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Kornacki, Chase

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UNIVERSITY OF CALIFORNIA SAN DIEGO

Differences in Sacred and Commercial Tobacco Perceptions by Smoking Status in Southern
California Tribal Communities

A Thesis submitted in partial satisfaction of the requirements
for the Masters of Public Health

in

Public Mental Health

by

Chase Kornacki

Committee in charge:

Professor Wael Al-Delaimy, Co-Chair
Professor Samantha Hurst, Co-Chair
Professor Tommi Gaines
Professor Matthew D. Stone

2025

The Thesis of Chase Kornacki is approved, and it is acceptable in quality and form for publication on microfilm and electronically.

University of California San Diego

2025

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ABSTRACT OF THE THESIS

Differences in Sacred and Commercial Tobacco Perceptions by Smoking Status in Southern California Tribal Communities

by

Chase Kornacki

Master of Public Health in Public Mental Health

University of California San Diego, 2025

Professor Wael Al-Delaimy, Co-Chair

Professor Samantha Hurst, Co-Chair

Sacred tobacco holds deep cultural and spiritual significance in many American Indian and Alaska Native (AIAN) communities, while commercial tobacco contributes to ongoing tobacco-related harms. Distinguishing sacred from commercial tobacco is essential for informing culturally relevant prevention and cessation efforts, yet few studies assess both tobacco types

within the same framework. Local data remains limited, particularly in Southern California Tribal communities. Thus, to examine differences in sacred and commercial tobacco perceptions and explore prevention and cessation-related needs, a cross-sectional survey was administered in person at the Southern California American Indian Health Center. Adults ($n = 201$) reported demographics, smoking status, perceptions of commercial and sacred tobacco, and prevention and cessation needs. Smoking status was categorized into “people who smoke” and “people who do not smoke” (former + never). Group differences were assessed using Welch’s *t*-tests, chi-square tests, and Fisher’s exact tests. A linear regression model examined whether smoking status predicted a four-item composite of sacred tobacco perceptions. People who smoke were more likely to view “all-natural” cigarettes as less harmful and were more aware of the California menthol cigarette ban than people who do not smoke. Both groups overwhelmingly agreed that commercial tobacco does not align with their culture and has impacted community health. People who smoke participated more frequently in practices involving sacred tobacco and had higher sacred tobacco composite scores ($p < 0.001$). In the regression model, smoking status remained significantly associated with higher sacred tobacco composite scores after adjusting for covariates. A lack of awareness was the most common barrier to accessing commercial tobacco cessation services. Findings underscore the need to increase visibility of existing cessation resources and reinforce distinctions between tobacco types in culturally grounded approaches to commercial tobacco prevention and cessation. This community-specific assessment offers insight to support ongoing Tribal public health initiatives and may inform similar efforts in other Tribal settings.

INTRODUCTION

Public Health Significance and Background

For millennia, Indigenous peoples have maintained a cultural and spiritual connection to tobacco. Tobacco is a sacred plant for Indigenous communities, used in ceremonies as an offering to others, the land, or as a means of communicating with the spiritual world.¹⁻³ Sacred tobacco, which is used in its natural and unprocessed form, can be burned in a fire or smoked in a pipe, but it is usually not inhaled and is not used recreationally.^{4,5} It is used in prayers, medicinal practices, and to honor relationships. Although these practices vary across Indigenous Nations of Turtle Island (North America), sacred tobacco promotes well-being in many Indigenous communities and supports cultural continuity.⁶ Sacred tobacco use continues today across Tribal Nations, including those in California.⁷

Colonization disrupted sacred tobacco practices and introduced commercial tobacco products that were never part of Indigenous practices or values.⁸ Federal policies, such as the Code of Indian Offenses of 1883, criminalized American Indian and Alaska Native (AIAN) ceremonial and spiritual practices, including those involving sacred tobacco. These laws, along with other systemic injustices, significantly influenced how Indigenous communities could access and practice cultural traditions until restrictions were lifted by the American Indian Religious Freedom Act of 1978. The prohibition of sacred tobacco use, combined with the widespread availability of commercial tobacco products and targeted promotion to Indigenous peoples, actively contributed to commercial tobacco use and addiction.⁹⁻¹¹ These historical and ongoing forces contribute to detrimental impacts on AIAN health and community well-being.¹²

Today, AIAN peoples face high rates of commercial tobacco use. In the United States, AIAN adults have a cigarette smoking rate more than double that of the general population

(27.1% vs. 12.5%).¹³ This trend persists even in California, a state known for its low commercial tobacco use rates, where 15.8% of AIAN adults smoke compared to 10.9% of Californians overall.¹⁴ A similar pattern appears among youth; while youth commercial tobacco use has decreased across the United States, commercial tobacco use among AIAN high school students has increased.¹⁵ Access to cessation support also reflects structural patterns within healthcare systems, as only 26.8% of AIAN adults who smoke report receiving clinician advice to quit, compared to 49.3% of White adults who smoke.¹⁴ Despite progress in Indigenous-led commercial tobacco control,^{16,17} including in California,^{18,19} more community-specific information is needed to support AIAN communities in preventing and reducing commercial tobacco use, while respecting sacred tobacco practices.

Knowledge Gaps and Need for Local Data

Distinguishing sacred tobacco from commercial tobacco is critical in research and public health efforts to address AIAN tobacco-related inequities. Yet national and state surveillance tools rarely differentiate between types of tobacco, which limits recognition of sacred tobacco practices and obscures culturally specific patterns of commercial tobacco use. Small AIAN sample sizes often lead to aggregation into an “Other” category or exclusion from reports altogether, reducing visibility and accuracy of population-level estimates. As a result, little quantitative research has examined sacred tobacco use or perceptions among AIAN adults, and even fewer studies have assessed sacred and commercial tobacco perceptions within the same analytic framework.

