Intergenerational Differences in Smoking Behavior for Mexican-Americans: The Role of Culture and Cohesion

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Abstract

Lack of acculturation to U.S. society is often suggested as a reason for foreign-born health advantages. This paper argues that scholars interested in the effects of acculturation on health outcomes should first focus on health behaviors, as behaviors are more closely tied to culture. Additionally, acculturation is not an individual or straight-line process, and should not be measured as such. Thus, this paper investigates differences in smoking behavior between first- and second-generation Mexican-American adults and their children, second- and third-generation Mexican-American adolescents. Using multi-level modeling techniques, I find that adult Mexican immigrants and their adolescent children smoke less than U.S.-born Mexican-American adults and their adolescent children. Although the expanded acculturation measures do not account for the generational difference in smoking for either adults or adolescents, some significantly affect smoking, including frequency of church attendance and the level of the respondent's disapproval of unhealthy behaviors, for adults, and parental holding of traditional values, for adolescents. Additionally, high neighborhood immigrant concentration is significantly and negatively associated with adult smoking for all Mexicans but also does not affect the intergenerational difference. The findings suggest that although acculturation measures focusing on social influences on health behaviors may not explain intergenerational differences in smoking, the measures do contribute to overall levels of smoking in the Mexican-American community for both adults and adolescents.

Introduction

Racial and ethnic disparities in health are well-documented, particularly the Hispanic mortality paradox, which shows that despite typically low socioeconomic levels, Hispanics exhibit lower mortality than other minority groups and whites (Elo et al. 2004; Palloni and Arias 2004). Research on the Hispanic paradox also extends to other aspects of health, showing that Hispanics do better than expected on many health outcomes, such as low birth weight, infant mortality, and many measures of morbidity

(Scribner and Dwyer 1989; Collins and Shay 1994; Markides et al. 1997; Landale et al. 1999; Iannotta 2002), as well as health behaviors, such as smoking and drinking (Haynes et al. 1990; Lizarzaburu and Palinkas 2002; Control 2004). These advantages, however, are largely limited to foreign-born Hispanics, and health outcomes seem to worsen with time spent in the U.S. (Crump et al. 1999; Landale et al. 2000; Frisbie et al. 2001; Mooteri et al. 2004). Close investigation of the paradox reveals intra-ethnic group differences based on country of origin, with Mexican immigrants generally experiencing better health outcomes than, for instance, Puerto Ricans.

Cigarette smoking is the single-most preventable cause of premature death in the United States. Each year, more than 400,000 Americans die from the effects of smoking (plus another 3,000 from the effects of secondhand smoke). One in five deaths in the U.S. is smoking-related. Smoking increases the risk of dying from lung cancer, bronchitis, emphysema, and it *triples* the risk of dying from heart disease for both men and women. In 2001, 22.8 percent of Americans were smokers, but large racial/ethnic differences are apparent (Centers for Disease Control and Prevention 1999). Whites have the highest rates of smoking in the U.S., followed closely by blacks. Hispanics generally have a low prevalence of smoking, at about 16.7 percent (Centers for Disease Control and Prevention 2004). This statistic is surprising, given that low socioeconomic status is highly correlated with smoking and thus we might expect smoking rates to be similar for Hispanics and blacks. Although Hispanics have a low overall rate of smoking, given that the Hispanic population in the United States is quite heterogeneous, an overall prevalence rate may hide significant differences in smoking behavior among Hispanic subgroups.

Researchers of the Hispanic Paradox typically cite two mechanisms by which Hispanics are thought to achieve better-than-expected health outcomes: Selection of healthy immigrants into and out of the U.S. and acculturation. The selection argument claims that since healthier people are more likely to immigrate to the U.S. than their less-healthy counterparts in Latin America or other sending countries, the foreign-born population in the U.S. may be healthier than persons born in the U.S. (Sorlie et al. 1993; Landale et al. 2000; Jasso et al. 2004; Palloni and Arias 2004). Additionally, because persons who are sick appear to be more likely to leave the U.S. to return to their home countries, these two phenomena combine to produce lower rates of morbidity and mortality for the Hispanic population in the U.S. (Pablos-Mendez 1994; Abraido-Lanza et al. 1999). Finally, some scholars believe that low levels of acculturation to the U.S. may be a reason immigrants often have better health outcomes and behaviors than the second generation (Garcia-Maas 1999; Arcia et al. 2001; Frisbie et al. 2001; Gordon-Larsen et al. 2003). Deleterious changes in diet, exercise, and other health behaviors may cause the health of an immigrant to decline over time and also influence their children, the second generation. Neither of these explanations can be explicitly ruled out with current data, and it is likely that both are operating to some extent to produce health advantages for Hispanic immigrants. Recent papers have found evidence for both selection and acculturation occurring simultaneously, and thus the two explanations are seen as complementary rather than competing (Landale et al. 2000; Frisbie et al. 2001).

In this paper, I test for acculturation effects on smoking for both adults and adolescents and argue that scholars interested in the interactions between the social environment, culture, and health outcomes would do better to first understand the

relationship between these factors and health behaviors. It is only when we understand how social norms and culture influence health behaviors that we can begin to understand how they influence health outcomes. Additionally, I argue that acculturation is not a uni-dimensional process but rather a multi-faceted, multi-level process. Thus, I examine smoking behavior among Mexican immigrants and Mexican-Americans and test the acculturation hypothesis for explaining differences between the groups, using traditional and new acculturation measures that focus on social cohesion at the individual, family, and neighborhood levels.

Background

Smoking and Health

For many years, smoking cessation has been one of the highest public health priorities. The detrimental health effects of smoking are well-documented and will not be repeated here, but it is important to note that U.S. smokers, on average, have their lives cut short by more than thirteen years, 13.2 years for men and 14.5 years for women (U.S. Department of Health and Human Services 2004). Additionally, annual smoking-attributable productivity costs and smoking-attributable medical expenditures total $3,400 per smoker (Centers for Disease Control 2002).

