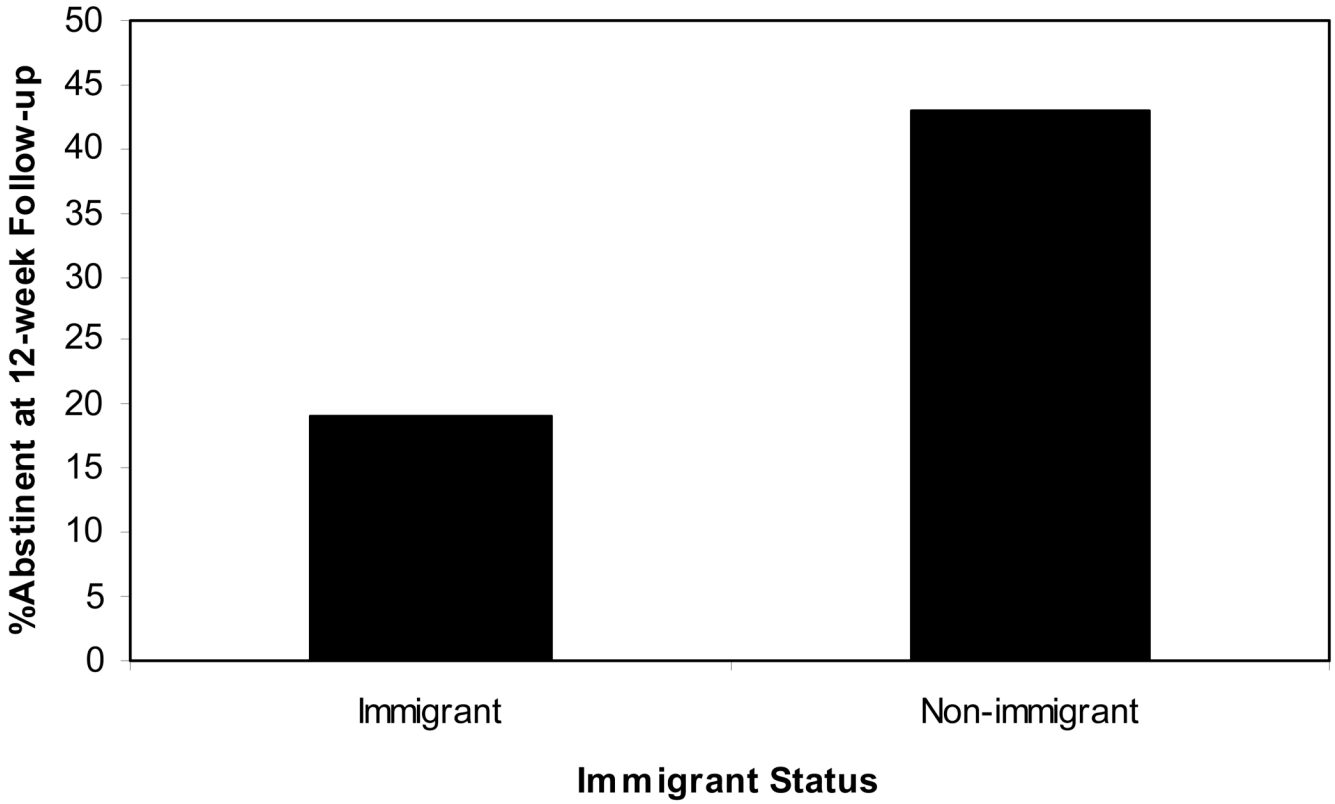

Figure 2.
Abstinence Rates as a Function of Immigrant Status

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 U.S.	14.77 (13.01)	15.52 (11.95)
Proportion of life in U.S.	34.86% (24.66)	35.6% (23.7)
	N (%)	**N (%)**
Yearly household income		
< 10,000	**21 (14.4)**	**30 (25.2)**
10,000–19,999	**50 (34.2)**	**43 (36.1)**
20,000–29,999	**40 (27.4)**	**17 (25.6)**
30,000–39,999	**15 (10.3)**	**12 (10.1)**
40,000–49,999	**8 (5.5)**	**3 (2.5)**
50,000–or more	**3 (6.6)**	**9 (7.6)**
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		
5 minutes or less	19 (13.2)	20 (16.7)
6 minutes or more	125 (86.8)	100 (83.3)
Immigrant status		
Immigrant	141 (94.6)	116 (95.1)
Non-immigrant	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)

	Men **N = 149**	**Women** **N = 122**
	Mean (SD)	**Mean (SD)**
Both equally	34 (23.0)	26 (27.0)
Only/mostly English	21 (14.2)	8 (13.0)

Note: SD = standard deviation

* 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, $p < .05$.

Table 2

Summary of Analyses Predicting Abstinence at 12 Week Follow-up*

	Adjusted OR	95% CI	p value
Gender (male)	1.91	.96–3.81	.07
Years in U.S.	**1.04**	**1.01–1.07**	**.02**
Proportion of life in U.S.	**1.02**	**1.002–1.03**	**.02**
Immigrant status (non-immigrant)	**4.25**	**1.26–14.32**	**.02**
Language spoken at home	1.49	.72–3.06	.28
Language spoken at work	1.04	.66–1.62	.88
Preferred media language	**1.67**	**1.05–2.64**	**.03**
Gender X years in U.S.	**1.08**	**1.02–1.15**	**.01**
Gender X proportion of life in U.S.	**1.03**	**1.002–1.062**	**.04**
Gender X immigrant status	11.03	.58–208.66	.11
Gender X language spoken at home	.75	.19–2.96	.68
Gender X language spoken at work	.77	.30–1.99	.59
Gender X preferred media language	**3.43**	**1.07–10.97**	**.04**

Note: OR = odds ratio; 95% CI = 95% confidence interval.

*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.

Table 3

Acculturation Indicators Predicting Abstinence at 12 Weeks by Gender*

	Adjusted OR	95% CI	p value
	Men		
Years lived in U.S.	**1.08**	**1.03–1.13**	**.001**
Proportion of life in U.S.	**1.03**	**1.01–1.05**	**.002**
Preferred media language	**2.61**	**1.41–4.82**	**.002**
	Women		
Years in U.S.	.95	.88–1.03	.18
Proportion of life in U.S.	.99	.96–1.02	.43
Preferred media language	.60	.17–2.06	.41

Note: OR = odds ratio; 95% CI = 95% confidence interval.

*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.