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Article

Exploring differences in men's marijuana consumption and cigarette smoking by race and citizenship status

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SUMMARY

In recent years, the use of marijuana for recreational and medicinal purposes has become increasingly popular and socially accepted in California. In this study, we hypothesized that citizenship status and racial background were associated with marijuana consumption and cigarette smoking. Marijuana users were defined as males who self-report having used marijuana in the past, and smokers were defined as males who reported currently smoking. We used the dataset from 2017–2018 in the California Health Interview Survey (CHIS). Our dataset included 8,587 males from ages 18 to 85 living in metropolitan areas of California. We used a logistic regression model to find correlations between citizenship status and race with marijuana consumption and cigarette smoking. We showed that, relative to US-born citizens, non-citizens and naturalized citizens were less likely to report using marijuana. In addition, we observed that Asian and Latino males were less likely to report consuming marijuana in comparison to White males. American Indians/Alaska Natives, African Americans, Latino, and Other Single/Multiple races were more likely to report smoking cigarettes in comparison to White males. The effect size analysis showed that citizenship status had a medium effect and race had a small effect on marijuana consumption. Both citizenship status and race had a small effect on cigarette smoking. These results suggest that race and citizenship status were correlated with the likelihood of consuming marijuana and smoking cigarettes among adults in California. As marijuana consumption and cigarette smoking are associated with certain health risks, future health improvement efforts could include targeted outreach efforts based on specific citizenship status and race.

INTRODUCTION

Marijuana consumption and smoking cigarettes have a severe impact on the health outcomes of individuals, especially cardiovascular diseases (1). According to the National Institute of Drug Abuse, marijuana was the third most significant cause of drug-related health emergencies between 2004–2011 in the US (2). The consumption of marijuana for recreational and medicinal purposes has become increasingly popular and socially accepted in the US (3). An increase in marijuana consumption is associated with a decline in the stigma of its usage (4).

Tobacco is often referred to as a "gateway drug" and is commonly one of the first substances consumed by adolescents in the US (5). Smoking is a leading cause of preventable deaths, including cancers, cardiovascular diseases, and respiratory diseases, worldwide (6). There are significant health and social costs of smoking cigarettes and consuming marijuana such as the costs of medical complications, increasing emergency room visits, black market violence, drug treatment, diminished quality of life, and the impact on total economic output (7). Smoking cigarettes during adulthood is associated with lower income and wealth, as well as increased alcohol consumption, while marijuana use is associated with higher average income and wealth (8). Extensive cannabis use is correlated with various negative health consequences such as depression, suicide, decline in cognitive function, and particularly attention deficit hyperactivity disorder (9). Intensive and early use of marijuana among youth was associated with mental health problems, specifically in races such as African American, Aboriginal, and Torres Strait Islander (10). Several socioeconomic factors are associated with smoking and marijuana consumption (8). It was observed that the retail availability of marijuana in urban areas in California was higher than rural areas (11). It was also observed that adult men in California were estimated to use marijuana at higher rates than women (12). However, limited research exists on the association of citizenship status and race with marijuana consumption and cigarette smoking.

In this work, we studied the marijuana consumption and cigarette smoking habits for different racial groups and citizenship status through logistic regression. Specifically, we used the publicly accessible California Health Interview Survey (CHIS) 2017–2018 dataset to analyze males who had tried marijuana at least once or were tobacco smokers, looking for associations with race and citizenship status (13). We hypothesized that citizenship status and racial background are associated with marijuana consumption and cigarette smoking among males of ages 18–85 living in metropolitan California. We found that the marijuana consumption and cigarette smoking were correlated with citizenship statuses and races. There is a need to spread awareness of the adverse mental health problems that may arise with excessive marijuana consumption (10). As marijuana consumption and cigarette smoking are associated with several health problems, future health improvement efforts could include targeted outreach and awareness programs based on specific

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Variable Name	Number of Respondents	Distribution Percentage
Citizenship Status		
US-Born Citizen	6835	79.6%
Naturalized Citizen	1056	12.3%
Non-Citizen	696	8.1%
Race		
Latino	1254	14.6%
Other Single / Multiple Race	842	9.8%
American Indian / Alaska Native	86	1%
Asian	635	7.4%
African American	421	4.9%
White	5358	62.4%

Table 1: Distribution of adult male CHIS respondents across citizenship status and race. Number of respondents and the distribution percentages for race and citizenship status in our sample evaluated.

citizenship statuses and races.

