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Knowledge of Health Conditions Associated With Sugar-Sweetened Beverage Intake Is Low Among US Hispanic Adults

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Abstract

Purpose: To examine associations between knowledge of health conditions and sugar-sweetened beverage (SSB) intake among Hispanic adults.

Design: Quantitative, cross-sectional study.

Setting: The 2015 *Estilos* survey data.

Participants: One thousand US Hispanic adults (≥ 18 years).

Measures: The outcome variable was frequency of SSB intake (regular soda, fruit drink, sports/energy drink, and sweetened coffee/tea drink). Exposure variables were knowledge of 6 SSB-related health conditions (weight gain, diabetes, dental caries, high cholesterol, heart disease, and hypertension).

Analysis: Six multinomial logistic regression models were used to estimate adjusted odds ratios for consuming SSBs ≥ 3 times/day (high intake), in relation to knowledge of SSB-related health conditions.

Results: Overall, 58% of Hispanic adults consumed SSBs ≥ 2 times/day and 36% consumed SSBs ≥ 3 times/day. Although most identified that weight gain (75%) and diabetes (76%) were related to drinking SSBs, only half identified this relation with dental caries (57%) and hypertension (41%). Even fewer identified high cholesterol (32%) and heart disease (32%) as

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Declaration of Conflicting Interests

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related. In crude analyses, SSB intake was significantly associated with knowledge of the associations between SSBs and weight gain, dental caries, and heart disease; however, after adjusting for sociodemographics and acculturation, associations were no longer significant.

Conclusions: Although SSB intake was very high, knowledge of SSB-related health conditions was low and was not related to high SSB intake among US Hispanic adults. Education efforts alone may not be adequate for Hispanic adults to change their behaviors.

Keywords

sugar-sweetened beverages; knowledge; Hispanic adults; sociodemographic characteristics

Purpose

The Hispanic population is the largest ethnic minority group in the United States. As of July 1, 2015, the Hispanic population constituted 17.6% of the total US population and 56.6 million Hispanic individuals reside in United States.¹ Understanding dietary intake patterns among US Hispanic adults is important because they experience a greater prevalence of chronic health conditions, such as obesity and diabetes, than non-Hispanic (NH) whites.²⁻⁴ As an example, based on the 2015 to 2016 National Health and Nutrition Examination Survey (NHANES), 47.0% of US Hispanic adults (aged ≥20 years) had obesity (body mass index [BMI] ≥30 kg/m²), whereas 37.9% of NH whites had obesity.⁴ According to the *2015 Health, United States* report, the prevalence of physician-diagnosed or undiagnosed diabetes (defined as fasting plasma glucose ≥126 mg/dL or a hemoglobin A1c ≥6.5% and no reported physician diagnosis) was 16.8% in Hispanic adults, while it was 9.6% in NH white adults in 2011 to 2014.²

Sugar-sweetened beverages (SSBs) are defined as “liquids that are sweetened with various forms of added sugars. These beverages include, but are not limited to, soda (regular, not sugar-free), fruitades, sports drinks, energy drinks, sweetened waters, and coffee and tea beverages with added sugars.”^{5(p95)} Frequent intake of SSBs, such as one or more times per day, is associated with adverse health consequences in adults including obesity,⁶⁻⁸ type 2 diabetes,⁸⁻¹⁰ cardiovascular disease,^{11,12} dental caries,¹³ hypertension,¹⁴ dyslipidemia,^{15,16} and asthma.¹⁷ About half (49.3%) of US adults reported consuming any SSB on a given day according to the 2011 to 2014 NHANES data, and SSB intake varies by race/ethnicity.¹⁸ For example, mean calorie intake from SSBs was significantly higher among Hispanic men (215 kcal/day) and Hispanic women (142 kcal/day) than their NH white counterparts (NH white men: 167 kcal/day and NH white women: 97 kcal/day, respectively) in 2011 to 2014.¹⁸

In addition to sociodemographic and geographical factors (eg, Census regions or states) that are related to SSB intake,¹⁸⁻²¹ other studies among US adults found that SSB intake is associated with health literacy, knowledge, perception, attitudes, and social norms related to SSBs (eg, knowing which health conditions/diseases are related to SSB intake or identifying a beverage as being sugary)²²⁻²⁷ and distrust of local tap water.²⁸ In spite of higher SSB intake and greater prevalence of chronic diseases among the Hispanic population,^{2,4,18} there is limited information on whether health-related knowledge is related to SSB intake among US Hispanic adults. Thus, the primary objectives of this study were to describe knowledge

of the association of SSB intake with specific health conditions and to assess whether this knowledge is associated with SSB intake among US Hispanic adults after controlling for sociodemographic characteristics and acculturation.

