

Acculturation, Education, and Income as Determinants of Cigarette Smoking in New Mexico Hispanics¹

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Abstract

Surveys of cigarette smoking among Hispanics in the Southwest have shown a pattern of smoking distinct from that of non-Hispanic whites, but determinants of smoking by Hispanics remain inadequately characterized. We have assessed household income, education, and language preference as predictors of cigarette smoking in 1072 Hispanic adults residing in a community in New Mexico. Cigarette smoking status (never, former, or current smoker) varied strongly with educational attainment, showing the anticipated gradient of increasing smoking as level of education declined. In contrast, cigarette smoking status did not vary in a consistent pattern with reported language preference. A composite measure of socioeconomic status, combining education and household income, predicted continued smoking among ever smokers, whereas language preference had no effect. In males, the age at which subjects started to smoke increased significantly with increasing education; a similar trend in females did not reach statistical significance. Determinants of numbers of cigarettes smoked daily were not identified. The findings suggest that, as in other U.S. populations, Hispanics in the Southwest with lower education and less income should be targeted for smoking prevention and cessation.

Introduction

Surveys of cigarette smoking among Hispanics in the Southwest have shown a pattern of smoking distinct from that of non-Hispanic whites. A lower proportion of Hispanic women smoke, and while the prevalence of smoking in Hispanic males is similar to that in non-Hispanic males, average daily consumption by Hispanic males has been lower (1–6). Rates of cigarette-related chronic diseases also differ between Hispanics and non-Hispanic whites in the Southwest. As would be anticipated from

the lesser smoking by Hispanics, mortality rates for lung cancer, chronic obstructive pulmonary disease, and ischemic heart disease have been lower in Hispanics in comparison with non-Hispanic whites (7–10). However, assessments of recent trends in lung cancer occurrence in Hispanics residing in Denver (8) and in New Mexico (9) document increasing lung cancer rates in males, implying that smoking patterns have shifted toward greater consumption.

The determinants of cigarette smoking by Hispanics remain inadequately characterized. Several recent investigations have addressed the roles of acculturation, education, and socioeconomic indexes (5, 11–13), but strong and consistent predictors of smoking were not found. Identification of the predictors of smoking in Hispanics would facilitate the development of ethnic-group-relevant strategies for smoking prevention and cessation. The rising lung cancer rates in Hispanic males in the Southwest point to the immediate need for such information as a basis for preventing increasing cigarette consumption by Hispanic males.

During 1984 and 1985, we conducted a cross-sectional study of Hispanic residents of a community in New Mexico (6); most were born in New Mexico. Data were collected on respiratory and other chronic diseases, tobacco smoking, and lung function from 1175 adult subjects residing in 733 households; in addition, information was obtained for adults on household income, education, and language ability and preference. We have assessed the effects of these factors on cigarette smoking status (ever or current smoker), age at which subjects started to smoke, and level of daily cigarette consumption.

Methods

Sample Selection. The methods of the study and overall results with regard to the prevalence of respiratory disease and cigarette smoking have been fully reported elsewhere (6, 14). Briefly, from July 1984 to November 1985, we conducted a population-based survey among 733 Hispanic households in a semirural city near Albuquerque. The sampling frame comprised all dwelling units, including apartments, within the city limits. Eligible households contained at least one self-identified Hispanic adult. All persons residing in that household were considered eligible to participate. Participation rates by age and sex have been reported; overall, 68.1 percent of eligible males and 78.9 percent of eligible females participated in the study (6).

Data Collection. Survey procedures included completion of the standard respiratory symptoms questionnaire developed by the American Thoracic Society (15); a questionnaire on smoking; spirometry; measurement of

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height, weight, and blood pressure; and collection of exhaled air for carbon monoxide and saliva for cotinine determination (16). The validation of the self-reported smoking histories against carbon monoxide and cotinine has been previously reported (16). Annual household income was assessed using categories of less than \$10,000, \$10,000 to \$19,999, \$20,000 to \$29,999, \$30,000 to \$39,999, and \$40,000 and over. The questionnaire also obtained number of years of education.