Qualitative work with Tribal elders, respected knowledge keepers, from various Tribes highlights that sacred tobacco carries responsibility and relational meaning, while commercial tobacco can disrupt these teachings.^{20–22} When public health efforts fail to reflect these

distinctions, prevention and cessation strategies may be less relevant in AIAN communities. Given the diversity across 574 federally recognized Tribes in the United States, including more than 100 in California, local and culturally contextualized data are essential to guide effective commercial tobacco prevention and cessation programming.^{23–25} Within this context, no existing data describe sacred and commercial tobacco perceptions or cessation needs among adults eligible for services at the Southern California American Indian Health Center (SCAIHC). This gap limits SCAIHC's ability to tailor commercial tobacco prevention and cessation services to its community. This study seeks to address these gaps and provide culturally contextualized information to support ongoing and future Tribal public health programming.

Study Purpose and Rationale

This study used a cross-sectional survey administered at SCAIHC to examine perceptions of commercial and sacred tobacco, as well as prevention and cessation needs among two groups: people who smoke and people who do not smoke. A cross-sectional survey design allows for efficient quantification of commercial and sacred tobacco perceptions within the SCAIHC service population. This design also provides practical, community-specific information that can directly support program planning and service delivery. This study addresses these knowledge gaps and contributes local data by examining commercial and sacred tobacco perceptions and community-identified prevention and cessation needs among SCAIHC-eligible adults.

Study Aims and Hypotheses

The first aim was to assess whether commercial tobacco perceptions differed by smoking status groups, with the hypothesis that people who smoke would have more favorable views of commercial tobacco than people who do not smoke. The second aim was to assess whether sacred tobacco perceptions varied by smoking status, with the hypothesis that people who smoke

would endorse less traditional views of sacred tobacco than those who do not currently smoke. This aim was analyzed using group comparisons and a regression model where smoking status was the main predictor of a sacred tobacco composite score, adjusted for demographic covariates. The third aim, which was exploratory, was to explore perceived community needs for commercial tobacco prevention and cessation services at SCAIHC.

METHODS

Use of Person-First Language

Person-first language is used throughout to describe smoking status (e.g., “people who smoke,” “people who formerly smoked,” and “people who have never smoked”). This approach intentionally separates smoking behavior from the person, which helps reduce stigma and avoids defining individuals by a health behavior. This framing also aligns with public health principles that emphasize how systems, environments, and historical factors shape commercial tobacco use, rather than placing responsibility solely on individuals. For analyses involving grouped categories, the terms “people who do not smoke” (former + never) and “people who smoke” are used.

Study Design

The study used a cross-sectional survey design. Data were collected between September 2025 and October 2025 using the Qualtrics survey platform. Participants completed the survey in person at SCAIHC on SCAIHC-owned tablets. The survey included categorical, Likert-scale, multi-select, and open-ended items to elicit a range of quantitative and qualitative responses. The study was approved by the University of California San Diego Institutional Review Board (Protocol #812044). Approval was also obtained from the SCAIHC Tribal Institutional Review Board. Securing Tribal IRB review is essential for research involving AIAN communities because it ensures oversight by the Tribal governing body and protects Tribal sovereignty.²⁶

Recruitment and Data Collection Procedures

Participants were recruited using convenience sampling. Recruitment strategies included flyers, posts on the SCAIHC Facebook and Instagram platforms, and outreach tabling in

SCAIHC lobbies and at a SCAIHC-hosted community event. Individuals received a \$25 gift card upon survey completion.

When a participant expressed interest in the survey, the MPH candidate reviewed the consent form with them. The consent form, displayed on the Qualtrics introduction page, outlined the purpose of the study, study procedures, potential risks and benefits, voluntary participation, and confidentiality protections. Participants had the opportunity to ask questions before providing consent. Participants provided electronic consent by selecting “Yes, I agree to participate” and signing an electronic signature field. Only after providing consent could participants begin the survey. If Tribal elders requested technology assistance, the MPH candidate read each question verbatim and verbally confirmed their answer choices.

Participants

Participants were eligible if they:

1. Were 18 years of age or older, and
2. Were eligible to receive services at SCAIHC, defined as meeting one of the following:
 - a. Member of an SCAIHC health consortium Tribe or lineal descendant of an enrolled member
 - b. Enrolled member of another California or out-of-state Tribe
 - c. Non-AIAN individual who is (i) a spouse of an eligible AIAN (including same-sex spouses), (ii) a dependent of an eligible AIAN (including adopted, step, or foster children), or (iii) a pregnant woman carrying the child of an eligible AIAN individual, and
3. Were able to read and understand English.

Survey Instrument

The survey used skip logic to tailor items based on participant smoking status. All participants completed eligibility, demographic, and smoking status questions. Next, people who smoke were directed to a block assessing recent smoking behaviors, product use, quit attempts, and barriers to quitting. People who formerly smoked and people who never smoked were directed to a block assessing lifetime product experimentation and reasons for abstaining. Then, all participants completed shared sections on commercial tobacco perceptions, sacred tobacco use and perceptions, community prevention and cessation needs, and the Personal Health Questionnaire-2 (PHQ-2). On average, people who smoke answered 30-41 questions, and people who do not smoke answered 25-31 questions.

Measures

Smoking Status and Smoking Group Formation

Participants were asked the following questions to determine their current cigarette smoking status: “Have you ever smoked a cigarette (even one or two puffs)?”, “Have you smoked at least 100 cigarettes in your entire life?”, and “Do you now smoke cigarettes...every day, some days, or not at all?” Responses formed three smoking status categories:

1. Never: People who have smoked fewer than 100 cigarettes in their lifetime.
2. Former: People who have smoked at least 100 cigarettes in their lifetime but do not currently smoke.
3. Current: People who smoke cigarettes every day or some days and have smoked at least 100 cigarettes in their lifetime.

These smoking status categories were classified into two groups: “people who do not smoke (never + former) and “people who smoke” (current).

Commercial Cigarette Perceptions

Most commercial tobacco perception items were adapted from the Population Assessment of Tobacco and Health (PATH) study's Wave 3 questionnaire.²⁷ Items were modified to reflect relevant products and descriptors for AIAN communities. For example, participants were asked: "Do you think cigarettes described as 'all-natural' have different effects on health compared to other cigarettes?" with response options of "fewer negative health effects," "about the same," and "more negative health effects." Similar items assessed perceptions of cigarettes described as "Native-owned" and "flavored like menthol or mint," allowing examination of perceived differences in health effects across these product types.

