Limited Awareness of Alcohol-Related Cancer Risk Factors among Spanish-Preferring Adults in a National US Survey

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ABSTRACT

Background: Alcohol is a modifiable risk factor for several types of cancer, though awareness of this link is often found to be low among the US population. The current study investigated beliefs about alcohol as a cancer risk factor among Spanish-preferring Americans, specifically for different types of alcoholic beverages (e.g., beer, liquor, and wine).

Methods: We analyzed data from a national survey of US adults who prefer speaking Spanish, comparing their awareness of alcohol's link to cancer with the general population and Hispanic respondents in the Health Information National Trends Survey (HINTS) 5 Cycle 4 dataset.

Results: Awareness among Spanish-speaking adults was lower (wine: 8.2%, beer: 18.3%, and liquor: 28.4%) than all HINTS respondents (wine: 20.3%, beer: 24.9%, and liquor: 31.2%) and specifically the Hispanic HINTS respondents (wine: 18.3%, beer: 22.4%, and liquor: 32.2%). Statistically significant differences were found for wine and beer compared with the general population and for wine compared with Hispanic respondents. Higher media literacy correlated with increased awareness, particularly for beer, whereas eHealth literacy showed an inverse relationship. Recent immigrants demonstrated greater awareness than long-term residents. Gender, insurance status, cancer history, and information-seeking behaviors predicted differential awareness.

Conclusions: Awareness of the alcohol–cancer link among Spanish-preferring adults in the United States is below the national average, with factors such as media literacy, eHealth literacy, demographics, and length of US residency associated with this awareness.

Impact: The study underscores the need for culturally adapted health communication strategies to improve knowledge of alcohol as a cancer risk factor among Spanish-preferring Americans.

Introduction

Alcohol consumption has been recognized as a modifiable risk factor for different types of cancer, including breast, colorectal, oral, esophageal, larynx, and liver cancers (1–3). Globally, the impact of alcohol consumption is evident, with an estimated 741,300 new cases of cancer in 2020, accounting for 4.1% of all diagnoses, being directly attributable to this pervasive behavior (3). In the United States, 4.8% of all cancer cases were attributed to alcohol consumption annually from 2013 to 2016 (4).

Previous studies found a low level of public awareness of alcohol as a risk factor for cancer in the United States. One study found that only 38% of the US population knew of the connection between alcohol consumption and cancer (5). Other studies found similarly low levels of awareness, with 33% knowing about the alcohol–cancer link (2, 6). For example, a separate study focusing on females ages 15 to 44 found that only 25% were aware of alcohol as a cancer risk factor (7). In addition, researchers have found that few messages on social media about cancers caused by alcohol mention alcohol as a risk factor (8). Specifically, only 0.8% of more than 1 million sampled Twitter messages referenced alcohol, with the highest proportions in #livercancer (2.1%) and #oralcancer (2.0%). Alcohol-related tweets were lowest in #coloncancer (0.5%) and #esophagealcancer (0.9%). Extant studies explored general awareness about alcohol consumption as a cancer risk factor, but recent research has focused more on specific awareness of individuals about cancer as a risk factor of categories of alcoholic beverages. For instance, people tend to have less awareness about the risks of wine consumption compared with beer and liquor (9), and there is a concerning misbelief among 10.3% of adults in a national survey that wine can reduce cancer risk (2).

Existing literature on alcohol-related cancer risk awareness has predominantly relied on general population samples without an in-depth examination of historically marginalized ethnic and racial groups in the United States. Individuals who are Hispanic represent the second largest racial/ethnic group in the United States, and the proportion of Hispanics in the US population continues to increase (10). Identifying and addressing health inequities experienced by Hispanic/Latino communities continues to be a critical task for public health communication researchers and practitioners. Compared with non-Hispanic Whites, Hispanics/Latinos have higher odds of high alcohol consumption and a higher prevalence of later-stage cancer at diagnosis (11). However, the epidemiologic phenomenon called the Hispanic paradox would suggest that outcomes for Hispanics/Latinos might be more similar to non-Hispanic Whites than such disparities would suggest for other racial or ethnic groups (12). Regardless, to develop effective health promotion messages, it is necessary to understand Hispanics' awareness of the association between alcohol consumption and the risk of developing cancer and what factors are associated with their knowledge about alcohol risk.