Each subject was asked a series of questions on language ability and preference. The participants were asked to rate ability to understand, speak, and read Spanish and English on a four-level scale: very well; well; not very well; and not at all. Language use in work and family settings was also assessed using a five-level scale extending from English only to Spanish only.

Data Analysis. Cigarette smokers had smoked cigarettes for at least 6 months. Current smokers were smoking at the time of the interview or within 6 months of the interview. Former smokers had stopped for at least 6 months.

An index of socioeconomic status was created using a combination of the responses on education and household income. Low socioeconomic status was defined as less than a high school education or a household income of less than \$10,000/year. Persons having more than a high school education or whose household income exceeded \$30,000 annually were assigned to the high socioeconomic category. All other individuals were placed in the middle socioeconomic category.

A four-level composite language index was created with a combination of responses to the questions on language ability and language preference. Persons who stated that they spoke Spanish "not very well" or "not at all" were classified as English speakers only. Bilingual persons who used English "only" or "mostly" in a variety of everyday situations were coded English mostly. Bilingual speakers who indicated that they used both languages equally comprised the third category of respondents. Finally, persons who either spoke English "not very well" or "not at all" or who used Spanish primarily in everyday situations constituted the fourth category.

All analyses were performed with programs of the Statistical Analysis System (17). Multivariate approaches were used to assess simultaneously the effects of variables for socioeconomic status and language on smoking state, current and ever smoking, on the age at which subjects started to smoke, and on the number of cigarettes smoked daily. Multiple logistic regression was used for smoking status and multiple linear regression for amount smoked. The independent variables were entered as indicators.

Results

The analysis was limited to 1072 Hispanics aged 18 years or older, with complete information on cigarette smoking status (never, current, and former), language use, household income, and education (Table 1). Two subjects were excluded because of missing information on smoking and 98 because household income was not provided. In comparison with subjects who provided information on household income, these 98 had a comparable proportion of women (59% for both groups) and comparable distributions of smoking status; however, they were sig-

Table 1 Distribution of age, sex, and cigarette smoking status of Hispanic adults in a survey in New Mexico, 1984-1985

Age group/smoking	Males	Females
18-34 years		
Never	94	168
Current	48	84
Former	23	26
35-54 years		
Never	64	105
Current	46	54
Former	46	19
≥55 years		
Never	46	117
Current	38	31
Former	38	25

nificantly older, used Spanish significantly less often, and tended to have less education, although the difference between the two groups was not statistically significant.

Cigarette smoking status varied strongly with educational attainment for both men and women (Tables 2 and 3). In the younger age groups, nearly one-half of the men and women with the lowest level of education were smoking at the time of the survey. In all age groups, women assigned to the low education group were more often current smokers (Table 3). The proportions of never smokers were greater for the males categorized into the middle and high groups (Table 2). Smoking tended to be least common for those 55 years and older.

In contrast, cigarette smoking status did not vary in a consistent pattern with reported language preference (Tables 4 and 5). Smoking tended to be most common in males using Spanish and English equally, but there were no trends across the range of language use. Among females clear patterns of smoking by language preference were not evident (Table 5).

To further assess the effects of education, income, and language preference on cigarette smoking status, multiple logistic analysis was utilized with ever smoking regularly and currently smoking regularly as the outcome measures (Table 6). The analyses of factors determining current smoking were limited to those subjects who had

Table 2 Cigarette smoking status by educational attainment and age group, Hispanic males, New Mexico, 1984-1985

Age group smoking status	Education		
	<High school (%)	High school (%)	>High school (%)
18-34 years	(n = 38)	(n = 92)	(n = 45)
Never	34	65	62
Current	42	23	29
Former	24	12	9
35-54 years	(n = 44)	(n = 67)	(n = 55)
Never	34	45	40
Current	45	24	26
Former	21	31	34
≥55 years	(n = 91)	(n = 31)	(n = 20)
Never	36	45	45
Current	36	19	15
Former	28	36	40

Table 3 Cigarette smoking status by educational attainment and age group, Hispanic females, New Mexico, 1984–1985

Age group smoking status	Education		
	<High school (%)	High school (%)	>High school (%)
18–34 years	(n = 71)	(n = 175)	(n = 50)
Never	41	65	72
Current	51	25	16
Former	8	10	12
35–54 years	(n = 61)	(n = 108)	(n = 24)
Never	46	62	88
Current	39	30	4
Former	5	8	8
≥55 years	(n = 121)	(n = 48)	(n = 29)
Never	61	81	65
Current	23	6	14
Former	16	13	21

ever been regular smokers and had complete data available ($n = 238$ for males and $n = 239$ for females).