In 2002, 22.5% of Americans were smokers. The highest rates of smoking are found in the 18-24 age group, with 28.5% of young adults smoking. Rates decline with age; only 9.3% of those 65-and-over are smokers. Some of this decline with age is due to quitting and some, of course, is attributable to mortality. Smoking prevalence also varies by income and education. People living below the poverty level are much more likely to

smoke than those living at or above the line, at 32.9% as compared to 22.2%. Those with more education are less likely to smoke, with 25.6% of high school graduates smoking compared to just 7.2% of those with a graduate degree. Adult men smoke more than women, in every age group, income level, and education level. The overall percentage of male smokers is 25.2%; the overall percentage of female smokers is 20.0% (Rogers 1991; Control 2004). Rates of smoking among adolescents are high. In 2002, 22.9% of high school students had used cigarettes in the last month, as well as 10.1% of middle school students. There are no sex differences in smoking for middle or high school students (Centers for Disease Control and Prevention 2002).

While smoking is a health practice that affects every community, smoking prevalence and intensity vary widely by race/ethnicity and nativity. In 2002 in the U.S., 23.6% of whites were smokers, 22.4% of blacks smoked, and 16.7% of Hispanics smoked (Centers for Disease Control and Prevention 2004). A recent study showed that overall, 22.6% of native-born Americans are smokers, compared to just 13.4% of the foreign-born. In every ethnic/gender group except for male Asian/Pacific Islanders, immigrants have lower smoking prevalence than the native-born, although the rates vary depending on country of origin (Baluja et al. 2003). In general, African-American and Hispanic youth initiate smoking earlier than white or Asian youth, but whites and Hispanics have higher rates of regular smoking (Prevention 2002; Ellickson et al. 2004). Among middle school students, no race/ethnic differences in smoking prevalence are noted (Centers for Disease Control and Prevention 2002). Among teenagers, immigrant Hispanics have more overall behavioral risk factors than US-born Hispanics, but rates of smoking for both groups are very similar (Brindis et al. 1995). Another study found that

first-generation Mexican adolescents smoked significantly less than second-generation youth, at 8.5% compared to 17.8% (Gordon-Larsen et al. 2003). These racial, ethnic, and nativity differences for both adults and adolescents raise the question of why subgroups have differential rates of smoking.

Cultural Influences on Health Behaviors

In order to understand the influence of social and cultural environments on smoking for immigrants, it is necessary to integrate two bodies of theory. First, assimilation and acculturation theory make predictions about how immigrants will adapt to the new environments of their host countries. Second, social-learning theory makes predictions about how people adopt new health behaviors. Although the two theories come from different disciplines (assimilation and acculturation theory from sociology and anthropology and social-learning theory from epidemiology and psychology), the situation of an immigrant moving to an unfamiliar place, surrounded by unfamiliar people, provides a good test of how the theories may be interrelated.

Although assimilation and acculturation are often used interchangeably, it is important to distinguish between the two concepts. Assimilation typically refers to the gradual disappearance of economic and social boundaries between groups, with the end result being integration and inter-marriage. Acculturation, however, typically refers to the gradual adoption of the *cultural* practices of another group. In this case, the cultural practice is smoking behavior, and the change is from one immigrant generation to

another. The general consensus of recent scholars of assimilation is that socioeconomic (or structural) assimilation can occur without acculturation, and vice-versa. Acculturation to U.S. society can also occur without the loss of strong ties to traditional cultures. There is also a recognition that retaining the culture of the immigrant's ethnic group is almost certainly beneficial, if the immigrant is also conversant with mainstream American culture (Portes and Hao 2002).

The social-learning approach to understanding the development and maintenance of health behaviors (Akers 1977; Akers et al. 1979) suggests that individuals undergo a series of steps in their choice of whether or not to adopt a particular behavior. First, an individual comes into contact with members of groups other than his own. These interactions provide an environment where health behaviors may be modeled and observed, and the consequences of those behaviors discovered. The outsider thus learns how the group will respond, either positively or negatively, to a given health behavior. These responses are then internalized, so that the outsider recognizes the possible consequences of his future actions whether or not members of the group are actually present. In this manner, the cultural beliefs and practices of a group are transmitted to outsiders, who either adopt the practices or rebel actively against them.

Combining the two approaches, we can consider acculturation to be a series of social-learning situations, so that many beliefs and practices are being observed and possibly adopted as immigrants adapt to the U.S. However, this

process is complicated by the fact that the groups Mexican immigrants encounter after migrating are heterogeneous. For simplicity, let us assume that these immigrants are typically faced with two, quite different, situations. First, they may move to communities with many others like themselves, in which case their social environments may not differ much from that of their home countries. Such "cultural encapsulation" (Swidler 1986) restricts the opportunities for immigrants to learn new behaviors, and thus they will continue to practice health behaviors that they learned in their home country. In contrast, immigrants may move into communities with very few people like themselves, in which case the opportunities for social learning and adopting new health behaviors would be vastly greater.

First-generation immigrants are more likely to encounter the first situation, and second-generation immigrants the second. Because social networks of migrants and their often limited resources lead to a relatively small number of receiving communities and neighborhoods (Massey et al. 1987), first-generation immigrants often end up in homogenous and supportive communities (Browning and Rodriguez 1985; Liang 1994; Zhou and Bankston 1994; Portes and Rumbaut 1996). However, their children are exposed to many other groups through the public school system and may feel more pressure to adopt local practices (Zhou and Bankston 1994; Rosenbaum and Friedman 2001). In addition, second-generation immigrants are likely to

eventually move out of the ethnic enclaves where their parents reside, thus further opening up their possibilities of social-learning from other groups. These factors, combined with the acculturative stress that is experienced more often by the second generation (Harker 2001), create an environment where the second generation is more likely to pick up a health behavior such as smoking.