Methods

Sample and Survey Administration

This cross-sectional study used data from the *Estilos* survey administered by Porter Novelli (a public relations company) through Offerwise (a Hispanic research company) during fall 2015. The *Estilos* survey, developed by Porter Novelli, is an annual online survey of a sample of US Hispanic adults (18 years) designed to assess purchase decisions, use of technology or new media, opinions about health, sustainability, and food choices. Survey participants were selected from the QueOpinas Panel, which is the largest online US Hispanic panel with over 220 000 active panelists who are recruited nationally through both English and Spanish network television. This study was exempt from the Centers for Disease Control and Prevention (CDC) institutional review board because personally identifiable information was not included in the data provided to the CDC.

Porter Novelli determines the overall sample size ($n = 1000$ Hispanics). During October and November 2015, the *Estilos* survey was sent to a random sample of 3414 panelists (18 years). Preset quotas (caps) were set by Offerwise for age, language, acculturation, region, sex, and heritage based on US Census American Community Survey (ACS) proportions to prevent unbalanced results. Of these panelists, 256 respondents were excluded because of unfinished surveys, 27 were excluded because of straight-lined answers, 1866 did not respond, and 265 potential respondents were dismissed before entering the survey because of filled sample quotas, yielding a final analytic sample of 1000 Hispanics. The median survey completion time was about 37 minutes, and respondents could leave the survey at any time. The survey was administered in both English and Spanish. Individuals who completed the survey received 750 cash-equivalent reward points (worth about \$15). The data were weighted based on sex, age, region, household income, household size, education, census region, country of origin, and acculturation. The ACS was used to provide weighting proportions for all variables except acculturation. Acculturation proportions were set to match the overall Offerwise panel proportions (25% low, 50% medium, and 25% high acculturation) since this variable is not measured in ACS.

Outcome Variables

The outcome variable was frequency of SSB intake, which was determined by the following 4 questions: (1) “During the past month, how often did you drink REGULAR SODA or pop that contains sugar? Do NOT include diet soda”; (2) “During the past month, how often did you drink COFFEE, including lattes, and TEA, including bottled tea, that was sweetened with sugar or honey? Do not include drinks with things like Splenda or Equal”; (3) “During the past month, how often did you drink SPORTS and ENERGY drinks such as Gatorade, Red Bull, and Vitamin water?”; and (4) “During the past month, how often did you drink sweetened fruit drinks, such as Kool-aid, cranberry, lemonade, agua fresca, and Jumex? Include fruit drinks you made at home and added sugar to.” These questions are identical to

the questions used in the 2010 National Health Interview Survey Cancer Control Supplement²⁹ except the fourth question, in which 2 ethnic beverages were added to the examples. For each question, response options were none, 1 to 6 times/week, 1 time/day, 2 times/day, 3 times/day, and 4 times/day. To compute daily SSB intake, 1 to 6 times/week was changed to 0.5 times/day (3.5 times divided by 7 day/wk) and 4 times/day was changed to 4 times/day. To estimate the frequency of total daily SSB intake, the responses from 4 questions (ie, regular soda, sweetened coffee/tea drinks, sports or energy drinks, and fruit drinks) were summed. Four mutually exclusive categories (<1, 1 to <2, 2 to <3, or 3 times/day) were created for total daily SSB intake. These cutoffs were based on the SSB intake distribution of the study sample to evenly distribute the data in each category. Hispanic adults in our study had higher SSB intake than other adult population.^{20,27} As such, we used <1 time/day as the lowest group rather than 0 times/day because only 5.1% (n = 35) reported not consuming any SSBs during the past 30 days.

Exposure Variables

The key exposure variables were knowledge of 6 SSB-related health conditions determined by the following question: “Which of the following conditions do you think are related to drinking sugary drinks, such as regular sodas, fruit drinks (eg, Kool-Aid, Jumex), sports or energy drinks (eg, Gatorade, Red Bull), and sweetened teas?” Respondents were asked to select one or more health conditions: weight gain, diabetes, cavities (henceforth referred to as dental caries), high cholesterol, heart disease, and high blood pressure (henceforth referred to as hypertension). These questions were almost identical as those used in a previous study.²⁷