Sacred Tobacco Use and Perceptions

Participants were asked how often they participate in practices involving sacred tobacco, with response options ranging from daily to never. Next, sacred tobacco perceptions were assessed using a four-item scale. Each item was rated on a five-point Likert scale with the following response options: strongly disagree, disagree, neutral, agree, and strongly agree (coded 1-5). Item responses were averaged to create a mean composite score ranging from 1 to 5, with higher scores indicating stronger sacred tobacco orientation. The four items were:

1. "The use of sacred tobacco is meaningful to maintaining cultural traditions."
2. "Using tobacco in ceremonies is not the same as smoking cigarettes."
3. "Sacred tobacco use is an important part of who I am."
4. "When practiced traditionally, tobacco use strengthens my cultural identity."

These Likert items captured attitudes towards sacred tobacco across several conceptual domains: cultural significance, distinction between both tobacco types, and cultural identity and belonging.

Data Analysis

All analyses were conducted using R (Version 4.5.1). The following R packages were used for data management, analysis, and visualization: tidyverse, janitor, gtsummary, broom,ggeffects, and psych. Data was imported from an Excel file from Qualtrics using the “readxl” package in R.

Data were screened for completeness and eligibility prior to analysis. Exclusions included one participant who did not complete the survey, one participant who failed to report age, one participant under age 18 (screened out automatically by Qualtrics), and one participant who did not meet eligibility criteria to receive services at SCAIHC (screened out automatically by Qualtrics). Analyzed survey items were completed by nearly all participants; missingness is presented in the “overall” or “n” columns of the descriptive tables.

Group Comparisons

Group differences for continuous variables were assessed using Welch’s two-sample t-test, which does not assume equal variances and is well-suited for the unequal smoking groups in this study. Group differences for categorical variables were assessed using chi-square tests or Fisher’s exact tests when expected cell counts were less than five. All tests were two-sided, with a statistical significance set at $p < 0.05$.

Regression Model

A multivariable linear regression model was used to examine the association between smoking status and sacred tobacco composite mean scores. Covariates were selected based on confounding factors known to be associated with commercial tobacco use behaviors, including age, gender, education, and employment.²⁸ Additional covariates included California Tribal affiliation (vs. non-California Tribe), identifying as only AIAN (vs. multiracial), and residing on

a Tribal reservation, which were included as potential confounders relevant to this study population. Adjusted marginal means were estimated using the “effects” package in R to facilitate interpretation of group differences. Model assumptions were evaluated using residual-versus-fitted plots, Q–Q plots, scale–location plots, and residual leverage diagnostics. Normality and homoscedasticity were formally assessed using standardized residuals and the Breusch–Pagan test.

RESULTS

Participant Characteristics

A total of 201 participants were included in the final analytic sample. Participants had a mean age of 44.41 years ($SD = 15.84$), and the majority identified as female (65.2%). Most participants reported being enrolled in or a descendant of a California Tribe (89.6%). Over half identified as AIAN in combination with other ethnic identities (59.2%), while the remainder identified as only AIAN. Just over three-fourths reported residing on a Tribal reservation (76.1%). Most participants reported either some college without a degree (35.3%) or a high school diploma or GED (32.3%) as their highest level of education. Over half of participants were employed, including full-time, part-time, and self-employed positions (59.2%).

Among the 201 participants, 102 (50.7%) were people who have never smoked, 60 (29.9%) were people who formerly smoked, and 39 (19.4%) were people who smoke. These categories were combined to form two analytic groups: 162 (80.6%) were classified as people who do not smoke, and 39 (19.4%) were classified as people who smoke.

Table 1 presents participant demographics stratified by smoking status. Demographic characteristics were generally similar across the two groups. A statistically significant difference was observed for being enrolled or a descendant of a California Tribe ($p = 0.037$), with a higher proportion of people who smoke identifying with a non-California Tribe compared to those who do not smoke.

Table 1: Demographic characteristics by smoking group

Demographic Characteristics	Overall N = 201 ¹	People who do not smoke N = 162 ¹	People who smoke N = 39 ¹	p-value
Age (in years)	44.41 (15.84)	44.15 (16.24)	45.49 (14.21)	0.6 ²
Gender identity				0.2 ³
Female	131 (65.2%)	110 (67.9%)	21 (53.8%)	
Male	65 (32.3%)	48 (29.6%)	17 (43.6%)	
Other	5 (2.5%)	4 (2.5%)	1 (2.6%)	
California Tribal Affiliation				0.037 ³
No (another Tribe)	21 (10.4%)	13 (8.0%)	8 (20.5%)	
Yes	180 (89.6%)	149 (92.0%)	31 (79.5%)	
Only AIAN				0.5 ⁴
No	119 (59.2%)	94 (58.0%)	25 (64.1%)	
Yes	82 (40.8%)	68 (42.0%)	14 (35.9%)	
Reside on Tribal reservation				0.6 ⁴
No	48 (23.9%)	40 (24.7%)	8 (20.5%)	
Yes	153 (76.1%)	122 (75.3%)	31 (79.5%)	
Education				>0.9 ³
Some high school	22 (10.9%)	17 (10.5%)	5 (12.8%)	
High school diploma or GED	65 (32.3%)	53 (32.7%)	12 (30.8%)	
Some college (no degree)	71 (35.3%)	58 (35.8%)	13 (33.3%)	
Postsecondary degree	43 (21.4%)	34 (21.0%)	9 (23.1%)	
Employment				0.6 ⁴
Employed	119 (59.2%)	95 (58.6%)	24 (61.5%)	
Unemployed/Unable to work	45 (22.4%)	35 (21.6%)	10 (25.6%)	
Not in labor force	37 (18.4%)	32 (19.8%)	5 (12.8%)	

Note. ¹ Mean (SD); n (%); ²Welch Two Sample t-test; ³Fisher's exact test; ⁴Pearson's Chi-squared test

Commercial Tobacco Use Behaviors Among People Who Smoke

Among people who smoke (n = 39), cigarettes and electronic cigarettes (e-cigarettes) were the most used commercial tobacco products in the last 30 days. Of these participants, 26 reported exclusive cigarette use (66.7%) and 13 reported dual cigarette and e-cigarette use (33.3%). Among people who smoke, 20% of participants reported menthol cigarette use. Daily

cigarette users ($n = 23$) smoke an average of 11.4 cigarettes per day ($SD = 8.4$), with daily use ranging from 1 to 33 cigarettes.