The general public commonly seeks and receives health information through various media, interpersonal channels, and the Internet, both actively (information seeking) and passively (information

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scanning; refs. 13–15). However, disparities in Internet and healthcare access may hinder the ability to access interpersonal channels (e.g., receiving information from healthcare providers) and online resources. According to the 2020 Health Information National Trends Survey (HINTS), the uninsured rate among Hispanic respondents (13.4%) was more than twice that of the general population (5.7%), and Hispanic respondents reported lower odds of having ever used the Internet compared with non-Hispanic Whites (16, 17). Many Spanish-preferring adults may be immigrants, and their length of residence in the United States could affect their access to information and knowledge acquisition channels.

Different forms of literacy—particularly media literacy and eHealth literacy—may be positively associated with how individuals process health information and understand alcohol-related risks. Media literacy—the ability to access, decode, analyze, evaluate, and create media content—plays an important role in people's health knowledge acquisition (18–20). Individuals with stronger media literacy skills are better equipped to comprehend and critically evaluate health-related information, leading to improved awareness and understanding of health topics (19, 21–23). eHealth literacy refers to the ability to seek, find, understand, and evaluate health information from digital sources and how to apply that information to address health-related issues (24, 25). With the rapid advancement of information technology, eHealth literacy has become a key predictor of health knowledge. A study conducted during the COVID-19 pandemic found that participants with low eHealth literacy were at greater risk of having limited health knowledge about COVID-19 prevention (26). Previous studies have also found a positive association between eHealth literacy and knowledge related to cervical and colon cancers (27, 28).

The present study builds on prior work by providing a detailed assessment of alcohol-related cancer risk awareness and examining differences across beverage types (beer, wine, and liquor) among Spanish-preferring Americans. Given that public perceptions often vary by beverage type, with certain drinks like wine occasionally perceived as healthier, it is crucial to understand whether cancer risk beliefs vary in this community (2, 29). Consistent with past research (2), we also assess awareness of another alcohol–disease link (e.g., diabetes), given alcohol's status as a risk factor for multiple health conditions. Additionally, the current study aims to advance the understanding of Hispanics' awareness about the risks of various types of alcoholic beverages to cancer and how social determinants, literacy, and information consumption behavior (including information seeking and scanning) are associated with perception. The study seeks to provide nuanced insights for the design of health communication and education campaigns specifically tailored to the Hispanic, Spanish-preferring population in the United States. Specifically, we propose the following research questions:

RQ1: How aware are Spanish-preferring Americans of the cancer risks associated with different types of alcoholic beverages (beer, wine, and liquor)?

RQ2: How are social determinants, literacy, and information consumption behaviors associated with awareness of alcohol-related cancer risks among Spanish-preferring Hispanics in the United States.?

Materials and Methods

This study utilized data from a NORC/AmeriSpeak national survey that sampled adults who preferred to speak Spanish, ages 18 and above, in the United States. Participants completed the survey between July 28 and September 11, 2023. Participants were given the cash equivalent of $2 as an incentive for survey completion. The study received approval from the Institutional Review Board (IRB) and adhered to the ethical principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants at the beginning of the online survey. Only those who consented could proceed to the survey questions. The final sample included 196 individuals ages 18 to 79 (mean = 46.98 and SD = 13.40). All participants identified as Hispanic, with one thirds identifying as male, and approximately half (52.6%) had more than a high school education. NORC/AmeriSpeak also provided population weights as described below.

The final weight variable combines adjustments at three levels to ensure data representativeness. First, the AmeriSpeak panel weights adjust for each member's probability of selection, recruitment nonresponse, and alignment with population benchmarks. Then, study-specific base weights incorporate the panel weights and account for selection probabilities in the study's sample design. Finally, study-specific final weights adjust for survey nonresponse using weighting classes, followed by raking to match specific population benchmarks.