Covariates

We created mutually exclusive response groups for each covariate. Sociodemographic variables were age (18–24 years, 25–39 years, 40–59 years, and 60 years), sex, education level (<high school, high school, some college, and college graduate), and marital status (married/domestic partnership and not married). Not married included widowed, divorced, separated, or never married. Annual household income was categorized as <\$24 999, \$25 000–\$44 999, \$45 000–\$69 999, or \$70 000. Using self-reported weight and height data, weight status was grouped as underweight/normal weight (BMI <25 kg/m²), overweight (BMI 25 to <30 kg/m²), or having obesity (BMI ≥30 kg/m²).³⁰ Census region of residence was grouped as Northeast, Midwest, South, and West.³¹ Country of origin was grouped as Mexican and non-Mexican. Acculturation level was developed by Offerwise based on following 4 questions: years living in the United States (0–4, 5–9, 10–14, 15–19, 20 years), language spoken at home (Spanish only, Spanish mostly, Spanish and English equally, English mostly, and English only), cultural self-identification (much closer to Hispanic/Latino culture, somewhat closer to Hispanic/Latino culture, equally close to both cultures, somewhat closer to US culture, and much closer to US culture), and use of Spanish language media (Spanish media only, Spanish media mostly, equally Spanish and English media, English media mostly, and English media only). Each of 5 response options had corresponding points ranging from 1 to 5. One point indicated assimilated (or acculturated to the US/English culture) and 5 points indicated adherence to the traditional Latino/Spanish culture or unacculturated to the US/English culture). All points from the 4 questions were

added to create a composite score of acculturation, which was then grouped into 3 categories: traditional (16–20 points), bicultural (9–15 points), and assimilated (<9 points). This acculturation model was developed by Offerwise in 2011 using concepts from the market research industry, but is consistent, both in measurement and scoring, to other acculturation scales.^{32,33}

Statistical Analysis

We used χ^2 tests to examine bivariate associations between sociodemographic variables, knowledge of the SSB-related health conditions, and SSB intake. A P value of <.05 indicated statistical significance. Multinomial logistic regression analyses were used to calculate adjusted odds ratios and 95% confidence intervals for the odds of consuming SSBs among those who did not have knowledge of the SSB-related health condition versus those who did have the knowledge. Consuming SSBs <1 time/day was the reference group. Each multinomial logistic regression model included 1 health condition because of potential collinearity among the 6 health conditions and controlled for age, sex, education level, marital status, annual household income, weight status, census region of residence, country of origin, and acculturation. All statistical analyses were executed with the Statistical Analysis Software (SAS; version 9.4, SAS Institute Inc, Cary, North Carolina) and integrated proper survey procedures to account for the sample weight by using SURVEYFREQ and SURVEYLOGISTIC with WEIGHT statements.

Results

Overall, 36.5% of participants were aged 25 to 39 years old, 50.6% were male, 34.7% had less than a high school education, 60.3% were married or in domestic partnership, 28.3% had an annual household income of \$24 999 or less, 24.6% had obesity, 40.2% were living in the West, 63.9% were Mexican origin, and 50.0% were bicultural (Table 1). Overall, 87.7% of Hispanic adults reported consuming SSBs 1 time/day, 58.2% consumed SSBs 2 times/day, and 35.6% consumed SSBs 3 times/day during the past month, and SSB intake significantly varied by age and sex only (χ^2 tests, $P<.05$). For example, the proportion of Hispanic adults who consumed SSBs 3 times/day was highest among adults aged 25 to 39 years (40.6%) and males (44.1%; Table 1).

Although most Hispanic adults identified that weight gain (74.8%) and diabetes (75.7%) were related to consuming SSBs, fewer Hispanic adults identified that dental caries (57.2%), high cholesterol (31.8%), heart disease (31.9%), and hypertension (41.2%) are related to consuming SSBs. Furthermore, having knowledge of the 6 SSB-related health conditions was significantly associated with various demographic characteristics in this study (χ^2 tests, $P<.05$). For example, Hispanic adults aged 25 to 39 years old had the lowest knowledge that weight gain, high cholesterol, heart disease, or hypertension was related to SSB intake. Hispanic males had lower knowledge that weight gain or dental caries were related to SSB intake. Hispanic adults with either the lowest or highest household income categories and those living in the Northeast region had the lowest knowledge that weight gain or dental caries is related to SSB intake. Mexican descendants had lower knowledge that high cholesterol is related to SSB intake than non-Mexican descendants, and those traditionally

Latino/Hispanic had the lowest knowledge that dental caries were related to SSB intake (Table 2).

On the basis of χ^2 tests, SSB intake significantly differed among participants with versus without knowledge that weight gain, dental caries, and heart disease were associated with SSB intake ($P < .05$; Table 3). However, based on the multinomial logistic regression models, odds of consuming SSBs were not associated with knowledge of any SSB-related health conditions after controlling for covariates (ie, age, sex, education, marital status, annual household income, weight status, census region of residence, country of origin, and acculturation; Table 4).