Regarding cessation behaviors, approximately half of people who smoke ($n = 39$) expressed interest in quitting (51.3%) and reported making a 24-hour quit attempt within the past year (51.3%). The most frequently selected barriers to quitting were stress (51.2%), viewing smoking as a habit or dependence (51.2%), and enjoying how smoking feels (41%).

Commercial Tobacco Experiences Among People Who Do Not Smoke

Among people who do not smoke ($n = 162$), cigarettes and electronic cigarettes were the most reported products ever tried. Sixty-one participants reported ever trying cigarettes exclusively (37.7%), 10 reported ever trying e-cigarettes exclusively (6.2%), 60 reported ever trying both cigarettes and e-cigarettes (37.0%), and 31 reported never trying either product (19.1%). The most frequently selected reasons for not smoking were caring about one's health (75.3%), not wanting to become addicted (40.7%), and smoking being too expensive (37.0%).

Commercial Tobacco Perceptions

Table 2 presents commercial tobacco perceptions stratified by smoking group.

Cigarette Perceptions

People who smoke were more likely than people who do not smoke to believe that all-natural cigarettes had fewer negative health effects compared to standard cigarettes ($p = 0.033$). There were no group differences in perceptions of the health effects of Native-owned cigarettes between groups. People who smoke were also more likely to believe that menthol cigarettes have more negative health effects compared to standard cigarettes ($p = 0.008$). In addition, people who smoke were more aware of the menthol ban in California ($p = 0.006$).

Additional analyses compared the perceived harm of menthol cigarettes compared to standard cigarettes and awareness of the menthol ban in California between people who smoke menthol cigarettes and those who smoke non-menthol cigarettes. Fisher's exact test indicated that people who smoke menthol cigarettes were more likely to perceive menthol cigarettes as having the same health effects as standard cigarettes, whereas people who smoke non-menthol cigarettes more often viewed menthol as more harmful ($p = 0.019$). There was no statistically significant difference between these groups in awareness of the menthol ban in California.

Cultural Alignment and Community Effects of Commercial Tobacco Use

Across both smoking groups, most participants believed that smoking cigarettes does not align with their culture, with 101 participants who do not smoke (62.3%) and 20 participants who do smoke (52.6%) selecting the "does not align with my culture" statement. Regarding community impact, most participants agreed that commercial tobacco use has impacted their community's health: 140 people who do not smoke (86.4%) and 30 people who smoke (76.9%).

Table 2: Commercial tobacco perceptions by smoking group

Commercial Tobacco Perception Items	N	People who do not smoke N = 162 ¹	People who smoke N = 39 ¹	p-value
All-natural cigarettes vs standard	200			0.033 ²
Fewer negative effects		21 (13.0%)	12 (30.8%)	
Same		118 (73.3%)	24 (61.5%)	
More negative effects		22 (13.7%)	3 (7.7%)	
Native-owned cigarettes vs standard	197			0.9 ²
Fewer negative effects		26 (16.5%)	7 (17.9%)	
Same		122 (77.2%)	29 (74.4%)	
More negative effects		10 (6.3%)	3 (7.7%)	
Menthol cigarettes vs standard	199			0.008 ²
Fewer negative effects		5 (3.1%)	4 (10.3%)	
Same		84 (52.5%)	11 (28.2%)	
More negative effects		71 (44.4%)	24 (61.5%)	
Aware of menthol ban	201			0.006 ²
Yes		70 (43.2%)	28 (71.8%)	
No		70 (43.2%)	9 (23.1%)	
Unsure		22 (13.6%)	2 (5.1%)	
I believe that smoking cigarettes...	200			0.3 ³
Aligns with my culture		61 (37.7%)	18 (47.4%)	
Does not align with my culture		101 (62.3%)	20 (52.6%)	
Commercial tobacco use has impacted my community's health	201			0.2 ²
Agree		140 (86.4%)	30 (76.9%)	
Neutral		13 (8.0%)	7 (17.9%)	
Disagree		9 (5.6%)	2 (5.1%)	

Note. ¹ n (%); ²Fisher's exact test; ³Pearson's Chi-squared test

Sacred Tobacco Use and Perceptions

Figure 1 displays participants' frequency of participation in sacred tobacco practices, ranging from daily use to never. Patterns of participation differed between smoking groups, with people who smoke reporting more frequent engagement than those who do not smoke. Fisher's exact test indicated a significant difference in frequency of participation in sacred tobacco practices between smoking groups ($p = 0.002$). Examination of standardized residuals showed

that people who smoke were overrepresented in daily and weekly categories, while people who do not smoke were overrepresented in the occasional and never categories.