Existing empirical evidence points to effects of acculturation on smoking for Hispanics. As a subgroup, Mexicans have a high prevalence of smoking, although rates are much lower for Mexican women than for Mexican men (Marin et al. 1989; Haynes et al. 1990). However, the likelihood of smoking differs by acculturation status. For instance, U.S.-born Mexican-American women are more likely to smoke than women born in Mexico, and more-acculturated Mexican immigrant women and those who live in less cohesive families are more likely to smoke (Coonrod et al. 1999; Perez-Stable et al. 2001). There is also some evidence that Mexican immigrant women have less favorable views towards smokers than Mexican-American women (Johnsen et al. 2002). Additionally, more-acculturated Mexican-Americans smoke more often and more heavily than the less-acculturated, regardless of immigrant generation (Marin et al. 1989). One study found that attitudes about smoking were more positive among more-acculturated Hispanics (Johnsen et al, 2002). More-acculturated Mexican women are more likely to smoke during pregnancy (Wolff and Portis, 1996). In a comparative study of Anglo, Black, and Mexican-American men and women, Mexican-American women were the least likely to smoke (Rogers, Nam, and Hummer, 1995). These findings indicate that a

clear gradient exists in smoking behavior based on immigrant generation and acculturation.

Traditionally, acculturation is measured by such characteristics as preferred language, immigrant generation, and preferred ethnic identification. Typically, researchers combine these measures into a scale, indicating that acculturation can be measured on a continuum, from least acculturated to most acculturated (Cuellar et al. 1980; Marin et al. 1987; Cuellar et al. 1995). Other scholars argue that acculturation is best thought of as a multi-dimensional, rather than straight-line, process (Keefe and Padilla 1987). More recent work has expanded further the definition of acculturation (Arcia et al. 2001; Gordon-Larsen et al. 2003).

In this paper, I continue this line of research by including measures of (1) the strength of social norms; (2) attitudes about traditional values; and (3) level of disapproval of unhealthy behaviors. I also incorporate a neighborhood-level measure of immigrant concentration that includes percent immigrant and percent Spanish speaking. My approach assumes that acculturation is not a concept that can be captured by a scale of language preferences or other individual processes. Rather, it is a multi-faceted concept that should be measured at multiple levels.

Data

This paper uses data from Wave 1 of the Los Angeles Family and Neighborhood Survey (L.A.FANS), a hierarchical data set consisting of a sample of 65 census tracts from Los Angeles County that includes interviews with 3,085 households and 3,558 adults. L.A.FANS is an excellent resource for researchers interested in the Hispanic paradox or health differences among Hispanic subgroups, because roughly one-half of the

sample is Hispanic, and numerous countries of origin are represented. Additionally, the survey offers a rich array of data, including information on self-reported health conditions, health behaviors, social ties, children's health and well-being, neighborhood conditions, and perceived neighborhood cohesion. The census tracts were selected at random from all tracts in the county after stratifying by the percentage of the tract that was in poverty in 1997. Twenty very-poor tracts, 20 poor tracts, and 25 non-poor tracts were selected. In each census tract, between 40 and 50 households were randomly selected and interviewed from mid-2000 to early 2002, with at least one adult randomly selected from each household. In houses where there were children, the primary caregiver was also interviewed (if different from the randomly selected adult), as well as a randomly-selected child and, if available, a sibling. For this paper, I use data for the randomly-selected adult Mexicans from each household, for a total sample size of 1072[1] adults who live in 87 census tracts.[2] To study the impact of parental acculturation on adolescent smoking, I also use data for the adolescents in the study (ages 9-17), both the randomly-selected child and a sibling, if available, for only the Mexican adolescents who also have primary caregiver data, for a final sample size of 642. Because just 4% of the primary caregivers were not the biological or adoptive mother or father of the adolescent, I refer to the primary caregivers as parents. Additionally, I append demographic data for each census tract using the Summary Tape File 3 (STF3) from Census 2000 data. Tracts are referred to as neighborhoods throughout.

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[1] One case was dropped because the household was accidentally interviewed twice; and one case was dropped because an incorrect Census tract number was recorded.

[2] Although the original sampling frame consisted of 65 Census tracts, the same tracts expanded to 87 tracts in the 2000 Census.

Variables

Adult Analysis

The dependent variable for these analyses is a dichotomous measure for "current smoker." Respondents were asked, "Do you smoke cigarettes?" To differentiate the respondents by immigrant generation, a dummy variable for foreign-born is used. Background variables include sex, age, years of education, family income, presence of children in the household, and family background. Sex is measured with a dichotomous measure for male. Age is measured as a continuous variable. Age is usually shown to have a curvilinear relationship with smoking, with the very young and very old less likely to smoke (Rogers et al. 1995), so a quadratic term for age is included in the models. Education is measured continuously by years of education completed. Family income is included as household income in $10,000 increments[3]. Education and income are both negatively related to smoking (Centers for Disease Control 2004). An indicator variable is included for whether children also live in the household, as the presence of children is a deterrent for adult smoking (Jarvis 1996). Family background is measured with an indicator for whether or not the respondent lived with both of his/her biological parents from birth to age 14. This variable is included to attempt to control for unobserved background characteristics associated with family structure.

In this paper, I measure acculturation using a series of variables intended to measure the strength of social norms for the respondent. First, I consider a measure of

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[3] 9.5% of cases were missing income information. For these cases, household income was imputed using multiple imputation helpfully provided by the L.A.FANS research team: Narayan Sastry, Christine Peterson, and Marianne Bitler. The imputation was performed with the same programs used for the Health and Retirement Study.

the frequency of church attendance. Respondents are classified as "never attends," "attends some," and "attends often" (the last category includes those who attend three times a month or more often). Recent Mexican immigrants attend church frequently, and this behavior diminishes over time and over generations (Jasso et al. 2003), indicating it may be a dimension of acculturation. Religion has been shown to have positive effects on physical and mental health outcomes (Ellison et al. 2000), particularly for Mexican-Americans (Hovey and Magana 2000). Frequent church attendance could indicate a greater level of social norm control over behaviors (Ellison and George 1994), which I expect to find among first-generation Mexicans. Then, I consider an indicator variable for whether Spanish is the only language spoken in the household, as language is a traditional and robust measure of acculturation (Castro 1992; Cuellar et al. 1995; Arcia et al. 2001). Next, I construct a traditional values scale (Cronbach's alpha=.81), computed as the sum of four items, with a high score indicating strong adherence to traditional values. The four items assess the extent of approval or disapproval of issues such as unmarried childbearing and cohabitation instead of marriage. Mexican immigrants are often thought to hold traditional views of gender roles and household structure, and to stress the importance of family and intra-ethnic ties, but these values may erode over time in the U.S. (Rogler and Cooney 1984; Sabogal et al. 1987; Freeberg and Stein 1996; Gil and Vega 1996). These traditional values may be related to smoking because they may indicate the presence of a greater degree of familial or cultural control over behaviors (Zhou and Bankston 1994; Portes and Rumbaut 1996). The last acculturation variable is a scale composed of six summed items designed to measure the extent of approval or disapproval of marijuana and alcohol use (Cronbach's alpha=.85). A higher score

indicates a greater degree of disapproval of the two unhealthy behaviors. Mexican immigrants may be more likely to disapprove of these behaviors (Johnsen et al. 2002). See Appendix 1 for a list of all the items in the traditional values and the approval of unhealthy behaviors scales.