Measures
Alcohol–cancer link beliefs

The alcohol–cancer link beliefs were measured through three distinct questions, each addressing a specific alcoholic beverage type—wine, beer, and liquor—consistent with past research (2). The participants were asked to agree or disagree with the statement, "How much do you agree or disagree that drinking (wine/beer/liquor) affects your risk of cancer?" The same pattern was followed for assessing the awareness of the alcohol-related risk of diabetes, covering the same three alcoholic beverage types. Responses were rated on a five-point scale, ranging from strongly disagree to strongly agree. In our analysis, we treated the alcohol–cancer link belief as three distinct variables: wine–cancer link belief, beer–cancer link belief, and liquor–cancer link belief. Upon examination, all three variables exhibited positive skewness. To address this nonnormal distribution and facilitate further analysis, we recoded these variables into binary format by collapsing the original scale values of 4 and 5 into 1 (know) and 1, 2, and 3 into 0 (do not know).

Demographic factors

Age was determined by participants' self-reported age at the time of the survey and was treated as a continuous variable. We categorized education based on participants' highest level of educational attainment, with two categories: (i) never attended college and (ii) had at least some college education. We categorized income based on annual household income as (0) less than $30,000 or (1) $30,000 or more. The $30,000 threshold for income categorization was chosen based on the 2022 federal poverty guidelines for a family of four in the 48 contiguous states and District of Columbia, set at $31,200 (30). This figure was rounded to $30,000 to account for slight variations and to align with common income brackets used in survey research. Previous studies have also found that households with an annual income below $30,000 are more likely to experience significant difficulties affording healthcare services (31).

Structural factors

Participants were asked to disclose their health insurance status and Internet accessibility (1 = yes, 0 = no).

Skills factors

Media literacy was measured using 11 items scored on a five-point scale (18), ranging from (1) strongly disagree to (5) strongly agree, with a midpoint of (3) neither agree nor disagree (mean = 3.34, SD = 0.63, and α = 0.92). Sample items included "I manage to classify media messages based on their producers, types, purposes, and so on," "I can assess media in terms of credibility, reliability, objectivity, and currency," and "I can distinguish different functions of media (communication, entertainment, etc.)."

eHealth literacy was measured using the eHealth literacy scale (24). The scale comprises eight items, and respondents rated their agreement on a five-point scale, ranging from (1) strongly disagree to (5) strongly agree, with a midpoint of (3) neither agree nor disagree (mean = 3.32, SD = .74, and α = .93). Sample items included "I know where to find helpful health resources on the Internet," "I know what health resources are available on the Internet," and "I feel confident in using information from the Internet to make health decision."

Because the two literacy variables were not normally distributed, we dichotomized them using a cutoff point of 3.5 for regression analysis. This specific cutoff was established to balance the number of participants in each group. Scores below 3.5 were classified as "low literacy," whereas scores equal to or above 3.5 were categorized as "high literacy."

Communication factors

For cancer information seeking (32), participants were asked, "Were you actively looking for information about cancer from any of the following sources in the past 12 months?" For cancer information scanning, we used the question, "Thinking about the last 12 months, did you hear about or come across information about cancer from doctors, other people, online sources, or the media when you were NOT actively looking for it?" Participants had the following response options for both variables: "yes," "no," and "I do not recall." Responses of "yes" were recoded as 1, whereas "no" and "I don't recall" responses were recoded as 0.

Correlation tables for all variables can be found in supplementary materials (Supplementary Tables S1 and S2).

Statistical analysis

Stata Version 18 was used to perform t tests and Pearson's χ^2 tests and build the logistic regression models. T tests were used to compare awareness of the alcohol–cancer link among Spanish-preferring adults in our dataset with the general population and Hispanic respondents from the HINTS 5 Cycle 4 dataset. We also ran three logistic regression models with identical predictors (sex, age, education, income, cancer history, time spent in the United States, insurance, Internet access, media literacy, eHealth literacy, cancer information seeking, and cancer information seeking/scanning) but with different outcome variables: wine–cancer risk awareness, beer–cancer risk awareness, and liquor–cancer risk awareness.