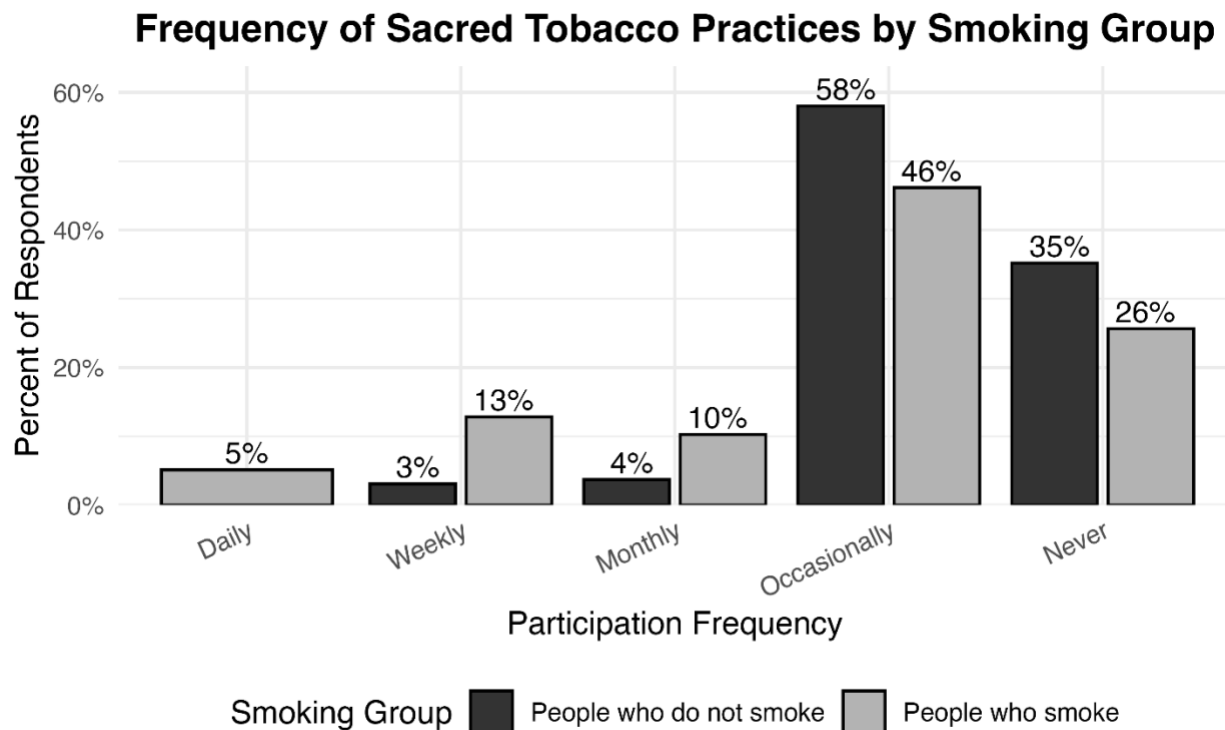


Figure 1: Frequency of participation in sacred tobacco practices by smoking group

Sacred tobacco perceptions were assessed using a four-item composite score (mean scores range 1–5). Two participants were excluded due to incomplete responses. The sacred tobacco composite demonstrated strong internal consistency (Cronbach’s $\alpha = 0.88$). Across the analytic sample ($n = 199$), the overall composite mean was 3.59 ($SD = 1.08$).

Across all four items, people who smoke reported significantly stronger sacred tobacco perceptions than people who do not smoke (all $p < 0.01$). Mean scores for both groups were highest for items reflecting the cultural meaning of sacred tobacco and the difference between tobacco types, whereas scores were lower for items relating to personal and cultural identity. The largest difference was observed for the item assessing the importance of sacred tobacco to personal identity.

The composite score revealed the same pattern: people who smoke had higher overall sacred tobacco perceptions (mean = 4.05, SD = 0.79) compared with people who do not currently smoke (mean = 3.48, SD = 1.11), as determined by Welch's t-test ($p < 0.001$). **Figure 2** displays the distribution of sacred tobacco composite scores for both groups, and **Table 3** presents the item-level means, group differences, and 95% confidence intervals.

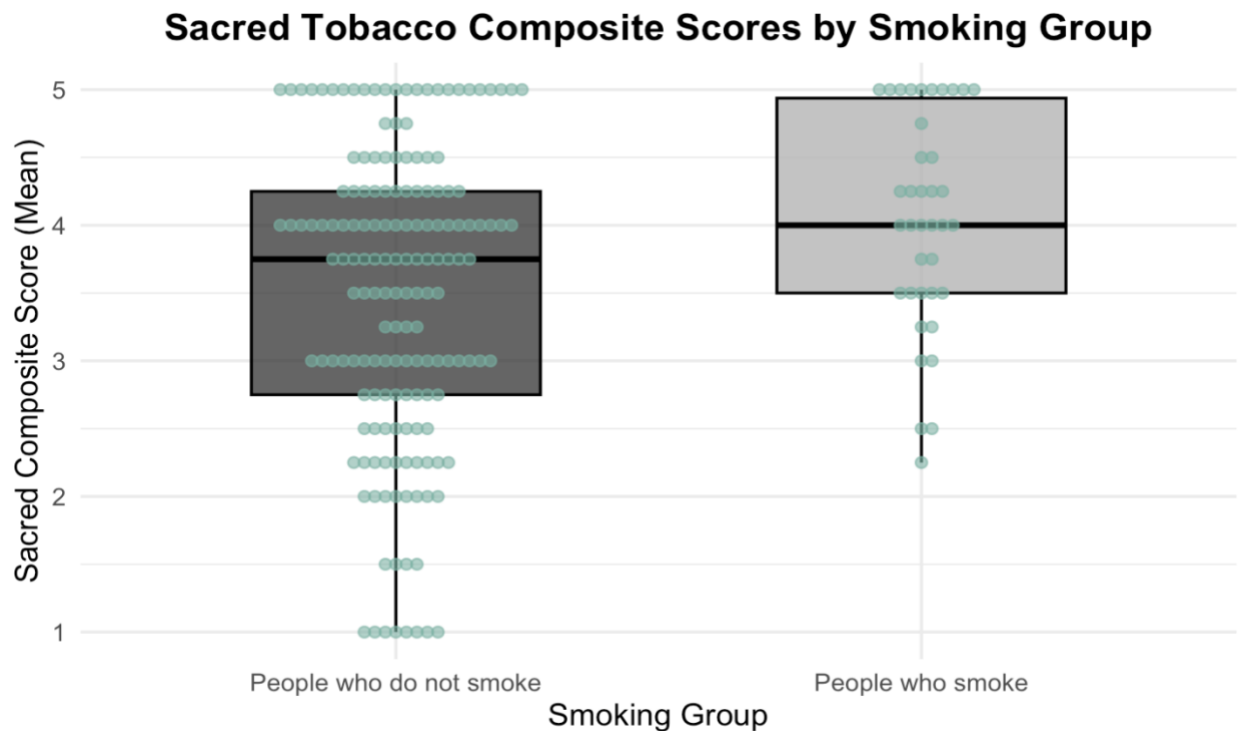


Figure 2: Distribution of sacred tobacco perception composite score means by smoking group