Neighborhood characteristics in the model include neighborhood immigrant concentration and poverty level. First, I construct a dummy variable for "High Immigrant Concentration." This variable is derived from census data and scored a 1 if respondents live in a neighborhood that is more than 60% foreign-born and Spanish-speakers. Because I argue that acculturation occurs on multiple levels, I believe that recent Mexican immigrants who live in homogenous neighborhoods of high Hispanic immigrant concentration will be least likely to smoke, due to greater norm and value sharing and control among their social networks. To control for the poverty status of the neighborhood, a dummy variable was constructed to represent poor or very poor neighborhoods, based on L.A.FANS categories. This variable is then called "Poor Neighborhood," although it includes poor and very poor neighborhoods. Poor neighborhoods had an average of 40% of households who were below the poverty line. Next, I combine this immigrant concentration variable with the neighborhood poverty indicator, to create three neighborhood classifications: High immigrant concentration, poor neighborhood; Low immigrant concentration, poor neighborhood; and Non-poor neighborhood (there were no non-poor neighborhoods with a high immigrant concentration). These categories capture potential interactions between neighborhood immigrant concentration and poverty in the models.

Adolescent Analysis

The dependent variable in the adolescent analysis is "Ever tried smoking." Rates of "regular smoking" in the sample were too small to analyze. Rather than differentiating the adolescents by immigrant generation, as in the adult analysis, they are instead differentiated by their parents' nativity status. Thus, the *children of immigrants* are compared to the *children of native-born Mexicans*. An indicator variable is included in the model to represent the children of immigrants. It should be noted that 12% of the children of immigrants are actually immigrants themselves, although in this paper I treat them as second-generation because the vast majority immigrated as small children. Because the research question concerns the relationship of parental acculturation to their children's smoking behavior, it is of more substantive interest to compare adolescents by their parents' nativity status. Background variables include age, sex, family income, primary caregiver's years of education, and whether the biological father is in the household.

Age and sex have both been shown to be predictive of teenage smoking, with older adolescents more likely to have tried smoking (Brindis et al. 1995; Ellickson et al. 2004), and young women less likely to have tried smoking than young men (Elder et al. 2000). Family income, primary-caregiver's education, and whether or not the biological father is in the household are included in the models to control for family background. Additionally, the interviewed parent's acculturation status is included in the models, based on the same variables described for the adult analysis section above.

In addition to these individual- and family-level characteristics, I include the same neighborhood-level variables as in the adult analysis, which classify neighborhoods into

three categories based on the level of immigrant concentration and poverty: High immigrant concentration, poor; Low immigrant concentration, poor; and Non-poor (there were no non-poor neighborhoods of high immigrant concentration).

Methods

Due to the hierarchical structure of the data and hypotheses about multi-level acculturation effects, a multi-level logit model was employed and estimated with HLM6 software (Raudenbush and Bryk 2002).

Adult Analysis

Level one of the adult data consists of individuals that are nested within neighborhoods (level two). The multi-level logit model takes the following form, where φ_{ik} is the probability of smoking for the i^{th} individual in the k^{th} neighborhood:

$$\text{Log}[\varphi_{ik}/(1- \varphi_{ik})] = \eta_{ik}$$

Thus, the Level-1 model takes this form:

$$\eta_{ik} = B_{0k} + B_{pik},$$

where B_{0k} is the average log-odds of smoking in neighborhood k, and B_{pik} represents both the characteristics of individual i in neighborhood k and the corresponding individual-level effects of the covariates for individual i in neighborhood k.

The Level-2 Model takes the following form:

$$B_{0k} = \gamma_{00} + \gamma_{01}(\text{High IC; High Pov.}) + \gamma_{02}(\text{Low IC; High Pov.}) + \mu_{0k}$$

$$B_{pk} = \gamma_p \text{ for } p>0$$

Here, the average log-odds of smoking in neighborhood k (B_{0k}) is determined by the grand mean log-odds of smoking across all neighborhoods (γ_{00}), neighborhood immigrant concentration and poverty level, and a random effect (μ_{0k}). A random effect at the neighborhood level, (μ_{0k}), serves to allow the average log-odds of smoking to vary between neighborhoods. B_{pk} represents each of the individual-level slopes, which are constrained to be equal across neighborhoods (e.g. the effect of age on an individual's propensity to smoke is assumed not to vary across neighborhoods).

Adolescent Analysis

The adolescent analysis is similar to the adult analysis, except that because the sample may contain up to two children from a given family, the analysis is a three-level analysis, with the first level representing the individual, the second level denoting the family, and the third level denoting the neighborhood.