After adjusting for age, level of education was a strong predictor of becoming a smoker for both males and females (Table 6). In males, those using Spanish and English equally were significantly more likely to have ever smoked regularly, but a trend in smoking status was not evident across the four categories. In women, language use was not associated with ever smoking. In assessing determinants of current smoking, the composite index of socioeconomic status, incorporating income and education, replaced education alone (Table 7). Strong effects of the socioeconomic status index were identified. The language preference variables were not associated with current smoking status.

In further analyses, the multiple logistic models were repeated with replacement of the socioeconomic status index by its components, years of education and household income. Among males and females who had ever smoked, both increasing household income and education were associated with decreasing likelihood of current smoking. For men, the effect of income was statistically significant for all categories above \$10,000 annually and exceeded the effect of increasing education, which was not statistically significant. For women, the effects of educational attainment and household income tended to be more closely comparable.

Using linear regression, we assessed educational attainment and language preference as determinants of age of starting to smoke with adjustment for age. In both sexes, language preference was not associated with the age at which subjects started to smoke. In males, the age at which subjects started to smoke increased significantly ($P < 0.001$) with increasing education (mean adjusted ages of 15.3, 17.4, and 19.5 years for <high school, high school, and >high school, respectively). In women, education was not significantly associated with the age at which subjects started to smoke ($P = 0.10$), although a pattern of increasing age with greater education was evident (mean adjusted ages, 19.5, 21.9, and 22.2 years for <high school, high school, and >high school, respectively).

Finally, using linear regression, we assessed socioeconomic status and language use as determinants of the number of cigarettes smoked by current smokers. In

Table 4 Cigarette smoking status by language preference and age group, Hispanic males, New Mexico, 1984–1985

Age group smoking status	Know only English (%)	Use mostly English (%)	Use both equally (%)	Spanish only/mostly (%)
18–34 years	(n = 69)	(n = 60)	(n = 29)	(n = 7)
Never	68	58	31	43
Current	20	32	48	14
Former	12	10	21	43
35–54 years	(n = 14)	(n = 56)	(n = 74)	(n = 11)
Never	50	43	24	55
Current	29	18	39	18
Former	21	39	37	27
≥55 years	(n = 2)	(n = 21)	(n = 66)	(n = 33)
Never	100	43	35	42
Current	0	24	32	37
Former	0	33	33	21

males, neither socioeconomic status nor language use was associated with number of cigarettes smoked. In females, the number of cigarettes smoked was significantly predicted by the language use variables ($P < 0.05$); those speaking English only smoked the least (adjusted mean = 10.9/day), but a consistent trend with language use was not evident. The means for the other groups were 18.2, 12.4, and 14.8 for the English mostly, English and Spanish equally, and Spanish mostly or only groups, respectively. As for males, socioeconomic status was not associated with numbers of cigarettes smoked.

Discussion

The starting of regular smoking depends in a complex fashion on age group, sex, peer influences, parental smoking, educational level, socioeconomic status, advertising, and other factors (18); nicotine addiction, perceived benefits and enjoyment from smoking, and the physical and psychological discomfort associated with cessation motivate continued smoking (19, 20). The decision to quit and success in remaining abstinent are determined by many of the same factors affecting the initiation and maintenance of smoking (19–20). Although relevant to successful programs for prevention and cessation, factors influencing smoking rates within racial and ethnic groups in the United States have not yet been adequately described.