RESULTS

We studied responses from 8,587 males from ages 18 to 85 living in metropolitan areas using the CHIS dataset. We investigated the associations between citizenship status and race with marijuana consumption and cigarette smoking. White citizens and US-born citizens were taken as the comparison groups for statistical analyses, as they were the largest percentage in our dataset (**Table 1**).

From our data, we observed that 80% of the males were US-born citizens and 62% were White (**Table 1**). We also observed that 60% of all respondents had consumed marijuana at least once and 13% were regular cigarette smokers (**Table 2**). The percentage of male smokers who were US-born citizens was 12.5%, and for naturalized citizens, it was 11.3%. However, the percentage of male smokers who were non-citizens was relatively higher at 15.7%. The percentage of male marijuana users who were naturalized citizens was 39.1%, and for non-citizens, it was 35.1%. However, the percentage of male marijuana users who were US-born-citizens was relatively higher at 65.3% (**Figure 1**). The cigarette smoking by males ranged from 11% to 16% for different citizenship statuses (**Figure 2**).

Regression and Effect Size Analysis of Marijuana Consumption

From our logistic regression, we found that citizenship status was a significant factor in marijuana consumption ($p < 0.0001$). The correlation of marijuana consumption was statistically significant for both naturalized citizens and non-citizens. Though the odds ratio was low for naturalized citizens (0.342) and non-citizens (0.288), effect size analysis showed citizenship status had a medium effect (Cohen's D = 0.456) on marijuana consumption (**Table 3**). We observed that there was a significant correlation between marijuana consumption

Variable Name	Marijuana Consumers	Cigarette Smokers
Citizenship Status		
US-Born Citizen	4463 (87%)	856 (79%)
Naturalized Citizen	411 (8%)	120 (11%)
Non-Citizen	244 (5%)	108 (10%)
Race		
Latino	656 (13%)	176 (16%)
Other Single / Multiple Race	512 (10%)	147 (14%)
American Indian / Alaska Native	58 (1%)	20 (2%)
Asian	218 (4%)	58 (5%)
African American	279 (5%)	63 (6%)
White	3395 (66%)	620 (57%)
Total Consumers	5119	1084
Percentage Consumers of Total Sample (8587)	60%	13%

Table 2: Distribution of marijuana consumers and cigarette smokers across citizenship status and race. Number and percentages of marijuana consumers as well as cigarette smokers across different racial groups and citizenship statuses.

with Asian and Latino racial groups ($p < 0.0001$). The effect size analysis shows that race has a small effect (Cohen's D = -0.165) on marijuana consumption, and the odds ratios for Latino (0.631) and Asians (0.302) indicate that these racial groups were less likely to consume marijuana than the White racial group (**Table 3**).

Regression and Effect Size Analysis of Smoking

We observed that non-citizen status had a significant correlation with cigarette smoking ($p < 0.02$). Though the effect size analysis shows that citizenship status has a small effect (Cohen's D = -0.05) on cigarette smoking, the odds ratio for non-citizens (1.3) indicates that non-citizens were more likely to smoke than US-born citizens (**Table 3**). We found that race was also a significant factor in cigarette smoking. Cigarette smoking was correlated with the Latino, Other Single/Multiple Race, American Indian/Alaska Native, and African American races ($p < 0.04$, **Table 3**). The Other Single/Multiple race group was defined as individuals who do not qualify as part of the other five racial groups studied. Though the effect size analysis shows that race has a small effect (Cohen's D = 0.134) on cigarette smoking, the odds ratios for Other Single/Multiple Race (1.626), African American (1.353), American Indian/Alaska Native (2.467), and Latino (1.248) indicates that these racial groups were more likely to smoke than the White racial group (**Table 3**).