With a logit transformation, let φ_{ijk} be the probability of smoking for individual i in family j in neighborhood k:

$$\text{Log}[\varphi_{ijk}/(1- \varphi_{ijk})] = \eta_{ijk}$$

and Level one of the model takes the following form:

$$\eta_{ijk} = B_{0jk} + B_{pijk},$$

where B_{0jk} is the average log-odds of smoking of family j in neighborhood k and B_{pijk} represents individual-level characteristics and their corresponding effects. Level two of the model takes this form:

$$B_{0jk} = \pi_{00k} + \pi_{pjk} + r_{0jk}$$

Where π_{00k} is the average log-odds of smoking in neighborhood k, π_{pjk} represents the family-level characteristics and their corresponding effects, and r_{0jk} is a random family effect. Level three of the model can be expressed as follows:

$$\pi_{00k} = \gamma_{000} + \gamma_{001}(\text{High IC, High Pov.}) + \gamma_{002}(\text{Low IC, High Pov.}) + \mu_{0k}$$

$$B_{pk} = \pi_{p} \text{ for } p>0$$

$$\pi_{pk} = \gamma_{p} \text{ for } p>0$$

Here, γ_{000} is the grand-mean log odds of smoking across neighborhoods, and is determined by neighborhood immigrant concentration and poverty level, and a random neighborhood effect (μ_{0k}). Random effects at the family and neighborhood levels serve to allow an adolescent's average log-odds of smoking to vary between families and a family's average log-odds of smoking to vary between neighborhoods. Slopes at the individual level (B_{pk}) are constrained not to vary across either families or neighborhoods (e.g. the effect of age on an adolescent's propensity to smoke does not vary by family or by neighborhood). Additionally, slopes at the family level (π_{pk}) are constrained not to vary across neighborhoods (e.g. the effect of family income on an adolescent's propensity to smoke does not vary by neighborhood). Thus, the model allows for random intercepts between neighborhoods but not random slopes (Raudenbush and Bryk 2002). In the model, individual-level covariates include nativity, sex, and age; family-level covariates include family income, parent's years of education, whether their father lives in the household, and whether their interviewed parent smokes, as well as the parental acculturation variables; and neighborhood-level characteristics include neighborhood immigrant concentration and poverty level.

Intraclass Correlations

When considering intraclass correlations for a logistic model, it is helpful to consider the outcome as a latent variable representing the propensity of an individual to smoke, in order to estimate the individual-level random effect (Snijders and Bosker 1999). In the adult model, observations in the same neighborhood are correlated because they share a random effect. These intra-neighborhood correlations (ρ_n) show whether living in a particular neighborhood is a determinant of smoking and are calculated as:

$$\rho_n = \frac{\sigma^2{}_n}{\sigma^2{}_n + \frac{\pi^2}{3}},$$

where σ^2_n is the variance of the random effect at the neighborhood level, and $\pi^2/3$ represents the variance of the individual-level random effect in a logistic framework (Snijders and Bosker 1999).

In the adolescent analysis, observations in the same neighborhood and the same family are correlated because they share the random effects at the family and neighborhood levels.

These intra-family and intra-neighborhood correlations are defined as:

$$\rho_f = \frac{\sigma^2{}_f + \sigma^2{}_n}{\sigma^2{}_f + \sigma^2{}_n + \frac{\pi^2}{3}} \quad \textbf{and} \quad \rho_n = \frac{\sigma^2{}_n}{\sigma^2{}_n + \sigma^2{}_f + \frac{\pi^2}{3}},$$

where σ^2_f represents the variance of the family-level random effect, σ^2_n represents the variance of the neighborhood-level random effect, and $\pi^2/3$ represents the variance of the individual-level random effect in a logistic framework (Snijders and Bosker 1999).

These correlations show the extent of the correlation of outcomes between individuals within the same family and within the same neighborhood, respectively.

Results

Descriptive statistics for the adult sample are shown in Table 1. The Mexican immigrants' and the Mexican-Americans' means are compared using t-tests for continuous variables or chi-square statistics for categorical variables. Although U.S.-born Mexicans smoke at a slightly higher level than Mexican immigrants, the difference is only marginally statistically significant. However, because of the large sex differences in smoking in the Mexican community, this unexpected result could be driven by the fact that women comprise two-thirds of the U.S.-born Mexican sample. Despite the lower level of smoking, first-generation Mexicans tend to have many fewer years of education and much lower incomes than U.S.-born Mexicans. The two groups do not differ significantly by whether or not they lived with both biological parents from birth until age 14, or whether children are present in the household.

As expected, first-generation Mexican immigrants score highest on the church attendance variable, with fully 65% attending church three times a month or more often. Mexican-Americans attend less often, although a high level of church-going is still evidenced in this population, as 86% of both groups attend church at least a few times per year. Surprisingly, Mexican immigrants do not differ from Mexican-Americans on the traditional values scale, as much of the previous literature has suggested they should. This indicates either that the prevalence of traditional attitudes does not vary across generation, or that the scale is not capturing what it is intended to. Mexican immigrants do score significantly higher on the "disapproval of unhealthy behaviors" scale than the

other groups, as expected. Mexican immigrants are much more likely to live in households where Spanish is the only language spoken, at 64% compared to just 5% of U.S.-born Mexicans. Mexican immigrants are more likely to live in poor neighborhoods with both low (44%) and high (43%) immigrant concentrations than the native-born, who are more likely to live in non-poor neighborhoods.

Table 2 shows descriptive statistics for the adolescent Mexican sample. Although it should be noted that approximately 10% of the adolescent sample are in fact themselves immigrants, for simplicity, and because the vast majority of adolescent immigrants came when they were very young, I refer to the children of Mexican immigrants as "second-generation." Thus, the children of U.S.-born Mexicans are referred to as "third-generation." Among the second-generation adolescents, 14% report ever smoking. In contrast, 23% of the third generation has tried smoking. The third-generation adolescents are slightly older on average than Mexican immigrant adolescents. The third generation are more likely to have parents with higher educations and incomes than the second-generation, but less likely to have the father living in the household. Additionally, the third generation adolescents are more likely to have a parent who smokes.

In terms of the parental acculturation variables, the parents of the two groups of adolescents do not differ in the frequency of their church attendance, or in their scores on the traditional values scale. However, parents of the second generation score significantly higher on the disapproval of unhealthy behaviors scale, indicating greater average levels of disapproval. Additionally, second-generation adolescents are more likely to live in households where Spanish is the only language spoken, at 90% compared

to just 21% for the third generation. Second-generation adolescents are more likely to live in poor neighborhoods of both high and low immigrant concentrations, while third generation adolescents are more likely to live in non-poor neighborhoods.

