The reliability and validity of the Brief Sensation Seeking Scale (BSSS-8) with young adult Latino workers: implications for tobacco and alcohol disparity research

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Abstract

Aim—This study investigated the reliability and validity of the Brief Sensation Seeking Scale (BSSS-8) in both English and Spanish with Latinos, the fastest-growing minority group in the United States, and the correlation between sensation seeking and tobacco and alcohol use.

Design—Cross-sectional survey, computer-assisted telephone interviews (CATI).

Setting—Dallas and Houston, Texas.

Participants—A total of 789 Latinos participated in this study. Participants were currently in the work-force, not enrolled in college, and between the ages of 18 and 30 years.

Measurements—Participants completed a self-report questionnaire (in either English or Spanish) consisting of items measuring tobacco and alcohol use as well as the eight-item Brief Sensation Seeking Scale.

Findings and conclusions—For English-speaking Latino participants, the BSSS factor structure was second-order unidimensional and correlated positively with life-time cigarette use, intention to smoke in the future and amount and frequency of alcohol consumption. For Spanish-speaking Latino participants, a four-subfactor solution for the BSSS provided the best fit to the data although correlations between the four subscales and cigarette use were small.

Keywords

Alcohol use; Latino; risk factor; sensation seeking; tobacco use

INTRODUCTION

Latinos are the fastest-growing cultural group, and have recently surpassed African Americans in number to become the second-largest racial/ethnic segment of the population in the United States (after non-Hispanic whites). At their current rate of growth, Latinos are projected to compose nearly one-quarter of the total US population by around the middle of the 21st century [1,2]. According to the US Department of the Census, in 2002 the number of Latinos rose to

38.7 million (about 13.4% of the population), a 72% increase from the 1990 US Census [3]. The Latino growth rate has placed enormous pressure on health officials to identify and assess this population's health needs, and provide effective disease prevention and treatment services.

Given the large number of Latinos and their generally low economic and educational levels, which are linked to tobacco and other substance abuse, and barriers to adequate treatment, there should be an abundance of data about their use of alcohol, tobacco and other drugs. Unfortunately, very few studies, especially useful health-related studies, exist on this population [2,4,5]. After four decades, the literature reveals that most Latino mental health problems have not been studied thoroughly, and what literature does exist is inconsistent [2]. In addition to poor-quality studies, it is clear that only a small percentage of studies of health have focused on Latinos [4]. The purpose of this study is to help close this gap in the knowledge base about Latino health—specifically, the use of tobacco and alcohol by Latinos and the correlation of this use with sensation seeking. Recently, researchers have used sensation seeking successfully as a targeting variable for substance use media interventions [6–8]. Sensation seeking was also used as one of several targeting variables in the National Youth Anti-Drug Media Campaign [9]. However, these interventions focused largely upon adolescents, and there were far less Spanish-language messages used than English-language messages. Consequently, knowledge of the role of sensation seeking in substance use by Latino young adults is limited. This study addresses this knowledge gap, beginning by providing background on the measurement of sensation seeking.

Sensation seeking and substance use

Sensation seeking is a psychobiological personality trait used widely to document individuals' need for novelty, complexity and intensity [10–12]. Sensation seeking is a robust predictor of thrill-seeking activities such as bungee jumping, parachuting, hang-gliding, rock-climbing, fast and risky driving (including driving while intoxicated), gambling and attending X-rated movies and horror films [11–14]. Additionally, sensation seeking is associated with a wide array of thrill-seeking activities often defined as problem behaviors [8,12], including sexual risk-taking [15], unprotected sex [16,17], alcohol use [18], tobacco use [19,20] and drug use [21–24]. Such thrill-seeking experiences activate the release of dopamine and, along with serotonin and norepinephrine, provide the chemical reward that produces a positive emotional response among high sensation seekers. For sensation seekers, participating in these thrill-seeking activities elicits a 'transient and rapid surge' of dopamine and 'points to an enhanced functioning of the mesolim-bic DA (dopamine) reward pathway in the brain of high novelty responders' ([25], p. 227).