We have assessed potential educational, socioeconomic, and cultural determinants of cigarette smoking in a population-based sample of Hispanics in New Mexico. The analysis separately addressed initiating regular smoking and continuing to smoke. As in studies of other Hispanic and non-Hispanic populations, we found that educational attainment was a strong determinant of starting and then continuing smoking (12, 21, 22). An aggregate measure of social class incorporating education and income was strongly associated with current smoking (Table 7).

Our analysis focused on aspects of assimilation and cigarette smoking among a group of self-identified Hispanics. Assimilation is a multidimensional and bidirectional process, aspects of which may proceed at differing rates (23). Yinger (23) has identified four subprocesses that include changes at the psychological (identification), cultural (acculturation), structural (integration), and bio-

Table 5 Cigarette smoking status by language preference and age group, Hispanic females, New Mexico, 1984-1985

Age group smoking status	Know only English (%)	Use mostly English (%)	Use both equally (%)	Spanish only/mostly (%)
18-34 years	(n = 145)	(n = 79)	(n = 46)	(n = 10)
Never	60	68	48	50
Current	30	27	37	40
Former	10	5	15	10
35-54 years	(n = 22)	(n = 66)	(n = 77)	(n = 13)
Never	50	72	56	23
Current	32	23	32	54
Former	18	5	12	23
≥55 years	(n = 6)	(n = 26)	(n = 93)	(n = 48)
Never	83	62	71	62
Current	17	23	15	21
Former	0	15	14	17

logical (amalgamation) levels. Thus, increasing assimilation into non-Hispanic mainstream U.S. culture could plausibly affect smoking patterns through such mechanisms as increasing exposure to advertising media, altered coping styles and cultural stresses, changing patterns of income and education, and changing awareness of health risks and access to preventive services. In this study, education and income were used as measures of the structural integration subprocess. To assess acculturation, we used a four-level scale of preferred language use, ranging from English only to mostly or only Spanish. This measure was not consistently associated with either ever or current cigarette smoking, with the age at which subjects started to smoke, or with numbers of cigarettes smoked (Tables 4-7).

Other studies have also failed to provide uniform evidence that acculturation variables strongly affect smoking in Hispanics. In a three-generation study of Mexican Americans in San Antonio, three distinct acculturation measures, including ethnicity of friends, language use, and traditional values, were not associated with ever or current smoking in the middle and younger generations (5). Marin *et al.* (11) surveyed Hispanics in San Francisco by telephone and rated them on a five-level acculturation scale based on language (11, 24). Smoking prevalence was higher among less acculturated males and among more acculturated females, and more acculturated men and women smoked more cigarettes. In another study in San Francisco, Sabogal *et al.* (25) found that greater acculturation was associated with smoking more cigarettes per day and with less perceived self-efficacy to avoid smoking. In Mexican Americans included in the Hispanic Health and Nutrition Examination Survey, 1982-84, increasing acculturation, as measured on an eight-item scale, was associated with increasing smoking in women but not in men (12).

Thus, neither the present study nor studies in other populations provide clear evidence that smoking status varies consistently with language preference and use, lending support to Yinger's (23) argument that assimilation is not a straight-line process. Perhaps persons based equally in the two cultures, as evidenced by routine use of both languages in daily activities, are more susceptible to acculturative stress and attempt to manage it by smoking or perhaps drinking. It was this group of men who

Table 6 Predictors^a of ever smoking regularly versus never smoking in Hispanic males and females, New Mexico, 1984-1985

	Males	Females
	OR (95% CI) ^b	OR (95% CI) ^b
Education		
<High school	1.0	1.0
High school	0.49 (0.30, 0.79)	0.45 (0.31, 0.67)
>High school	0.61 (0.36, 1.05)	0.36 (0.21, 0.62)
Language use		
English only	1.0	1.0
English mostly	1.53 (0.86, 2.71)	0.66 (0.42, 1.05)
English and Spanish	2.10 (1.14, 3.88)	0.93 (0.58, 1.50)
Spanish only/mostly	1.19 (0.54, 2.64)	1.07 (0.55, 2.08)

^a Age-adjusted by logistic regression.