Table 3: Sacred tobacco perceptions by composite item, means, group differences, and 95% confidence intervals

Sacred Tobacco Perception Items	Overall N = 199 ¹	People who do not smoke N = 161 ¹	People who smoke N = 38 ¹	Difference	95% CI ²	p-value ²
Sacred Composite Mean						
Meaningful to cultural traditions	3.59 (1.08)	3.48 (1.11)	4.05 (0.79)	-0.56	-0.87, -0.25	<0.001
Difference between cigarettes and ceremony	3.99 (1.21)	3.89 (1.26)	4.39 (0.86)	-0.5	-0.84, -0.16	0.004
Important to personal identity	3.95 (1.24)	3.86 (1.28)	4.37 (0.97)	-0.51	-0.88, -0.14	0.008
Strengthens cultural identity	3.16 (1.34)	3.02 (1.36)	3.71 (1.14)	-0.69	-1.1, -0.26	0.002
	3.26 (1.26)	3.16 (1.28)	3.71 (1.06)	-0.56	-0.95, -0.16	0.007

Note. ¹Mean (SD); ²Welch Two Sample t-test

Abbreviation: CI = Confidence Interval

A multiple linear regression was conducted to examine whether smoking group was associated with sacred tobacco composite scores after adjusting for age, gender, education, employment, California Tribal affiliation, identifying as only AIAN, and residence on a Tribal reservation. After adjustment, people who smoke had significantly higher sacred tobacco composite scores than people who did not smoke ($\beta = 0.49$, 95% CI 0.10 to 0.89, $p = 0.014$). Estimated marginal means from the model indicated that the adjusted sacred tobacco composite mean was 3.98 (95% CI: 3.63 to 4.33) for people who smoke and 3.49 (95% CI: 3.32 to 3.66) for people who do not smoke.

Participants with a high school diploma or GED as their highest level of education had significantly lower sacred composite scores than those reporting “some high school” ($\beta = -0.58$, 95% CI: -1.10 to -0.05 , $p = 0.033$). No significant associations were observed for age, gender, California Tribal affiliation, identifying as only AIAN, residing on a Tribal reservation, other education levels, or employment status.

Regression assumptions were evaluated using residual plots and a Breusch-Pagan test for heteroscedasticity. Residuals were approximately normally distributed, and variance appeared constant across fitted values. The Breusch-Pagan test was not statistically significant ($\chi^2_{12} = 19.92$; $P = .069$), indicating no evidence of heteroscedasticity. Together, these diagnostics support the validity of the regression results.

Prevention and Cessation Needs

The first survey item of this block asked participants about their perceptions of culturally tailored cessation programs. Across both groups, the majority of participants perceived culturally tailored cessation programs as more effective compared to general cessation programs (71.6% of people who do not smoke and 71.8% of people who smoke).

Table 4 presents participants' selections of resources they believe would help reduce commercial tobacco use in their community, as well as perceived barriers to accessing cessation services. Among people who do not smoke, the most frequently selected resources were community education (61.7%), support groups (58.6%), and counseling or therapy (53.1%). Among people who smoke, the most frequently selected resources were nicotine replacement therapy (61.5%), support groups (53.8%), and community education (43.6%). Responses were largely similar between groups, apart from people who smoke were less likely to select community education compared to people who do not currently smoke ($p = 0.039$). Additionally, participants indicated barriers to accessing commercial tobacco cessation services. The most frequently selected barrier in both groups was a lack of awareness of resources, identified by 56.8% of people who do not smoke and 51.3% of people who smoke.

Table 4: Recommended resources to reduce commercial tobacco use and perceived barriers to accessing commercial tobacco cessation resources by smoking group

	People who do not smoke N = 162 ¹	People who smoke N = 39 ¹	p-value ²
Resources to Reduce Commercial Tobacco Use			
Counseling or therapy	86 (53.1%)	16 (41.0%)	0.2
Support groups	95 (58.6%)	21 (53.8%)	0.6
Nicotine replacement therapy	81 (50.0%)	24 (61.5%)	0.2
Community education	100 (61.7%)	17 (43.6%)	0.039
Culturally tailored cessation program	77 (47.5%)	14 (35.9%)	0.2
Barriers to Accessing Cessation Resources			
Stigma	64 (39.5%)	18 (46.2%)	0.4
Cost	69 (42.6%)	14 (35.9%)	0.4
Lack of culturally relevant programs	46 (28.4%)	10 (25.6%)	0.7
Lack of awareness of resources	92 (56.8%)	20 (51.3%)	0.5

Note. ¹ n (%); ² Pearson's Chi-squared test

Personal Health Questionnaire-2 (PHQ-2)

Depressive symptoms were assessed using the PHQ-2. Three participants did not complete PHQ-2 items, resulting in an analytic sample of 198 participants. Mean PHQ-2 scores were similar across groups: 0.83 (SD = 1.44) for people who do not smoke and 0.74 (SD = 1.27) for people who smoke. This difference was not statistically significant based on Welch's t-test. PHQ-2 scores of 3 or higher, which is a commonly used screening threshold indicating a risk of major depressive disorder, were observed in 21 participants (10.6%). Among people who do not smoke, 18 individuals (11.3%) met this threshold, and among people who smoke, 3 individuals (7.9%) met this threshold.