Zuckerman's Sensation Seeking Scale Form V is used widely as a self-report measure of sensation seeking [26]. However, the measure has received criticism for its unreliability, length, colloquialisms and forced-choice response format [27], thereby prompting others to develop self-report alternatives [10,28–30]. Among the new measures is the Brief Sensation Seeking Scale (BSSS) which is available both as an eight-item, the BSSS-8 [31], and a four-item measure, the BSSS-4 [30]. Unlike other scales, the BSSS scales retain the conceptualization advanced by Zuckerman [11] that sensation seeking is comprised of four components—thrill and adventure seeking, experience seeking, disinhibition and boredom susceptibility. The BSSS-8 includes two items for each component while the BSSS-4 retains only one per sub-scale. Stephenson and colleagues [30] released the shorter four-item measure so that it could be included in large nation-wide surveys which cannot typically include lengthy measures. For example, the BSSS-4 was used in the National Survey of Parents and Youth (NSPY) as part of the evaluation of the National Youth Anti-Drug Media Campaign [9].

Extensive psychometric analyses of both versions of the BSSS show that the measures are both reliable and valid predictors of variables in the nomological network of adolescent substance

use. The BSSS-8, analyzed with data from 7000 13–17-year-old adolescents, evidenced solid psychometric characteristics that held up across sex, age and the limited number of ethnic/ racial categories considered. Moreover, correlations between BSSS-8 scores and drug-related outcomes were robust for all major categories of licit and illicit substances as well as commonly identified risk and protective factors [31]. The shorter BSSS-4 performed equally well with a different sample of 5000 adolescents of similar age [30].

Rationale for this study

Noticeably absent from existing research on the BSSS-8 and BSSS-4 is its performance with (i) older teens and young adults; and (ii) individuals of Hispanic, Latino or Mexican descent. For substance use researchers, this is problematic for three reasons. First, this demographic is the most rapidly growing and largest minority group in the United States [32]. Secondly, illicit substance use of crack, heroin, methamphetamines and Rohypnol by 17- and 18-year-olds (in 12th grade) is highest among His-panics and Latinos, a trend that extends down to 8th grade, where drug use by Hispanics/Latinos is highest among all drug categories except amphetamines [33]. Similarly, binge drinking and heavy alcohol use is generally higher among young adults who are Mexican Ameri-can than young adults who are African American or Caucasian [34–36]. Thirdly, the role of sensation seeking in tobacco use among Hispanics living in the United States is largely unexplored. Although some research explores sensation seeking as measured by other scales among young adults living in Spain (e.g. [26,37]), the Hispanic cultures in the United States and Spain vary considerably and warrant further exploration.

There exists ample evidence that young adult Latinos engage in high-risk behaviors, including tobacco and alcohol use and risky sexual activities [38,39]. The missing element, however, is the connection between such risky behaviors and sensation seeking [30] as well as the overall lack of knowledge on the psychometric properties of the BSSS with non-adolescent, non-Caucasian participants. These missing elements serve as motivations for the existing research —a validation of the BSSS-8 with Latino young adults.

METHOD

The data on which this evaluation is based were generated from a larger investigation on the prevention of tobacco use by high-risk young Latino workers between the ages of 18 and 30. Enrollment in college was an exclusionary factor. Instead, in this study, participants had to be employed in one of two inner-city districts in Texas: the East End District (EED) in Houston and the Southwest (SW) District in Dallas. The populations of these two districts are very similar in age, migration status and acculturation. According to the Bureau of Census, Houston's EED is composed of five zip-code areas, with a population of 154 000. The proportion of Latinos in these zip codes ranges from 75% to 96%. Dallas's SW District includes four zip codes with a population of 125 000, 75% or more of Latino origin. In both communities, the Latino population is almost entirely Mexican American.

Procedures

The survey questionnaire was pre-tested with 82 participants (42 in Houston and 40 in Dallas) in order to modify long or confusing questions and keep interview length under 20 minutes. For the main study, computer-assisted telephone interviews (CATI) were conducted with 789 individuals ($n = 396$ in Houston and $n = 393$ in Dallas) between October 2005 and January 2006. Using specific census tracts in the two cities, samples were generated using Hispanic surname in the targeted areas. Researchers estimated the number of individuals needed to achieve the desired number of completes using incidence rates for each census tract in the area.

Interviewers first verified that they had contacted a private residence. Then, interviewers selected randomly one adult household member between the ages of 18 and 30 years to be interviewed. Participants answered 107 questions about their general health, tobacco use, cessation, second-hand smoke, risk perception and social influences, media exposure and sensation seeking. Participants were given the option to answer the survey in English or Spanish. The average interview length was 19 minutes. Participants were informed that their responses were confidential and any identifying information (e.g. the telephone number) was removed from the final data set for analysis.