Discussion

The current study found that 1 in 4 US Hispanic adults reported not knowing that weight gain and diabetes are related to consuming SSBs, and the majority of Hispanic adults did not know that dental caries, high cholesterol, heart disease, and hypertension are related to consuming SSBs. In our study, knowledge of SSB-related health conditions was not significantly related to SSB intake after controlling for covariates. A previous study reported that after adjusting for covariates only a lack of knowledge that heart disease is related to consuming SSBs was significantly associated with high intake of SSBs (ie, 2 times/day) among US adults.²⁷

In our study, SSB intake was very high among US Hispanic adults. For example, almost 3 of 5 (58.2%) US Hispanic adults reported consuming SSBs at least twice a day and about 1 least 3 times a day. Although a direct comparison cannot be made because of differences in survey methods (eg, in-person survey with 24-hour dietary recall vs online survey with food frequency questionnaire) and study populations, 8.6% of men and 6.4% of women consumed at least 3 or more SSBs on a given day among US adults aged 20 years based on 2011 to 2014 NHANES data.¹⁸ This high level of SSB intake among Hispanic adults is concerning given the added sugars and non-nutrient calories added to their diet. For instance, drinking three 20-ounce (591 mL) bottles of non-diet soda daily could add about 774 kcal per day, which includes 183 (0.9 cups) grams of added sugars, to a person's diet.³⁴

Somewhat similar to a previous study conducted with a US adult population,²⁷ while having knowledge of the SSB-related health conditions differed by various characteristics among Hispanic adults in the present study, there was no association between knowledge of SSB-associated health risks and high SSB intake among Hispanic adults. Our findings may suggest that knowledge of SSB-associated health risks alone might not be enough to reduce the SSB intake among Hispanic adults with high SSB intake. Further research is needed to explore facilitators and barriers of behavioral changes beyond improving health-related knowledge among US Hispanic adults. The lack of associations could be partially due to the high prevalence of chronic conditions among US Hispanic adults. For example, 47.0% of US Hispanic adults aged 20 years and older had obesity in 2015 to 2016,⁴ and 85.4% of US Hispanic adults aged 20 to 64 years had dental caries in permanent teeth and 35.7% had dental caries that were not treated in 2011 to 2012.³⁵

Other factors related to SSB intake among Hispanics may have influenced our null findings. A previous study reported that proxies of acculturation were associated with daily SSB intake among US Hispanic adults.³² For example, odds of consuming SSBs at least once per day was significantly higher among Hispanic adults who completed the interview in Spanish (vs US-born NH whites) and Hispanics who lived in the United States for 5 or more years (vs <5 years).³² Another study found that neighborhood food environment (eg, availability and advertising of SSBs) was related to SSB intake in 6 NYC neighborhoods.³⁶ Higher SSB intake neighborhoods (where a greater proportion of residents drank SSBs at least once per day) had a greater level of exposure to SSBs in the food retail stores than lower SSB intake neighborhoods.³⁶ Additionally, most residents in higher SSB intake neighborhoods were Hispanics or blacks, whereas they were white in lower SSB intake neighborhoods.³⁶

In our study, a large proportion of US Hispanic adults did not know about the adverse health consequences related to consuming SSBs. A previous study reported that low health literacy was related to higher intake of SSBs among adults residing in the rural Lower Mississippi Delta.²² Although, our study did not find an association between knowledge and SSB intake, educating Hispanic adults on health risks of high SSB intake might be important if it can be done in conjunction with efforts addressing other barriers and environmental factors that may lead to gaps between knowledge and behavior changes. Previous studies have found a positive impact of nutrition education on enhancing health knowledge or decreasing SSB intake.^{22–24,37}

Although this study used a large, nation-wide sample of Hispanic adults, there were several limitations. First, the *Estilos* survey is a cross-sectional survey, thus the directionality of association or causality cannot be determined. Second, the *Estilos* survey data are self-reported, so they might be subject to social desirability and/or recall bias. Third, study findings may not be generalizable to all US Hispanic adults because participants were randomly selected from an online panel, although the data were weighted to be similar to the distribution from the US Census ACS. Finally, the amount of SSB intake cannot be determined because SSB intake was measured in frequency rather than volume of intake.

In conclusion, 1 in 4 US Hispanic adults reported not knowing that SSB intake was related to weight gain and diabetes. Additionally, the majority of Hispanic adults did not know that drinking SSB is related to dental caries, high cholesterol, heart disease, or hypertension, and knowledge significantly differed by certain sociodemographic characteristics. The findings that knowledge of SSB-related health conditions was not related to high SSB intake among US Hispanic adults suggests that knowledge alone as an aspect of health literacy might not be associated with reported SSB intake. Improving health education regarding the possible adverse effects of high SSB intake may be necessary but insufficient as a lone approach to lower SSB intake among US Hispanic adults. Exploring what type of knowledge or health literacy may impact SSB intake in US Hispanic adults could help with designing interventions to decrease their SSB intake and lower their chronic disease risk.

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SO WHAT?**Implications for Health Promotion Practitioners and Researchers****What Is Already Known on This Topic?**

SSB intake is associated with health literacy, knowledge, perception, attitudes, social norms, and distrust of local tap water among US adults. However, despite higher SSB intake and prevalence of chronic diseases among Hispanic population, there is limited information on whether health-related knowledge is related to SSB intake among US Hispanic adults

What Does This Article Add?