Adult Analysis

Table 3 shows results for current smoking in the adult sample based on the first multi-level logit model. In the first model, which includes only the nativity variable, we see again that immigrants and U.S.-born Mexicans only marginally differ in the odds of smoking. In Model 2, however, after adding the background characteristics, adult Mexican immigrants have 53% lower odds ($1-e^{(-.75)}$) of smoking than U.S.-born Mexicans. After testing each background coefficient individually (not shown), it appears that both age and sex are suppressor variables for immigrant status (i.e. not controlling for these characteristics suppresses the relationship between immigrant status and smoking). Mexican men have more than two-and-a-half times the odds of smoking than women, and there is a significant quadratic relationship between age and smoking, so that both the youngest and the oldest respondents are less likely to smoke than middle-aged respondents. Interestingly, years of education is not significantly related to smoking for Mexican adults. Income is significantly and negatively related to the likelihood of smoking, with each $10,000 increment increase in income decreasing the odds of smoking by 11%. Both having children in the household and having lived with both biological parents when young decrease the odds of smoking.

The next model in Table 3 shows results after the individual acculturation variables are added. First each acculturation variable was added individually (results not shown), but the effects did not differ when all were included at the same time. The

acculturation variables slightly decrease the smoking differential between Mexican immigrants and Mexican-Americans (by 16%), indicating that the individual acculturation variables explain a modest portion of the difference in smoking between Mexican immigrants and the U.S.-born. Church attendance decreases the odds of smoking, but only if the respondent attends three times a month or more, so that respondents who attend church frequently have 42% lower odds of smoking than those who never or only sometimes attend. Holding traditional values does not affect the odds of smoking for Mexicans. However, disapproving of unhealthy behaviors decreases the odds of smoking. Each step up the scale (indicating greater disapproval) decreases the odds of smoking by 8%.

In the final model, the neighborhood characteristics are added. Living in a poor neighborhood of low immigrant concentration, compared to living in a non-poor neighborhood, more than doubles the odds of smoking. Interestingly, living in a poor neighborhood that also has a high concentration of immigrants does not significantly increase the odds of smoking relative to those living in non-poor neighborhoods. This indicates that areas of high immigrant concentration may have a protective effect on smoking (i.e. it is more beneficial to health behaviors to live in an area of high immigrant concentration than low concentration if the neighborhood is poor). Cross-level interactions between immigrant status and the neighborhood characteristics were tested, but none reached significance. The intra-neighborhood correlation for the first model is zero, indicating that living in a particular neighborhood has no effect on smoking for Mexicans. Inclusion of the background, acculturation, and neighborhood measures does not affect the intra-neighborhood correlation. It is puzzling that this correlation is zero

given the significant neighborhood effects of immigrant concentration and poverty. It is possible that the individual-level variance is so large that it dwarfs the neighborhood-level variance, in which case we might see this result. Additionally, it is possible that certain neighborhood-level characteristics have positive effects on smoking, and others have negative effects—and that in the aggregate these effects counteract one another. Whatever the reason, the value of zero for the intra-neighborhood correlation indicates that the data could be modeled using a standard logistic regression model, correcting standard errors for clustering at the neighborhood level.

Adolescent Analysis

Table 4 presents results from the three-level adolescent analysis. Model 1 includes only the immigrant status variable, representing the children of immigrants. These second-generation adolescents have 47% lower odds of smoking than third-generation adolescents. This effect is mediated by about 21% by the background variables in Model 2, age and sex. Unlike for adult Mexicans, gender has no effect on the odds of smoking for adolescents. Unsurprisingly, age has a large, significant effect on the odds of smoking. Each additional year of age increases the odds of having tried smoking by 51%. Model 3 adds the family-level characteristics. Having a parent who smokes more than doubles the odds of smoking for adolescents. The addition of the family-level characteristics to the model slightly decreases the generational difference in smoking for adolescents, and it becomes only marginally significant ($p<.10$).

In Model 4, the parents' acculturation measures are included. Interestingly, compared to adolescents whose parents never attend church, those whose parents attend church three times a month or more have *higher* odds of having tried smoking. However,

if the parent holds traditional values an adolescent has slightly lower odds of smoking. The unhealthy behaviors scale and the Spanish-language indicator coefficients are also in the hypothesized direction (negative) but are not significant. Adding the parental acculturation variables does not change the smoking differential between the second and third generations.

Model 5 adds the neighborhood-level characteristics, and neither of the neighborhood variables are significant, although the high immigrant concentration coefficient is negative as hypothesized. This finding indicates that adolescents do not receive the same protection from effects on health behaviors that their parents do from living in a neighborhood with high immigrant concentration.

The intra-family correlation for the first model is 0.12 and is marginally significant, indicating that 12% of the variance in a latent variable reflecting an adolescent's propensity to smoke comes from the family. After controlling for the background variables, this correlation is reduced to 0.07 and is no longer significant. The addition of the acculturation and neighborhood variables further reduces the intra-family correlation to 0.01 indicating that the models account for much of the remaining intra-family correlation. The intra-neighborhood correlation for the first model is 0.02 and is reduced to 0.00 with the addition of the other covariates, but it is never significant, indicating that as with the adult model, there is no neighborhood-level variance in smoking for Mexican adolescents.

Discussion

In this paper I show that after accounting for background characteristics, Mexican adult immigrants are substantially less likely to smoke than their U.S.-born peers, and the

children of Mexican immigrants are less likely to have ever smoked than the children of U.S.-born Mexicans. Thus, the most traditional measure of acculturation, immigrant status, is a predictor of smoking for both adult and adolescent Mexicans. Additional acculturation variables were then added to the models in an attempt to explain the immigrant effect. Accounting for levels of acculturation, as measured by church attendance, traditional values, and strong social norms, decreases the difference between immigrant and U.S.-born Mexican adults only slightly, and accounting for parental acculturation does not decrease the generational difference in smoking for second- and third-generation Mexican adolescents. However, some of the acculturation measures for both adults and adolescents *do* influence smoking overall, indicating that these characteristics may be important determinants of smoking for the Mexican-American community as a whole.