Table 5: PHQ-2 screening results by smoking group

	Overall	People who do not smoke	People who smoke	
PHQ-2 by Smoking Group	N = 198 ¹	N = 160 ¹	N = 38 ¹	p-value
PHQ-2 Total Score	0.81 (1.40)	0.83 (1.44)	0.74 (1.27)	0.7 ²
Risk of Major Depressive Disorder				0.8 ³
At risk (≥ 3)	21 (10.6%)	18 (11.3%)	3 (7.9%)	
Not at risk (< 3)	177 (89.4%)	142 (88.8%)	35 (92.1%)	

Note. ¹ Mean (SD); n (%); ²Welch Two Sample t-test; ³Fisher's exact test

DISCUSSION

This study examines differences between people who smoke and people who do not smoke in three domains: commercial tobacco perceptions, sacred tobacco perceptions, and prevention and cessation needs among SCAIHC-eligible adults. By explicitly distinguishing sacred tobacco from commercial tobacco, this study provides culturally grounded insight into tobacco-related beliefs within a Tribal healthcare setting.

The first aim, which hypothesized that people who smoke would hold more favorable views of commercial tobacco, was partially supported. One product-specific item aligned with the hypothesis: people who smoke were more likely to believe that all-natural cigarettes were less harmful than standard cigarettes. This perception mirrors long-standing nicotine and tobacco industry marketing strategies that frame certain cigarettes as “safer” or more “natural,” despite having comparable health risks. Research among U.S. adults who smoke found that Natural American Spirit cigarettes are consistently perceived as less harmful than other cigarette brands, despite no toxicological evidence supporting reduced risk. These perceptions decreased only when plain packaging removed such marketing cues.²⁹ For AIAN communities, these dynamics are further complicated by the prominent misappropriation of Indigenous imagery and symbolism in American Spirit marketing, which can blur distinctions between sacred and commercial tobacco.^{9–11} This finding highlights an opportunity for SCAIHC and other Tribal tobacco programs to emphasize that all commercial tobacco products, including those marketed as “natural,” carry significant health risks.

The hypothesis was not supported for Native-owned cigarettes, as both groups held similar perceptions of harm. Additionally, people who smoke perceived menthol cigarettes as more harmful than standard cigarettes. Exploratory comparisons within the smoking group

further showed that people who smoke menthol cigarettes were more likely than those who smoke non-menthol cigarettes to view menthol and standard cigarettes as having the same health effects. Because the number of participants who smoke menthol cigarettes in this sample was small, these findings should be interpreted cautiously. Future studies would be needed to determine whether product-specific use patterns, such as menthol cigarette smoking, shape harm perceptions among AIAN adults.

People who smoke were also more aware of California's menthol ban (Senate Bill 793). Awareness was notably lower among people who do not smoke, which may be related to differences in purchasing behaviors or exposure to retail environments. Another possible explanation is that Tribal Nations, as sovereign governments, may set commercial tobacco policies independent of state regulations, resulting in varied exposure to menthol products across Tribal communities. Prior research documented the widespread availability of menthol cigarettes in retailers on and near California Tribal lands before the statewide ban, which provides historical context for understanding variability in awareness of menthol-related policies.³⁰ However, these possibilities cannot be confirmed from this study, as purchasing behavior or Tribe-specific policies were not measured.

Despite group differences in perceptions of specific commercial tobacco products, people who smoke and people who do not smoke overwhelmingly agreed that commercial tobacco does not align with their culture and has impacted community health. This shared understanding reinforces the community's emphasis on cultural continuity and overall well-being. Together, these patterns of commercial tobacco use perceptions suggest opportunities for SCAIHC to address misperceptions about "all-natural" cigarettes and to improve community awareness of the menthol ban.

People who smoke reported engaging in practices involving sacred tobacco more frequently than people who do not smoke. However, since the survey did not ask participants to specify the type of tobacco used (e.g., traditionally grown tobacco or commercial cigarettes) or the context of use (e.g., ceremony, prayer, offering), the interpretation of this finding is limited. Without these details, we cannot determine whether participants were describing the use of sacred or commercial tobacco in contexts that carry cultural meaning specific to each participant. Previous research has documented that limited access to sacred tobacco may lead communities to use commercial tobacco as a substitute in certain cultural practices. Incorporating more precise measures of sacred tobacco use, such as type, source, and purpose, would improve future evaluations. It is important to acknowledge that some sacred tobacco practices are protected by Tribal Nations and may not be shared within a research setting. Thus, partnering with Tribal elders or cultural leaders and obtaining Tribal IRB approval would be essential in designing future measures.

The second aim, which hypothesized that people who smoke would hold less traditional sacred tobacco perceptions, was not supported. Instead, people who smoke had higher sacred tobacco composite scores than people who do not smoke. This unexpected finding presents an opportunity to explore how individuals understand and relate to sacred tobacco teachings within their lived experiences and values. Prior research with Midwest American Indian communities revealed that using sacred tobacco may be correlated with greater cessation behaviors among adults who smoke.³¹ However, the protective effects of sacred tobacco may diminish when inhaled, rather than when smudging (i.e., burning and wafting the smoke over a person to cleanse). These complexities underscore the importance of understanding how sacred tobacco is

used, understood, and taught, rather than assuming a uniform relationship with commercial tobacco behaviors.

The sacred tobacco composite also revealed meaningful patterns. First, items reflecting cultural meaning and tradition received higher endorsement in both groups than items related to personal identity. One possible interpretation is that sacred tobacco teachings and practices are understood as shared community knowledge rather than individually defining characteristics. While this interpretation aligns with Indigenous concepts of relationality and collective responsibility, it reflects patterns in survey responses rather than directly measured constructs and should therefore be considered cautiously.