About 1 in 4 US Hispanic adults reported not knowing that SSB intake was related to weight gain and diabetes. The majority of Hispanic adults did not know that drinking SSB was related to dental caries, high cholesterol, heart disease, or hypertension. However, after adjustment for covariates, knowledge related to SSB intake was not associated with high SSB intake (3 times/day) among US Hispanic adults

What Are the Implications for Health Promotion Practice or Research?

Our findings that knowledge of SSB-related health conditions was not related to high SSB intake among US Hispanic adults suggest that knowledge alone might not be associated with reported SSB intake. Exploring what type of knowledge or health literacy may impact SSB intake in US Hispanic adults could help with designing intervention to decrease their SSB intake

Table 1.

Respondent Characteristics and Their Associations With Sugar-Sweetened Beverage (SSB)^a Intake Among US Hispanic Adults Participating in the *Estilos* Survey, 2015.^b

Characteristic	SSB Intake During the Past 30 Days, % ± SE					P Value ^c
	All, % ± SE	<1 time/day	1 to <2 times/day	2 to <3 times/day	3 times/day	
Total sample (n = 1000)	100	12.3 ± 2.0	29.4 ± 2.7	22.6 ± 2.5	35.6 ± 2.8	
Age						.008
18–24 years	17.8 ± 2.1	10.2 ± 4.2	35.7 ± 6.5	21.6 ± 4.3	32.6 ± 5.5	
25–39 years	36.5 ± 2.9	5.8 ± 2.4	26.1 ± 4.0	27.4 ± 5.1	40.6 ± 5.1	
40–59 years	33.4 ± 2.6	14.2 ± 3.2	27.1 ± 4.1	19.4 ± 3.1	39.2 ± 4.6	
60 years	12.2 ± 2.2	29.7 ± 8.8	36.6 ± 10.3	18.4 ± 7.1	15.2 ± 6.2	
Sex						.02
Male	50.6 ± 2.9	9.2 ± 2.7	26.9 ± 4.1	19.8 ± 2.9	44.1 ± 4.4	
Female	49.4 ± 2.9	15.5 ± 2.8	32.0 ± 3.5	25.5 ± 3.9	26.9 ± 3.3	
Education level						.58
<High school	34.7 ± 3.0	9.3 ± 3.6	29.2 ± 4.9	25.5 ± 5.5	36.0 ± 5.1	
High school graduate	27.2 ± 2.7	13.1 ± 3.6	32.6 ± 5.4	22.6 ± 4.1	31.6 ± 5.9	
Some college	17.6 ± 1.9	19.8 ± 5.4	31.2 ± 5.1	17.0 ± 3.6	32.0 ± 5.0	
College graduate	20.5 ± 2.2	9.9 ± 2.9	24.1 ± 5.9	22.7 ± 4.1	43.4 ± 5.9	
Marital status						.82
Married/domestic partnership	60.3 ± 2.9	12.6 ± 2.4	27.5 ± 3.1	24.0 ± 3.3	35.9 ± 3.5	
Not married ^d	39.7 ± 2.9	11.9 ± 3.3	32.4 ± 4.9	20.6 ± 3.6	35.2 ± 4.6	
Annual household income						.21
\$24 999	28.3 ± 2.3	8.6 ± 2.9	26.9 ± 3.2	24.0 ± 3.4	40.5 ± 4.1	
\$25 000–\$44 999	25.9 ± 2.6	14.2 ± 4.0	32.9 ± 5.5	28.0 ± 5.4	25.0 ± 4.5	
\$45 000–\$69 999	18.3 ± 2.4	12.4 ± 4.5	33.1 ± 6.9	25.7 ± 7.7	28.9 ± 6.1	
\$70 000	27.5 ± 2.9	14.4 ± 4.3	26.4 ± 6.1	14.2 ± 3.3	45.1 ± 6.6	
Weight status ^e (n = 964)						.53
Underweight/normal weight	42.2 ± 3.0	10.6 ± 2.5	27.2 ± 4.0	24.0 ± 4.4	38.2 ± 4.9	
Overweight	33.2 ± 2.8	17.5 ± 4.4	32.7 ± 5.2	19.1 ± 3.0	30.7 ± 4.5	
Obese	24.6 ± 2.4	9.5 ± 3.2	30.8 ± 5.0	22.2 ± 5.3	37.5 ± 5.2	
Census region of residence						.18
Northeast	14.0 ± 1.7	8.9 ± 3.2	18.1 ± 4.6	16.3 ± 3.6	56.6 ± 6.1	
Midwest	9.2 ± 1.6	15.9 ± 6.9	30.4 ± 8.3	27.2 ± 7.9	26.5 ± 7.4	
South	36.7 ± 3.0	11.4 ± 3.6	32.6 ± 5.2	20.8 ± 4.7	35.2 ± 5.5	
West	40.2 ± 2.8	13.5 ± 3.0	30.3 ± 4.0	25.4 ± 3.8	30.7 ± 3.8	
Country of origin						.27
Mexican	63.9 ± 2.8	13.3 ± 2.7	30.1 ± 3.3	24.7 ± 3.5	31.9 ± 3.5	
Non-Mexican	36.1 ± 2.6	10.6 ± 2.5	28.2 ± 4.6	19.0 ± 2.8	42.2 ± 4.6	
Acculturation level ^f						.06
Traditional	25.0 ± 2.4	9.6 ± 4.1	31.4 ± 4.8	26.7 ± 4.3	32.3 ± 4.9	