For adults, other significant characteristics that decrease the odds of smoking are the presence of children in the household and whether the respondent lived with both parents from birth until age 14. These characteristics could represent the oft-stated importance of family in the Mexican-American community (Sabogal et al. 1987; Steidel and Contreras 2003). Living with children in the household appears to be a strong deterrent to smoking for Mexicans in the sample, which could indicate the importance placed on providing a healthy household environment for children. Additionally, respondents who grew up in an intact household are also much less likely to smoke, which could indicate either a higher socioeconomic background or the strength of intergenerational transmission of values.

The most salient individual-level acculturation measures in this paper for adults are frequency of church attendance and the unhealthy behavior approval scale. Mexicans who attend church more frequently may be subject to greater social control over their behaviors, including smoking, or there may be other characteristics of religious people that are also related to health behaviors. It is not surprising that those who have greater disapproval of unhealthy behaviors have lower odds of smoking. This scale attempts to measure the importance of social norms for the respondents, and those for whom these norms are salient are less likely to smoke. This finding and that for frequency of church attendance support the hypothesis that Mexican immigrants may have a more encapsulated social norm structure than U.S.-born Mexicans, and that selective acculturation may operate to protect Mexican immigrants from unhealthy behaviors such as smoking. Interestingly, holding traditional values has no impact on smoking for adults. Although most literature on acculturation and Mexican-Americans claims that they tend to hold more traditional values than is typical in the U.S. (Rogler and Cooney 1984; Sabogal et al. 1987; Freeberg and Stein 1996; Gil and Vega 1996), I find no differences between Mexican immigrants and U.S.-born Mexicans in adherence to traditional values, at least as measured by this traditional values scale.

For adolescents, however, the strength of their parents' attitudes about traditional values does influence their smoking, so that adolescents whose parents hold traditional values have decreased odds of smoking compared to those whose parents hold less traditional values. Interestingly, adolescents whose parents attend church often smoke *more* than adolescents whose parents never attend church, indicating a possible rebellion against parental acculturation for adolescents. These two effects seem to be working in

opposite ways, so that in the first case, low levels of parental acculturation lead to decreased smoking among adolescents, while in the latter case low levels of parental acculturation lead to increased smoking among adolescents. Thus, I conclude that it is unclear whether parental acculturation influences adolescent smoking, but clear that it does not influence the generational difference for adolescents.

Much of the smoking difference between the second and third generations is explained by individual demographic characteristics, and the parental acculturation variables and neighborhood variables do not impact the generational difference in smoking. This finding indicates a disconnect between the advantages enjoyed by foreign-born adults with regard to health behaviors compared to their children's experiences. Although for adults, controlling for background characteristics reveals a large advantage for the first generation in smoking over the second generation, for adolescents, controlling for background characteristics significantly reduces the second generation's advantage in smoking over the third generation. Thus, it appears that successive generations of immigrants may lose the first generation's health behavior advantages.

The results from the addition of the neighborhood-level acculturation measures to the adult smoking model support an hypothesis of the paper, namely that living in a neighborhood of high immigrant concentration is beneficial for the health behaviors of Mexicans, controlling for neighborhood poverty status. Interestingly, it appears that living in a neighborhood with a high concentration of immigrants is as better for the health behaviors of residents of poor neighborhoods, indicating that immigrant concentration may provide a protective effect from poverty on health behaviors.

However, adolescents do not experience the same protection from immigrant concentration as their parents. Thus, it appears that an important component of acculturation, at least for adults, involves the kind of strong social ties and norm structure that immigrants may experience. Moreover, the social and neighborhood environments play a role not just for immigrants, but also for the U.S.-born, indicating that immigrant generation may not be the best demarcation for those interested in acculturation. Rather, one's cultural orientation is influenced by a multitude of factors, including neighborhood and social environments.

In sum, I find that acculturation variables that capture social norms and cohesion account for only a small portion of the difference in smoking between immigrant and U.S.-born Mexican adults, but that several of the variables are significant predictors of smoking for adult Mexicans. It appears that strong social cohesion, manifested through church attendance, disapproval of unhealthy behaviors, and living in areas of high immigrant concentration, are negatively related to smoking for Mexican adults. Additionally, the level of parental adherence to traditional values is negatively related to the odds of smoking for adolescents. However, the generational difference in smoking for Mexican adolescents is attenuated by background characteristics, rather than parental acculturation. Future research focusing on the adaptation and health of Mexicans immigrants should consider church attendance and attitudes about health behaviors, as well as neighborhood immigrant concentration, as measures of acculturation, as it appears that these factors influence health behaviors in the Mexican-American community. These results indicate that researchers interested in intergenerational

differences in health and health behaviors should consider measures of social norms and cohesion when measuring acculturation.

Table 1: Descriptive Statistics for the Adult Mexican Sample

	Full Sample	Mexican Immigrants	U.S. Born Mexicans
	Mean or Percent (St. Dev).		
Dependent Variable			
Smokes	13	12.0	15.0#
Background Variables			
Male	43	46	36**
Age	37	37.8 (12.6)	33.4 (14.4)***
Education (Years)	9.3 (4.4)	7.9 (4.2)	12.4 (2.8)***
Family Income ($10,000s)	3.3 (2.1)	3.0 (1.6)	4.2 (2.7)***
Kids in Household	83	84	81
Grew Up with Both Parents	69	70	66
Acculturation			
Never Attends Church	15	14	14
Attends Church Sometimes	23	21	28*
Attends Church Often	62	65	58*
Traditional Values Scale[1]	13.4 (3.2)	13.3 (3.1)	13.4 (3.5)
Unhealthy Behaviors Scale[2]	13.6 (2.8)	13.8 (2.6)	13.0 (3.0)***
Spanish-Only Household	45	64	5***
Neighborhood Characteristics			
Non-Poor Neighborhood	19	13	34
High IC[3]; Poor Neighborhood	40	43	33**
Low IC; Poor Neighborhood	41	44	33**
N	1072	752	320

*p<.05; **p<.01; ***p<.001 (t-tests or chi-square tests indicate U.S.-Born Mexicans have significantly different means than Mexican immigrants)

[1] The range of the traditional values scale is 4-20, and Cronbach's alpha is 0.81.
[2] The range of the disapproval of unhealthy behaviors scale is 6-18, and Cronbach's alpha is 0.85.
[3] IC stands for "Immigrant Concentration." Neighborhoods are designated as having high immigrant concentration if both the percentage of Spanish-speakers and the percentage of foreign-born residents are greater than 60%.