Statement of ethics

The IRB at the University of Utah reviewed and approved this study protocol (IRB_00167501). Informed consent was obtained from all participants at the beginning of the online survey. Only those who consented could proceed to the survey.

Data availability

The dataset, Stata code, and survey instrument used in this study can be viewed and accessed here in the Open Science Framework repository.

Results

In these data, the level of awareness about alcohol consumption risk for cancer varies across different types of alcoholic beverages. Specifically, awareness was 8.2% for wine, 18.3% for beer, and 28.4% for liquor.

T test results (see **Table 1**) showed that for wine, the Spanish-preferring respondents reported significantly lower awareness (8.2%) compared with both the general population (20.3%, $t = 4.146$, $P < 0.001$) and the Hispanic respondents in HINTS (18.3%, $t = 3.306$, $P = 0.001$). Similarly, awareness of the link for beer (18.3%) was significantly lower in the Spanish-preferring group compared with the general population (24.9%, $t = 2.214$, $P = 0.027$); however, the difference was not statistically significant when compared with the Hispanic respondents in HINTS (22.4%, $t = 1.164$, $P = 0.245$). For liquor, awareness levels in the Spanish-preferring respondents (28.4%) did not significantly differ from either the general population (31.2%, $t = 0.889$, $P = 0.374$) or the Hispanic respondents in HINTS (32.2%, $t = 1.036$, $P = 0.300$).

Table 2 presents the unweighted sample sizes and corresponding weighted estimates for each group, along with Pearson's χ^2 test results. Awareness of the connection between alcohol and diabetes is related to beliefs about how each type of beverage affected cancer risk, showing a consistent pattern across all three types of alcoholic drinks.

Logistic regression results (see **Table 3**) indicate that no significant predictors of awareness about the liquor–cancer link were identified in our model.

The logistic regression analysis, focused on awareness of the beer–cancer link, indicates that individuals with higher levels of media literacy have greater awareness of the connection between beer consumption and cancer risk [adjusted OR (aOR) = 10.26; $P < 0.001$]. Conversely, people with higher eHealth literacy had lower awareness of the beer–cancer link (aOR = 0.27; $P = 0.010$).

Additionally, women had lower awareness of the risk of wine (aOR = 0.14; $P = 0.031$) than men. Further analysis of the wine–cancer link reveals that individuals with health insurance (aOR = 9.92; $P = 0.036$) and those with higher media literacy (aOR = 10.65; $P = 0.010$) are more aware of the connection. Individuals without a history of cancer (aOR = 0.10; $P = 0.008$) and those who had passively received cancer information in the past year (aOR = 0.16; $P = 0.049$) demonstrate reduced odds of knowing this link. Compared with individuals residing in the United States for less than 6 years, those who have lived in the country for 6 to 10 years (aOR = 0.05; $P = 0.046$) have lower odds of knowing the wine–cancer link.

Discussion

The current study provided insights into the awareness of alcohol-related cancer risks among Spanish-preferring adults in the United States, a historically underrepresented group in research. Our results reveal notably low baseline levels of awareness in this population, with only 8.2% aware of the risks associated with wine, 18.3% with beer, and 28.4% with liquor. Comparison analyses revealed a knowledge gap in alcohol–cancer link awareness among Spanish-preferring adults, particularly for wine risk awareness, which was markedly lower than both the general population and Hispanic respondents. Beer risk awareness among Spanish-preferring adults also fell significantly below the general population, though it did not differ significantly from Hispanic respondents to HINTS.

Table 1. Awareness of the alcohol–cancer link across different populations and *t* test results.

Alcohol type	NORC/AmeriSpeak—Spanish-preferring group	HINTS—All population			HINTS—Hispanic respondents		
	%	%	*t*	*P*	%	*t*	*P*
Wine	8.2%	20.3%	4.146	<0.001	18.3%	3.306	0.001
Beer	18.3%	24.9%	2.214	0.027	22.4%	1.164	0.245
Liquor	28.4%	31.2%	0.889	0.374	32.2%	1.036	0.300
N	196	3,679			566		

NOTE: The percentages represent the proportion of respondents in each group who were aware of the link between alcohol and cancer. The HINTS—All population subset includes all participants from the HINTS 5 Cycle 4 dataset, whereas the HINTS—Hispanic respondents subset includes only Hispanic participants from the same dataset. *t* tests compare the Spanish-preferring group with the two HINTS groups.
Abbreviation: N, unweighted sample size.