The regression analysis further demonstrated that smoking status was independently associated with sacred tobacco perceptions after adjustment for demographic covariates. Participants who smoke had significantly higher sacred tobacco composite scores than those who do not smoke, a result that differs from the initial hypothesis and warrants deeper exploration. Although this study did not collect information on the type, source, or context of sacred tobacco use, prior qualitative work in other AIAN communities provides examples that may frame this pattern. A study in the Navajo Nation described circumstances in which commercial tobacco came to be used within ceremonial settings due to limited availability of traditionally grown sacred tobacco, the cultural protocols required to gather it, or historical shifts in practice.²¹ These accounts highlight the complex circumstances under which various forms of tobacco may be present in cultural environments and may influence how individuals learn about or relate to sacred tobacco teachings. Because the current study did not assess ceremonial participation or cultural involvement, these interpretations remain tentative and underscore the need for future research specific to the SCAIHC service area. Future research designed in partnership with

Tribal elders and cultural leaders would be essential to deepen understanding of how sacred tobacco knowledge is transmitted, practiced, and interpreted within SCAIHC communities.

The model also identified a statistically significant difference by education level, with participants whose highest education attained was a high school diploma or GED having lower sacred tobacco composite scores than those with less formal education. This association was not hypothesized in advance, and the study was not designed to examine mechanisms linking education and sacred tobacco perceptions. Thus, this finding should be interpreted with caution. Sample sizes in some education categories were relatively small, and additional research would be needed to determine whether this pattern reflects a meaningful relationship or is due to contextual factors not captured in the survey.

Recommended resources to reduce commercial tobacco use varied by smoking status. People who smoke were more likely to recommend nicotine replacement therapies and support groups, which reflect a focus on strategies that directly address nicotine addiction. Interestingly, culturally tailored cessation programs were less often selected by both groups. The perceived barriers to cessation resources offer context for this pattern: most participants identified a lack of awareness of available cessation services as a barrier, and stigma was the second most commonly reported barrier among people who smoke. These findings point to several actionable opportunities for SCAIHC. Increasing visibility of existing cessation services, through clinic-based reminders, digital outreach, or community events, may help address awareness gaps. Because people who smoke identified nicotine replacement therapy and support groups as helpful, SCAIHC could highlight these evidence-based options in program materials. Prior research suggests that peer-led approaches, such as testimonials from community members or community-based cessation activities, can reduce stigma and increase comfort with seeking

support.³² Lastly, ensuring that outreach materials clearly distinguish sacred tobacco from commercial tobacco may further enhance cultural relevance and align prevention messaging with community values and teachings.

In this study, PHQ-2 scores did not differ significantly between people who smoke and people who do not smoke. This contrasts with the well-established association between commercial tobacco use and elevated depressive symptoms among United States adults, and that higher depressive symptoms can make quitting smoking more difficult.^{28,33} The PHQ-2 is a brief screening tool and may not fully capture a range of depressive symptoms or the broader mental health contexts relevant to AIAN communities. Research has shown that standard Western mental health instruments do not always align with Indigenous concepts of health, which emphasize relational, spiritual, and community dimensions of well-being.³⁴ Additionally, prior studies have called for culturally grounded mental health assessments tailored to Indigenous peoples.³⁵ Thus, although no statistically significant differences were observed, depressive symptom burden may still be present in this population. Future studies using culturally responsive and more comprehensive assessment tools are needed to fully understand mental health in relation to commercial and sacred tobacco use.

Strengths and Limitations

This study has several strengths. First, it explicitly distinguishes between sacred and commercial tobacco, an essential but often overlooked distinction. Second, the study developed and applied a sacred tobacco perception composite with strong internal consistency. Third, the sample size represents a substantial proportion of SCAIHC's adult active user population, supporting meaningful interpretation of the findings for local programming. Additionally,

smoking rates within the sample aligned with current SCAIHC clinic data, increasing confidence that the findings reflect community patterns.

This study has several limitations that should be considered when interpreting the findings. First, using a convenience sample from a single Tribal health service area may limit generalizability beyond the SCAIHC service population. Sacred tobacco use varies across Tribal Nations, and interpretations of sacred tobacco practices were further constrained by the absence of items specifying the type or context of sacred tobacco use. Second, all responses were self-reported and may be subject to recall or social desirability bias, although anonymity likely reduced these effects. Third, some subgroups had small sample sizes, such as participants who reported menthol cigarette use, which may have limited statistical power for certain comparisons. Additionally, commercial tobacco perception items focused on cigarettes and did not assess perceptions of other commercial products, such as e-cigarettes. Because the study did not distinguish perceptions between people who exclusively smoke cigarettes and people who smoke both cigarettes and e-cigarettes, it is possible that experiences across products influenced commercial cigarette perception responses. Future work that incorporates product-specific perception measures would help clarify these patterns.

Future research could incorporate a deeper qualitative inquiry to contextualize these findings within SCAIHC Tribal communities. Further analysis of the open-ended responses and engaging in guided conversations with Tribal elders and leaders would strengthen understanding of sacred tobacco practices and help refine future survey measures. Studies might also examine how perceptions of sacred and commercial tobacco vary across generations (e.g., youth, adults, and elders) to better understand shifts in cultural knowledge. Future work can inform refinement

of SCAIHC's prevention and cessation services, as well as culturally relevant tobacco-related messaging.

CONCLUSION

This study identified key differences in commercial tobacco perceptions, sacred tobacco perceptions, and prevention and cessation needs between people who smoke and people who do not smoke within a Southern California Tribal healthcare setting. People who smoke were more likely to view all-natural cigarettes as less harmful, perceive menthol cigarettes as more harmful, and were more aware of California's menthol ban. Both groups strongly agreed that commercial tobacco does not align with their culture and has impacted community health. Contrary to the initial hypothesis, people who smoke had higher sacred tobacco composite scores, indicating stronger endorsement of sacred tobacco beliefs compared with people who do not smoke. Both groups reported limited awareness of available cessation resources.

These findings suggest several public health opportunities, including improving communication about the risks of all commercial tobacco products and awareness of available cessation resources. Additionally, increasing visibility of cessation services and tailoring education to distinguish sacred from commercial tobacco can address perceived barriers to such resources. For SCAIHC, this work offers community-specific data that can directly inform commercial tobacco prevention and cessation programming to help ensure that services reflect cultural context and community priorities. The study approach, which examines sacred and commercial tobacco within the same framework, may be useful for other Tribal Nations or Tribal health programs seeking to develop culturally relevant strategies to reduce tobacco-related inequities.

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