Table 2: Descriptive Statistics for the Adolescent Mexican Sample

	Full Sample	Children of Mexican Immigrants	Children of U.S. Born Mexicans
	Mean or Percent (St. Dev).		
Dependent Variable			
Tried Smoking	16	14	23**
Individual-Level Characteristics			
Male	49	49	50
Age	12.6 (2.6)	12.5 (2.6)	13.0 (2.8)#
Family-Level Characteristics			
PCG's Education (Years)	8.8 (4.2)	8.0 (3.9)	11.6 (4.1)***
Family Income ($10,000s)	3.3 (2.4)	2.9 (1.8)	4.8 (3.3)***
Dad in Household	81	83	74*
Parent Smokes	8	7	13*
Parental Acculturation Variables			
Never Attends Church	8	8	8
Attends Church Sometimes	50	50	50
Attends Church Often	41	41	41
Traditional Values Scale[1]	13.6 (3.2)	13.6 (3.1)	13.9 (3.3)
Unhealthy Behaviors Scale[2]	14.3 (2.8)	14.4 (2.5)	13.8 (3.3)*
Spanish-Only Household	74	90	21***
Neighborhood Measures			
Non-Poor Neighborhood	18	14	36***
High IC[3]; Poor Neighborhood	37	39	32
Low IC; Poor Neighborhood	45	47	32***
N	642	497	145

#p<.10; *p<.05; **p<.01; ***p<.001 (t-tests or chi-square tests indicate U.S.-Born Mexicans have significantly different means than Mexican immigrants)

[1] The range of the traditional values scale is 4-20, and Cronbach's alpha is 0.81.
[2] The range of the disapproval of unhealthy behaviors scale is 6-18, and Cronbach's alpha is 0.85.
[3] IC stands for "Immigrant Concentration." Neighborhoods are designated as having high immigrant concentration if both the percentage of Spanish-speakers and the percentage of foreign-born residents are greater than 60%.

Table 3: Estimated Coefficients for Multi-level Logistic Models of the Probability of Smoking: Mexican Adults

Variable	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient	Model 4 Coefficient
Constant	-1.73	-3.95	-2.73	-3.59
Background Variables				
Immigrant	**-0.21#**	**-0.75****	**-0.63***	**-0.71***
Male		1.01***	0.83***	0.83***
Age		0.19***	0.19***	0.20***
Age^2		-0.002***	-0.002***	-0.002***
Education (Years)		-0.03	-0.03	-0.03
Family Income ($10,000s)		-0.12*	-0.13*	-0.09
Kids in Household		-0.77**	-0.73**	-0.78**
Grew Up with Both Parents		-0.64**	-0.60**	-0.62**
Individual Acculturation Variables				
(Never Attends Church)			--	--
Attends Church Sometimes			-0.07	-0.11
Attends Church Often			-0.55*	-0.59*
Traditional Values Scale			0.02	0.02
Unhealthy Behaviors Scale			-0.08*	-0.08*
Spanish-Only Household			0.01	-0.02
Neighborhood Measures				
(Non-poor Neighborhood)				--
High IC; Poor Neighborhood				0.51
Low IC; Poor Neighborhood				0.87**
Random Effects				
$\sigma^2_n = var(\mu_{0k})$	0.01	0.05	0.06	0.01
ρ_n	0	0	0	0
N	1072	1072	1072	1072

# p<.10; * p<.05; **p<.01; ***p<.001

Table 4: Estimated Coefficients for Multi-level Logistic Models of the Probability of Smoking: Mexican Adolescents

Variable	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient	Model 4 Coefficient	Model 5 Coefficient
Constant	-1.18	-6.93	-6.32	-5.67	-5.70
Background Variables					
Child of Immigrant	**-0.63***	**-0.50***	**-0.46#**	**-0.46#**	**-0.47#**
Male		0.22	0.22	0.14	0.16
Age		0.41***	0.40***	0.41***	0.42***
Family-level Characteristics					
PCG's Education (Years)			0.01	0.004	0.002
Family Income ($10,000s)			-0.08	-0.07	-0.07
Dad in Household			-0.46	-0.39	-0.40
Parent Smokes			0.80*	0.87*	0.86*
Parental Acculturation Variables					
(Never Attends Church)					
Attends Church Sometimes				0.76#	0.76#
Attends Church Often				0.85*	0.85*
Traditional Values Scale				-0.09*	-0.09*
Unhealthy Behaviors Scale				-0.03	-0.02
Spanish-Only Household				-0.30	-0.30
Neighborhood Measures					
(Non-poor Neighborhood)					
High IC; Poor Neighborhood					-0.19
Low IC; Poor Neighborhood					0.11
Random Effects					
$\sigma^2_f = var(r_{0jk})$	0.34	0.21	0.20	0.12	0.12
$\sigma^2_n = var(\mu_{0k})$	0.09	0.03	0.03	0.02	0.01
ρ_f	0.12#	0.07	0.07	0.05	0.01
ρ_n	0.02	0.01	0.01	0.00	0.00
N	642	642	642	642	642

# p<.10; * p<.05; **p<.01; ***p<.001

Appendix 1: Components of Traditional Values and Disapproval of Unhealthy Behaviors Scale

Traditional Values Scale
(Chronbach's alpha=.81)

Responses (1-5): Strongly approve; Approve; Neither approve nor disapprove; Disapprove; Strongly disapprove

1. Opinion: Unmarried teenager having a baby
2. Opinion: Unmarried woman in her 20s having a baby
3. Opinion: Unmarried man in his 20s fathering a baby
4. Opinion: Living together before marriage

Unhealthy Behavior Scale
(Chronbach's alpha=.85)

Responses (1-3): Do not disapprove; Disapprove; Strongly disapprove

How do you feel about someone age 18 or over…
1. Trying marijuana once or twice?
2. Occasionally smoking marijuana?
3. Regularly smoking marijuana?
4. Having one or two drinks?
5. Having one or two drinks every day?
6. Having four or five drinks every day?