Awareness of these links is associated with several factors. Media literacy emerged as a significant predictor for beer, with individuals possessing higher media literacy being more aware of the beer–cancer link. This suggests that the ability to critically analyze and evaluate media content plays a crucial role in understanding and acknowledging the health risks associated with alcohol consumption. Previous research found that media literacy interventions can improve an individual's ability to think critically about online health information and increase cancer risk awareness and knowledge (21, 23). Hence, designing and implementing tailored media literacy interventions for Spanish-preferring adults has the potential to increase awareness of alcohol-related cancer risks, particularly when these programs are culturally adapted and linguistically appropriate, considering specific communication preferences (e.g., media channel, media format, etc.) of this population.

Conversely, higher eHealth literacy was unexpectedly associated with a lower likelihood of awareness. One possible explanation is that our study's relatively small sample size and the use of self-reported scales for media and eHealth literacy may limit the generalizability of these results. Additionally, the correlation between media literacy and eHealth literacy should be examined, as these constructs overlap or interact in ways (20) that may be associated with awareness outcomes. Specifically, these measures correlate at 0.7, meaning that when simultaneously included in the same model, we may see misleading results that are difficult to interpret. As such, we may be better served to prioritize the bivariate relationships in **Table 2** for these variables. Further research with larger samples and more objective measures of literacy is needed to replicate and expand upon our findings. It is also possible that traditional media provide more coverage about the cancer risks associated with alcohol consumption compared with social media. In this context, eHealth literacy may not translate into greater awareness if individuals primarily access health information through digital media, in which the nuances of cancer risk might not be adequately addressed. Therefore, understanding how individuals navigate different media environments and the quality of information available in those spaces could yield valuable insights into the observed discrepancies in literacy outcomes.

Females have lower odds of awareness of the wine–cancer link. In general, females in the United States account for approximately 80% of wine purchases (33). This high proportion of female wine purchasers underscores the importance of raising awareness among women, as their purchasing decisions may influence consumption patterns for all household members. Beverage preferences vary across different Hispanic communities. Individuals from Hispanic communities generally prefer beer over wine and liquor, with some notable exceptions to this consumption pattern; for example, research has found that American females with Cuban and Dominican South Central origins prefer wine (34). Given these differences in risk perceptions and consumption patterns, it is crucial to develop targeted intervention strategies. Gender- and beverage type–specific message interventions could be more effective in addressing these disparities. Specifically, it would be important to tailor and target messages based on gender and beverage preferences in different communities (e.g., delivering Spanish language educational materials about wine consumption and cancer risk in obstetrics and gynecology clinics).

New immigrants exhibit a greater likelihood of recognizing the wine–cancer link compared with individuals born in the United States or those who have resided in the United States for 6 to 10 years. This heightened awareness among new immigrants could potentially be attributed to knowledge gained in their countries of origin. In 2011, Pan American Health Organization Member States approved the Plan of Action to Reduce the Harmful Use of Alcohol, emphasizing policies on intoxicated driving, altering drinking contexts, and limiting alcohol availability (35). Countries like Peru established the National Drug Control Strategy 2017 to 2021 to promote healthy lifestyles, strengthen alcohol regulation policies, and develop preventive programs for targeted populations (36).

Our findings suggest that awareness of the liquor–cancer link is relatively dispersed and not strongly associated with specific demographic or psychosocial characteristics that we have tested. Specifically, for income, our initial approach of using the federal poverty standard to dichotomize income allowed us to examine disparities between economically vulnerable populations and others. However, this simplification might not fully capture income-related variations in health awareness. Our supplementary analyses using finer income categories (four levels: <30k, 30–60k, 60–100k, and >100k) showed no significant associations with alcohol-related cancer risk awareness (see Supplementary Table S3). Although we attempted to examine even more granular income levels, our sample size limitations prevented meaningful analysis. Future research with larger samples could better illuminate how awareness varies across different income levels and potentially identify critical income thresholds in which interventions might be most effective.