Correlation Between Independent Variables

We further analyzed the independent variables associated with cigarette smoking and marijuana consumption using Chi-squared test of independence. We observed that

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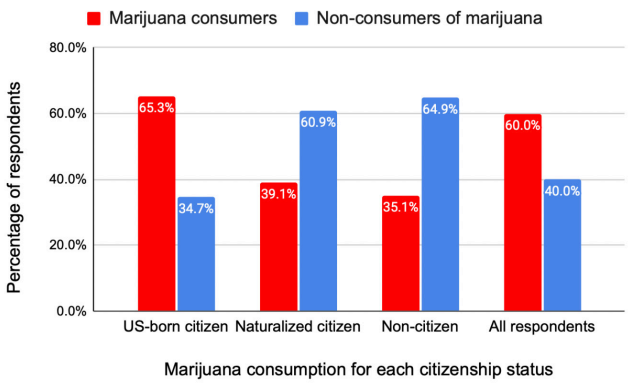

Figure 1: Marijuana consumption by citizenship status. The percentage of respondents who consume marijuana across different citizenship statuses. olded.

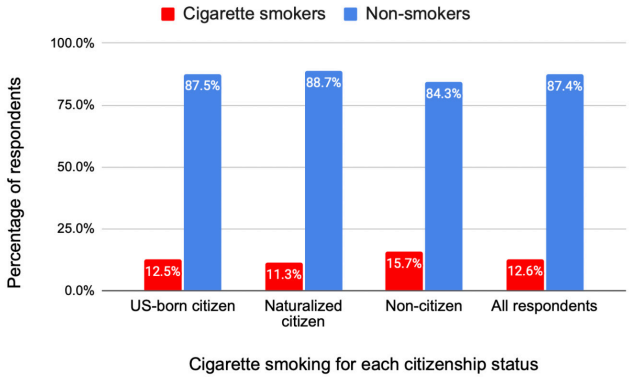

Figure 2: Cigarette smoking by citizenship status. The percentage of respondents who smoke cigarettes across different citizenship statuses.

the relationship between citizenship status and race was statistically significant ($p < 0.0001$) for the sample size of 8587 respondents. We also tested for the 5119 marijuana consumers and 1084 cigarette smokers separately and found that the independent variables were correlated ($p < 0.0001$).

DISCUSSION

Illicit marijuana consumption and associated health risks were observed in various states before legalization (14). Our dataset was taken from the CHIS public access data file after the legalization in the years 2017–2018 (13). The legalization of recreational and medicinal marijuana in California took place in November 2016, a year before our data sample was taken (15). Since the legalization of marijuana for recreational use in California in 2016, recreational and medicinal marijuana has seen an increase in its popularity (3). Our study focused on the impact of legalization of marijuana on its consumption by various demographics. Using the logistic regressions, we observed that the non-citizen and naturalized citizen statuses were correlated with marijuana consumption. Based on the odds ratio, non-citizens and naturalized citizens were less likely to consume marijuana compared to US-born citizens. This was not surprising because non-citizens may have a risk with their immigration status if they admit marijuana possession to a federal immigration officer because the federal law has not made marijuana possession legal (16). Based on the analysis of the Chi-squared test of independence, we observed that race and citizenship status were correlated. So, it seems that the non-citizen Latinos and Asians were less likely to consume marijuana compared to the control group.

American Indians/Alaska Natives, African Americans, Latino, and Other Single/Multiple race groups had a significant correlation with cigarette smoking. This may be so because racism is considered as a social determinant of health, and racism was associated with cigarette smoking from adolescence to adulthood (17). The Asian American race was not correlated with cigarette smoking in our study. It was reported that education, acculturation, and gender were the factors influencing the smoking habits among the Asians (18). Though non-citizen status was correlated with cigarette smoking in our study, the effect size was negative and small. Further research is needed to understand the reasons behind the correlation between non-citizen status and cigarette smoking.