Characteristic	SSB Intake During the Past 30 Days, % ± SE					P Value ^c
	All, % ± SE	<1 time/day	1 to <2 times/day	2 to <3 times/day	3 times/day	
Bicultural	50.0 ± 2.9	8.2 ± 1.8	28.3 ± 3.6	24.0 ± 3.6	39.5 ± 3.7	
Assimilated	25.0 ± 2.9	23.3 ± 5.5	29.8 ± 6.4	15.8 ± 5.1	31.0 ± 7.1	

Abbreviations: BMI, body mass index; SSB, sugar-sweetened beverage.

^aFrequency of SSB intake was calculated by adding 4 types of SSBs (ie, regular soda, fruit drink, sports/energy drink, and sweetened coffee/tea drink).

^bWeighted percentage may not add up to 100% because of rounding.

^c χ^2 tests were used for each variable to examine differences across categories.

^dWidowed, divorced, separated, or never married.

^eBased on BMI (kg/m²): underweight/normal weight, BMI <25; overweight, BMI 25 to <30; Obese, BMI ≥ 30.

^fBased on years living in the United States, language spoken at home, cultural self-identification, and use of Spanish language media.

Table 2.

Respondent Characteristics by Knowledge of Health Conditions Related to Sugar-Sweetened Beverage (SSB) Intake^a Among US Hispanic Adults Participating in the *Estilos* Survey, 2015.^b

Characteristic	Knowledge of Health Conditions Related to SSB Intake (Answering Yes), % ± SE ^c					
	Weight Gain	Diabetes	Dental Caries	High Cholesterol	Heart Disease	Hypertension
Total sample (n = 1000)	74.8 ± 2.6	75.7 ± 2.7	57.2 ± 3.0	31.8 ± 2.7	31.9 ± 2.7	41.2 ± 2.9
Age						
18–24 years	75.8 ± 5.0 ^d	71.9 ± 6.6	61.8 ± 5.8	38.4 ± 5.9 ^d	30.8 ± 6.2 ^d	42.3 ± 6.0 ^d
25–39 years	66.4 ± 5.2 ^d	73.6 ± 5.1	49.7 ± 5.2	22.5 ± 3.6 ^d	21.8 ± 3.5 ^d	31.0 ± 4.5 ^d
40–59 years	83.2 ± 3.2 ^d	79.7 ± 3.8	62.4 ± 4.5	31.7 ± 4.3 ^d	41.8 ± 4.5 ^d	48.2 ± 4.6 ^d
60 years	75.9 ± 8.1 ^d	76.9 ± 7.5	59.0 ± 9.5	50.1 ± 10.0 ^d	36.7 ± 10.2 ^d	50.6 ± 10.0 ^d
Sex						
Male	63.7 ± 4.4 ^d	71.9 ± 4.1	47.1 ± 4.4 ^d	34.6 ± 4.1	31.6 ± 4.1	41.4 ± 4.2
Female	86.3 ± 2.2 ^d	79.7 ± 3.6	67.6 ± 3.9 ^d	28.9 ± 3.4	32.2 ± 3.5	40.9 ± 3.9
Education level						
<High school	78.5 ± 4.1	74.5 ± 5.5	55.9 ± 5.6	38.5 ± 5.3	36.4 ± 5.4	50.5 ± 5.6
High school graduate	75.5 ± 5.8	79.0 ± 4.5	56.9 ± 6.0	26.8 ± 4.6	28.0 ± 4.7	33.4 ± 5.0
Some college	79.8 ± 4.9	78.6 ± 4.4	67.4 ± 5.3	29.1 ± 4.9	30.2 ± 4.5	38.6 ± 5.0
College graduate	63.5 ± 5.9	70.9 ± 6.0	51.3 ± 5.9	29.4 ± 5.8	30.9 ± 6.0	37.9 ± 6.1
Marital status						
Married/domestic partnership	77.5 ± 3.2	79.3 ± 3.1	55.8 ± 3.7	31.1 ± 3.3	30.3 ± 3.2	37.8 ± 3.5
Not married ^e	70.8 ± 4.6	70.3 ± 4.9	59.4 ± 4.8	32.7 ± 4.6	34.3 ± 4.8	46.2 ± 4.9
Annual household income						
\$24 999	68.6 ± 4.1 ^d	76.9 ± 3.2	51.4 ± 4.1 ^d	33.5 ± 3.8	37.0 ± 4.0	46.2 ± 4.1
\$25 000–\$44 999	82.2 ± 3.7 ^d	79.6 ± 5.2	72.8 ± 4.6 ^d	34.4 ± 5.3	31.3 ± 5.4	42.7 ± 5.7
\$45 000–\$69 999	87.9 ± 3.4 ^d	72.9 ± 8.0	53.4 ± 7.6 ^d	24.1 ± 5.7	32.0 ± 6.7	38.0 ± 7.0
\$70 000	65.6 ± 6.8 ^d	72.8 ± 5.9	51.1 ± 6.6 ^d	32.7 ± 6.2	27.2 ± 5.8	36.7 ± 6.3
Weight status (n = 964) ^f						
Underweight/normal weight	69.6 ± 4.8	71.7 ± 5.0	55.2 ± 5.0	26.7 ± 4.0	29.1 ± 4.1	34.5 ± 4.2
Overweight	80.6 ± 4.0	79.2 ± 4.0	59.7 ± 5.0	36.9 ± 5.2	39.4 ± 5.2	47.2 ± 5.1
Obese	77.4 ± 4.4	80.3 ± 4.4	59.6 ± 5.4	35.4 ± 5.1	29.6 ± 4.7	47.1 ± 5.6
Census region of residence						
Northeast	64.4 ± 6.2 ^d	72.3 ± 5.7	43.0 ± 6.1 ^d	35.2 ± 6.4	34.6 ± 6.1	39.2 ± 6.4
Midwest	82.9 ± 5.3 ^d	77.4 ± 6.6	77.6 ± 6.1 ^d	42.8 ± 9.2	41.5 ± 9.1	53.5 ± 8.7
South	68.9 ± 5.6 ^d	75.0 ± 5.4	51.6 ± 5.7 ^d	31.7 ± 5.1	29.2 ± 4.9	39.8 ± 5.4
West	82.1 ± 2.7 ^d	77.2 ± 3.9	62.7 ± 4.0 ^d	28.2 ± 3.4	31.3 ± 4.0	40.2 ± 4.1
Country of origin						