^b OR, odds ratio; CI, confidence interval.

were most likely to be smokers, independent of socioeconomic status (Tables 4 and 6).

In prior studies in Hispanic populations in New Mexico, we have shown that Hispanics of both sexes tend to smoke fewer cigarettes per day than non-Hispanic whites (1, 3, 6). This study did not adequately explain this pattern of smoking. In currently smoking males, neither socioeconomic status nor language use was associated with numbers of cigarettes smoked daily; in women, those speaking English only smoked the least, but a clear trend of numbers smoked with the language preference index was not evident. In a similar analysis of data from the study in San Francisco, Marin *et al.* (11) found that more acculturated men and women tended to smoke nearly twice as many cigarettes per day as the less acculturated.

The potential limitations of the measure of acculturation need to be considered in interpreting the present study. Since nearly all of the study population was born in New Mexico (6), neither birthplace nor length of residence was an informative measure of acculturation in this sample. All selected subjects were self-identified as Hispanics; therefore, we used language preference as an index of acculturation, which distributed the subjects broadly across the four categories in spite of the homogeneity of the study sample, defined by residence in a single small community. This language-based index is comparable with that developed by Marin and colleagues in San Francisco (24). We also urge caution in generalizing from these regional data, collected in 1984-1985, to the diverse Hispanic populations of the United States during the 1990s.

The lack of association between language use and other measures of acculturation and smoking in this and other studies parallels the findings for some other aspects of health behavior and acculturation in Hispanic groups in the United States. For example, acculturation was not a strong predictor of alcohol consumption in the three-generation study of Mexican Americans in San Antonio (26) or of health behavior in elderly Hispanic women residing in Los Angeles (27). In the Hispanic Health and Nutrition Examination Survey, acculturation was not a consistent determinant of use of preventive services (28) and alcohol consumption by Mexican Americans in the Southwest (29), although acculturation was associated with alcohol consumption (13) and marijuana and cocaine use (30) in the entire sample. The inconsistency

Table 7 Predictors^a of current cigarette smoking versus previously smoking in Hispanic males and females, New Mexico, 1984–1985

	Males	Females
	OR (95% CI) ^b	OR (95% CI) ^b
Socioeconomic status		
Low	1.0	1.0
Medium	0.51 (0.25, 1.04)	0.40 (0.19, 0.85)
High	0.37 (0.18, 0.74)	0.24 (0.10, 0.60)
Language use		
English only	1.0	1.0
English mostly	1.10 (0.43, 2.77)	1.84 (0.72, 4.70)
English and Spanish	1.43 (0.57, 3.60)	0.73 (0.31, 1.72)
Spanish only/mostly	1.07 (0.33, 3.47)	0.60 (0.19, 1.85)

^a Age-adjusted by logistic regression.

^b OR, odds ratio; CI, confidence interval.

of the effect of acculturation across these investigations may reflect inadequacies of the simplistic measures of acculturation used in epidemiological studies. Such indicators of acculturation as language use and generation appear to have little utility for targeting populations for intervention.

We used self-reported information on cigarette smoking in the analysis, although in this population, comparison of the self-reports with biological markers of smoking has shown that the prevalence of current smoking is underestimated by self-reports (16). Adjusting for the biological markers moves several percent of the self-reported former and never smokers to the current smoking group. However, the misclassification resulting from use of self-reports should be slight, and by itself, misclassification of smoking status could not explain the lack of association of the language preference variable with the smoking variables. The data on amount smoked may also be subject to misclassification. In a study of selected participants in the Hispanic Health and Nutrition Examination Survey, examination of the ratio of self-reported cigarette use to cotinine suggested underreporting by those claiming to smoke fewer than 20 cigarettes daily (31).

In spite of these potential limitations, the present study suggests that, as in other U.S. populations, Hispanics in the Southwest with lower education and less income should be targeted for smoking prevention and cessation. Culturally appropriate interventions, in addition to effective avenues for reaching those most needing the interventions, should be developed (32, 33). Increasing marketing of tobacco to Hispanics adds to the urgency of implementing antismoking programs for Hispanics (34).

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