Our study included a few limitations. Our study had an unequal number of respondents from each category of race and citizenship status, which might have influenced our results. Our study included respondents who had tried marijuana at one point and did not include regular marijuana consumers. E-cigarettes were not included in the study, and this could be a future factor to study. In addition, our data only consisted of male respondents living in metropolitan areas. A study in rural areas or a study covering females might provide additional perspectives to the research. As socioeconomic status is a major factor affecting marijuana consumption and cigarette smoking, future studies could include research on a population including all genders, diverse racial groups, and

Variable Name	Number of Respondents		Distribution Percentage	
	Odds Ratio	*p*-value	Odds Ratio	*p*-value
Citizenship Status				
Naturalized Citizen	0.342	<0.001*	0.891	0.265
Non-Citizen	0.288	<0.001*	1.300	0.018*
Race				
Latino	0.631	<0.001*	1.248	0.016*
Other Single / Multiple Race	0.927	0.322	1.626	<0.001*
American Indian /Alaska Native	1.398	0.322	2.467	0.001*
Asian	0.302	<0.001*	0.768	0.068
African American	1.141	0.220	1.353	0.035*

Table 3: Logistic regression of marijuana consumption and cigarette smoking by citizenship status and race. Odds ratio and p-values for marijuana consumption and cigarette smoking are provided for various citizenship status and race, compared to the US-born citizens and the White racial group. An asterisk (*) represents significant *p*-values ($p < 0.05$).

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various socioeconomic statuses.

Since we observed that some races and citizenship statuses were correlated with the consumption of marijuana and smoking cigarettes among men in metropolitan California, and that these could result in certain health risks, health improvement efforts could be tailored. Future efforts to address this could include targeted educational outreach and other efforts based on specific citizenship status and race. For example, the American Indian/Alaska Native race has a high odds ratio for cigarette smoking, and any smoking cessation efforts could be targeted to such groups.

MATERIALS AND METHODS

Data Collection

The data of this research paper was based on California Health Interview Survey's (CHIS) publicly available data from 2017 to 2018 (13). CHIS is a population-based telephone survey conducted by the University of California, Los Angeles Center for Health Policy Research. CHIS is a population-based random-digit-dial telephone survey of California's 58 counties. Notably, the CHIS is completely anonymous to ensure respondents' privacy. The names of the respondents were not retained and all home addresses as well as telephone numbers were deleted from the survey answers. The interview was conducted in English, Spanish, Mandarin, Cantonese, Vietnamese, or Korean to reach a rich and diverse sampling base. The survey collected data on whether respondents lived in rural or metropolitan areas, male or female, and age. We focused our research by selecting data from males from ages 18 to 85 living in metropolitan areas. The selected data had 8,587 valid survey responses.

Statistical Techniques

We used two independent variables namely, citizenship status and race. We measured the two dependent variables, marijuana consumption and cigarette smoking. We observed whether a respondent had tried marijuana or hashish at one point, and if the respondent was a current smoker. We conducted binary logistic regression and created the figures as well as tables using the software StataSE 17. White citizens and US-born citizens were taken as the comparison groups for statistical analyses, as they were the largest percentage in our dataset (**Table 1**).

Survey weights were applied to the sample data from the CHIS; however, we did not apply any additional weights to any responses. We used logistic regression to find the association of citizenship status and race with smoking and marijuana consumption. A two-tailed *p*-value less than 0.05 was considered statistically significant in all our regression models. We used Cohen's D test to analyze the effect sizes of our variables. Additionally, we included the odds ratios as an indicator of the coefficient values where the variables were statistically significant. We also used a Chi-squared test of Independence to analyze the correlation between the independent variables.

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