Characteristic	Knowledge of Health Conditions Related to SSB Intake (Answering Yes), % ± SE ^c					
	Weight Gain	Diabetes	Dental Caries	High Cholesterol	Heart Disease	Hypertension
Mexican	78.5 ± 3.3	78.5 ± 3.4	61.1 ± 3.9	27.6 ± 3.2 ^d	29.7 ± 3.3	40.5 ± 3.6
Non-Mexican	68.4 ± 4.4	70.7 ± 4.4	50.3 ± 4.6	39.2 ± 4.6 ^d	35.7 ± 4.6	42.4 ± 4.7
Acculturation level ^g						
Traditional	69.2 ± 5.1	79.3 ± 3.7	43.6 ± 5.1 ^d	29.6 ± 4.9	31.9 ± 4.8	36.7 ± 5.0
Bicultural	78.1 ± 2.8	74.9 ± 3.8	60.2 ± 3.9 ^d	33.7 ± 3.8	34.5 ± 3.8	45.8 ± 3.9
Assimilated	73.9 ± 7.2	73.9 ± 6.8	64.9 ± 7.2 ^d	30.1 ± 5.7	26.7 ± 6.0	36.3 ± 6.6

Abbreviations: BMI, body mass index; SSB, sugar-sweetened beverage.

^aDetermined by the question, “Which of the following conditions do you think are related to drinking sugary drinks, such as regular sodas, fruit drinks (eg, Kool-Aid, lemonade), sports or energy drinks (eg, Gatorade, Red Bull), and sweetened teas?”

^bWeighted percentage may not add up to 100% because of rounding.

^c χ^2 tests were used for each variable to examine differences across categories. Although both responses (yes/no) of SSB-related knowledge were included in χ^2 tests, the percentage answering yes are only presented in the Table 2.

^dP < .05 based on χ^2 test.

^eWidowed, divorced, separated, or never married.

^fBased on BMI (kg/m²): underweight/normal weight, BMI <25; overweight, BMI 25 to <30; Obese, BMI ≥ 30.

^gBased on years living in the United States, language spoken at home, cultural self-identification, and use of Spanish language media.

Table 3.