Pearson χ^2 tests found that people with higher media literacy and eHealth literacy tend to be more aware of the liquor–cancer link. Still, neither reached statistical significance at the conventional 0.05 level. Whereas media literacy and eHealth literacy may partially

Table 2. Awareness of the alcohol–cancer link among Spanish-speaking adults: percentages by beverage type.

		Wine		Beer		Liquor	
	n	% (95% CI)	P	% (95% CI)	P	% (95% CI)	P
Sex			0.470		0.017		0.112
Male	66	10.08 (3.47–25.91)		9.81 (4.35–20.63)		21.00 (10.95–36.45)	
Female	130	6.4 (3.28–12.24)		26.22 (17.65–37.09)		35.25 (25.69–46.14)	
Age			0.987		0.248		0.687
18–29	19	9.33 (3.08–24.98)		30.24 (12.66–56.47)		24.62 (8.45–53.60)	
30–44	73	8.39 (2.23–26.89)		12.59 (6.79–22.18)		23.58 (14.00–36.90)	
45–59	61	8.42 (2.34–26.06)		22.89 (11.75–39.82)		34.65 (19.57–53.61)	
60+	43	6.73 (1.65–23.69)		13.67 (5.28–31.03)		33.39 (18.88–51.92)	
Education			0.386		0.409		0.406
≤ High school graduate	93	6.27 (2.58–14.50)		20.25 (12.27–31.55)		25.65 (16.48–37.62)	
Some college ≥	103	11.14 (3.99–27.46)		15.20 (9.13–24.25)		32.62 (21.37–46.30)	
Income			0.447		0.228		0.654
Less than $30,000	100	10.34 (4.05–23.93)		22.42 (13.82–34.24)		26.45 (17.79–37.42)	
$30,000 or more	96	6.22 (2.29–15.80)		14.48 (8.12–24.50)		30.12 (18.95–44.28)	
Cancer history			0.023		0.600		0.244
Yes	18	27.80 (9.80–57.70)		23.62 (9.14–48.73)		44.39 (19.66–72.24)	
No	177	6.93 (2.96–15.39)		18.25 (12.24–26.32)		27.73 (19.93–37.16)	
Time spent in the United States			0.004		0.950		0.483
0–5 years	13	37.75 (10.15–76.49)		23.96 (6.86–57.41)		23.96 (6.86–57.40)	
6–10 years	39	2.30 (0.45–10.76)		18.62 (7.98–37.65)		26.64 (13.97–44.83)	
11–15 years	38	6.80 (2.22–19.00)		15.46 (6.07–34.08)		42.35 (21.76–65.99)	
16 or more years	105	6.57 (2.58–15.72)		19.03 (11.38–30.08)		26.10 (17.22–37.49)	
Insurance			0.035		0.873		0.682
No	56	2.59 (0.71–9.05)		19.13 (9.61–34.47)		25.93 (13.86–43.22)	
Yes	139	10.96 (5.19–21.69)		17.96 (11.47–27.00)		29.72 (20.85–40.43)	
Internet			0.040		0.173		0.883
No	24	2.00 (0.45–8.39)		30.94 (12.79–57.78)		26.87 (11.29–51.48)	
Yes	172	9.12 (4.48–17.70)		16.42 (10.90–24.00)		28.58 (20.54–38.26)	
Media literacy			0.106		0.013		0.092
Lower	98	4.91 (1.75–12.98)		12.58 (6.67–22.47)		23.29 (13.99–36.18)	
Higher	84	14.37 (5.54–32.42)		30.95 (19.85–44.79)		38.15 (26.23–51.69)	
eHealth literacy			0.124		0.880		0.084
Lower	94	4.44 (1.36–13.53)		18.18 (10.44–29.78)		22.43 (13.55–34.79)	
Higher	95	13.02 (5.33–28.46)		19.21 (11.65–30.01)		37.43 (25.41–51.24)	
Cancer information seeking			0.267		0.529		0.109
No	127	6.07 (1.96–17.29)		16.79 (10.35–26.10)		23.64 (15.75–33.89)	
Yes	69	12.78 (5.61–26.54)		21.22 (11.69–35.42)		37.90 (23.83–54.35)	
Cancer information scanning			0.066		0.672		0.335
No	115	10.51 (4.83–21.38)		19.32 (12.13–29.35)		25.13 (16.78–35.85)	
Yes	77	3.51 (1.30–9.10)		16.45 (8.71–28.90)		33.68 (20.53–49.95)	
Wine and diabetes			<0.001				
No	157	1.84 (0.70–4.73)					
Yes	36	36.74 (17.28–61.75)					
Beer and diabetes					<0.001		
No	126			5.00 (2.02–11.89)			
Yes	64			54.43 (38.48–69.51)			
Liquor and diabetes							<0.001
No	122					8.70 (3.82–18.61)	
Yes	70					67.14 (50.96–80.07)	