Bivariate Associations Between Sugar-Sweetened Beverage (SSB) Intake and Knowledge of Health Conditions Related to SSB Intake Among US Hispanic Adults Participating in the *Estilos* Survey, 2015.^a

Knowledge of Health Conditions Related to SSB Intake ^b	SSB Intake During the Past 30 Day, ^c % ± SE ^d				P Value ^e
	<1 time/day	1 to <2 times/day	2 to <3 times/day	3 times/day	
Weight gain					.03
Yes	13.2 ± 2.2	32.5 ± 3.2	23.4 ± 3.0	30.9 ± 2.9	
No	9.6 ± 4.1	20.3 ± 4.1	20.3 ± 4.2	49.8 ± 6.2	
Diabetes					.41
Yes	13.9 ± 2.3	30.4 ± 3.0	21.2 ± 2.5	34.4 ± 3.1	
No	7.2 ± 3.3	26.5 ± 5.8	27.0 ± 6.5	39.3 ± 6.3	
Dental caries					.03
Yes	14.5 ± 2.5	34.8 ± 3.8	20.8 ± 2.9	29.9 ± 3.2	
No	9.4 ± 3.1	22.3 ± 3.4	25.1 ± 4.2	43.2 ± 4.8	
High cholesterol					.14
Yes	15.5 ± 3.8	31.2 ± 5.0	15.1 ± 2.6	38.2 ± 4.8	
No	10.8 ± 2.2	28.6 ± 3.1	26.1 ± 3.3	34.4 ± 3.5	
Heart disease					.04
Yes	12.3 ± 2.9	38.6 ± 5.4	16.3 ± 2.6	32.8 ± 4.6	
No	12.3 ± 2.5	25.2 ± 2.8	25.6 ± 3.3	36.9 ± 3.5	
Hypertension					.98
Yes	13.0 ± 2.9	30.0 ± 4.3	22.7 ± 3.7	34.4 ± 4.0	
No	11.9 ± 2.7	29.1 ± 3.4	22.6 ± 3.3	36.4 ± 3.9	

Abbreviation: SSB, sugar-sweetened beverage.

^an = 1000.

^bDetermined by the question, “Which of the following conditions do you think are related to drinking sugary drinks, such as regular sodas, fruit drinks (eg, Kool-Aid, lemonade), sports or energy drinks (eg, Gatorade, Red Bull), and sweetened teas?”

^cSSB intake was calculated by adding 4 types of SSBs (ie, regular soda, fruit drink, sports/energy drink, and sweetened coffee/tea drink).

^dWeighted percentage may not add up to 100% because of rounding.

^e χ^2 tests were used for each variable to examine differences across categories.

Table 4.

Adjusted Odds Ratios and 95% Confidence Intervals for Frequency of Sugar-Sweetened Beverage (SSB) Intake by Knowledge of Health Conditions Related to SSB Intake Among US Hispanic Adults Participating in the *Estilos* Survey, 2015.^a

Knowledge of Health Conditions Related to SSB Intake ^b	SSB Intake During the Past 30 Day ^c Adjusted Odds Ratios (95% Confidence Interval) ^d		
	1 to <2 times/day	2 to <3 times/day	3 times/day
Weight gain			
Yes	Reference	Reference	Reference
No	0.72 (0.25–2.04)	1.17 (0.42–3.29)	1.52 (0.57–4.07)
Diabetes			
Yes	Reference	Reference	Reference
No	1.67 (0.53–5.26)	2.66 (0.84–8.47)	2.02 (0.64–6.39)
Dental caries			
Yes	Reference	Reference	Reference
No	0.89 (0.40–2.02)	1.90 (0.85–4.25)	1.72 (0.77–3.86)
High cholesterol			
Yes	Reference	Reference	Reference
No	1.31 (0.56–3.05)	2.24 (0.95–5.28)	1.18 (0.51–2.71)
Heart disease			
Yes	Reference	Reference	Reference
No	0.63 (0.29–1.37)	1.47 (0.70–3.10)	1.16 (0.55–2.45)
Hypertension			
Yes	Reference	Reference	Reference
No	1.14 (0.47–2.75)	1.06 (0.43–2.63)	1.21 (0.51–2.86)

Abbreviation: SSB, sugar-sweetened beverage.

^a n = 964.

^b Determined by the question, “Which of the following conditions do you think are related to drinking sugary drinks, such as regular sodas, fruit drinks (eg, Kool-Aid, lemonade), sports or energy drinks (eg, Gatorade, Red Bull), and sweetened teas?”

^c SSB intake was calculated by adding 4 types of SSBs (ie, regular soda, fruit drink, sports/energy drink, and sweetened coffee/tea drink).

^d The outcome variable was SSB intake, and the exposure variables were knowledge of SSB-related health conditions. The reference category was SSB intake of <1 time/day. Because of potential collinearity issues among 6 exposure variables, 6 multinomial logistic regression models were fitted to include each exposure variable separately and controlled for age, sex, education level, marital status, annual household income, weight status, census region of residence, country of origin, and acculturation.