NOTE: P values are from Pearson χ^2 tests with weight adjustment.
Abbreviation: CI, confidence interval.

explain variations in liquor–cancer link awareness, the associations are not as pronounced or statistically significant as observed for other types of alcohol, particularly beer. Further research with larger sample sizes is necessary to confirm these associations and potentially identify other factors that might contribute to knowledge of the liquor–cancer link.

Our study found that individuals who passively received information about cancer in the past 12 months demonstrated a surprisingly lower likelihood of being aware of the link between cancer and wine consumption. This finding suggests the current communication environment might lack discussion about the specific risks of wine in relation to cancer, leading to a general lack of awareness

Table 3. Logistic regression results on awareness of the alcohol–cancer link.

Model sample size	Wine 176		Beer 173		Liquor 175	
	aOR (95% CI)	P	aOR (95% CI)	P	aOR (95% CI)	P
Sex						
Male	ref	—	ref	—	ref	—
Female	0.14 (0.02–0.84)	0.031	2.60 (1.00–6.80)	0.051	1.36 (0.58–3.19)	0.481
Age						
18–29	ref	—	ref	—	ref	—
30–44	0.86 (0.16–4.54)	0.858	0.36 (0.09–1.37)	0.132	0.93 (0.24–3.57)	0.918
45–59	1.53 (0.22–10.62)	0.667	0.63 (0.14–2.78)	0.536	2.13 (0.44–10.21)	0.343
60+	0.19 (0.01–3.33)	0.254	0.35 (0.06–1.91)	0.225	2.18 (0.40–11.76)	0.362
Education						
≤ High school graduate	ref	—	ref	—	ref	—
Some college ≥	0.95 (0.17–5.20)	0.954	0.51 (0.20–1.34)	0.172	1.29 (0.52–3.18)	0.586
Income						
Less than $30,000	ref	—	ref	—	ref	—
$30,000 or more	0.38 (0.07–1.99)	0.252	1.03 (0.34–3.11)	0.964	1.27 (0.55–2.94)	0.568
Cancer history						
Yes	ref	—	ref	—	ref	—
No	0.10 (0.02–0.55)	0.008	1.11 (0.21–5.98)	0.904	0.71(0.15–3.43)	0.673
Time spent in the United States						
0–5 years	ref	—	ref	—	ref	—
6–10 years	0.05 (0.00–0.95)	0.046	0.54 (0.06–4.61)	0.575	1.49 (0.19–11.61)	0.704
11–15 years	0.25 (0.02–3.58)	0.306	0.66 (0.08–5.10)	0.685	4.64 (0.68–31.53)	0.116
16 or more years	0.15 (0.02–1.04)	0.055	0.65 (0.10–4.38)	0.659	1.19 (0.20–7.27)	0.846
Insurance						
No	ref	—	ref	—	ref	—
Yes	9.92 (1.16–84.39)	0.036	1.33 (0.49–3.60)	0.573	0.97 (0.38–2.51)	0.951
Internet						
No	ref	—	ref	—	ref	—
Yes	8.83 (0.09–864.80)	0.350	0.45 (0.13–1.61)	0.219	0.99 (0.30–3.29)	0.980
Media literacy						
Lower	ref	—	ref	—	ref	—
Higher	10.65 (1.79–63.35)	0.010	10.26 (3.55–29.62)	0.000	2.24 (0.81–6.18)	0.119
eHealth literacy						
Lower	ref	—	ref	—	ref	—
Higher	0.52 (0.09–3.10)	0.474	0.27 (0.09–0.75)	0.013	1.24 (0.43–3.62)	0.688
Cancer information seeking						
No	ref	—	ref	—	ref	—
Yes	10.46 (0.93–117.34)	0.057	2.26 (0.60–8.51)	0.226	2.58 (0.94–7.09)	0.065
Cancer information scanning						
No	ref	—	ref	—	ref	—
Yes	0.08 (0.00–27.68)	0.049	0.47 (0.13–1.77)	0.265	0.60 (0.21–1.77)	0.353
Pseudo R^2	0.614		0.308		0.219	

Abbreviation: CI, confidence interval.

among Spanish-preferring Americans. A previous study noted (37) that Hispanics with low English proficiency prefer to receive health information from audio and visual channels (radio messages, television, family/friends, and doctors) rather than text-based media. However, a significant research gap remains in understanding how health information is communicated through Spanish language mass media channels in the United States (38). Consequently, more educational initiatives focusing on Spanish-preferring Americans through mass media and interpersonal channels are needed. It is crucial to characterize the current information environment in Spanish language media, which would involve a comprehensive analysis of how wine consumption and its relationship with cancer risk are portrayed and discussed across various Spanish

language media channels, including news outlets, social media platforms, and entertainment media. Understanding the frequency, content, and framing of these messages can also provide valuable insights into the existing gaps in information dissemination and help identify potential misconceptions or underrepresented topics.

Our findings provide preliminary insights into Spanish-preferring adults' awareness of alcohol-related cancer risks and potential influential factors. Further studies are needed to examine these relationships with larger, more representative samples, explore additional cultural and socioeconomic factors that may be associated with awareness, and develop evidence-based interventions that effectively communicate alcohol-related cancer risks

to Spanish-preferring populations. Such research would be valuable in designing culturally appropriate health communication strategies and public health campaigns to serve these historically marginalized communities better.

Limitations

The cross-sectional design limits our ability to draw causal conclusions, making it unclear whether higher media literacy leads to increased awareness of alcohol-related cancer risks or whether individuals more concerned about health risks are more likely to develop stronger media literacy skills. The reliance on self-reported data may introduce response biases, particularly social desirability bias, in which participants might overstate their awareness of health risks or media literacy abilities. The nondirectional wording "affects your risk" used to measure the alcohol–cancer link outcome variables may have led participants to interpret the items as either increasing or decreasing cancer risk, potentially affecting how participants responded to the items. Future studies should adopt the language direction response options used in a previous study (2) to account for the direction of perceptual uncertainty. Measuring media literacy and eHealth literacy using self-reported scales may not fully capture participants' actual competencies. The sample size limited the detection of subtle yet potentially meaningful participant differences. This might have caused us to overlook important but smaller effects in the relationship between predictors and risk awareness. We could not examine associations within specific Hispanic communities to investigate potential heterogeneity. This prevented us from exploring how factors such as country of origin, acculturation levels, or specific cultural practices might influence the relationships between our variables of interest among different Hispanic subgroups.

Conclusions

Using a national survey conducted with Spanish-preferring adults in the United States, the current study offers insights into the awareness of alcohol-related cancer risks among Spanish-preferring Americans. The findings highlight the need for culturally tailored and beverage-specific health communication strategies, considering Hispanic/Latino communities' diverse linguistic, cultural, and media literacy levels. Addressing these disparities in awareness is vital for effective cancer prevention and health promotion among Spanish-preferring Americans.

Authors' Disclosures

Authors' Contributions

Y. Liao: Conceptualization, formal analysis, visualization, writing–original draft. **A.J. King:** Conceptualization, data curation, supervision, project administration, writing–review and editing. **B.A. Lyons:** Methodology, writing–review and editing. **K.A. Kaphingst:** Conceptualization, funding acquisition, project administration, writing–review and editing.

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Note

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