Interviewers made up to 10 attempts to reach each selected phone number or until a final disposition code (e.g. completed interview, disconnected/non-working number, etc.) was assigned. The 10 attempts occurred on no fewer than five calling occasions, each consisting of no more than three attempts at least 1 hour apart. Further, the 10 attempts involved at least three weekday calls, three week-night calls and three weekend calls. The calling periods for data collection were 8:30 a.m.–5:00 p.m. weekdays, 5:00 p.m.–9:00 p.m. weeknights, 10 a.m.–7:30 p.m. Saturdays and 1 p.m.–9:00 p.m. Sundays. Individuals who refused initially or who terminated the interview were re-contacted in an attempt to convert them to a participating respondent. The initial refusal could occur either at the household level or at the respondent level.

The response rate (specifically, RR4 of the American Association for Public Opinion Research), which reflects the percentage of completed and partially completed interviews achieved after fully processing all attempted sample records in worked replicates, was employed. It also estimated the number of eligible households from the total number of phone numbers of unknown status. The response rate was 31.3%.

Participants

On average, participants were 24.4 years old (SD = 3.81) and 60.5% female. Most individuals were married (35.5%) or unmarried (35%), while some were a member of an unmarried couple (20.3%) or single because of divorce, separation or death of a spouse (8.7%). In terms of education, 23.8% completed the 8th grade, 30.0% completed 11th grade and 30.8% completed 12th grade. About 2.9% earned a general educational development (GED), 1.1% never attended school or only attended kindergarten and 10.6% had some college education or a degree. Individuals were not currently enrolled in any higher education institution. For self-reported income, 22.7% earned less than $15 000 annually, 33.8% earned between $15 000 and $25 000, 19.6% earned between $25 000 and $50 000, 3.6% earned more than $50 000 and 20.3% refused or did not know their income. The majority of interviews (66%) were conducted in Spanish. Most (87.6%) identify themselves as Mexican, Mexican American or Chicano, and most (60.2%) were born in Mexico. The average age of coming to the United States was 16.9 years (SD = 6.03). For language preference, 40.8% speak only Spanish at home, 42.7% speak only Spanish with friends, 41.1% read Spanish only and 49.6% say they think only in Spanish.

Some demographic differences existed as a function of where participants lived. Houston participants were more educated than Dallas participants, χ^2 (4, $n = 787$) = 26.2, $P < 0.01$. More interviews were conducted in Spanish in Dallas (71%) compared to Houston (61%), χ^2 (1, $n = 787$) = 8.9, $P < 0.01$. More individuals from Houston than from Dallas identified themselves with Central Americans (8% versus 2%) or with Mixed Latinos (5% versus 2.5%), χ^2 (7, $n = 787$) = 26.8, $P < 0.01$. Finally, individuals from Dallas were more likely to think, χ^2 (4, $n = 787$) = 14.7, $P < 0.01$, and read, χ^2 (4, $n = 787$) = 16.5, $P < 0.01$, in Spanish than individuals in Houston. There were no significant differences for marital status, income or age. Moreover, no differences between cities on frequency of cigarette or alcohol use were detected.

Measures

Sensation seeking was measured with the eight-item BSSS-8 [30,31]. Responses were indicated on five-point scales labeled 'strongly disagree', 'disagree', 'neither disagree nor agree', 'agree' and 'strongly agree'. See Table 1 for a list of the items in both English and Spanish. Because the psychometric properties of the BSSS-8 are the focus of the paper, we present a detailed report in the Results. It is important to note that, in pre-testing the questionnaire, one of the eight items was not well understood by this demographic. The item 'I would like to try bungee-jumping' was changed to 'I would like to try parachute-jumping' because the bungee-jumping experience was unfamiliar enough to the audience that the item was perceived as confusing.

Of the 75 cigarette-related questions in the survey, seven single-item measures are reported here for construct validity. Life-time cigarette use was measured by 'Have you ever smoked a cigarette, even 1 or 2 puffs' (yes/no). Intention to smoke was assessed with 'Do you think you will smoke anytime in the next year' on a four-point scale (1 = definitely yes to 4 = definitely no). Belief about the addictive properties was measured by 'Smoking is addictive' on a four-point scale (1 = strongly disagree to 4 = strongly agree). Subjective norm was assessed with one of two items on a four-point scale (1 = strongly disagree to 4 = strongly agree). Smokers responded to 'People close to me are upset at my smoking' while non-smokers responded to 'People close to me would be upset if I smoked'. Belief about public policy was assessed with 'Do you think smoking should be barred in bars/taverns/nightclubs' on a three-point scale (1 = allowed throughout, 2 = prohibited in some areas, 3 = prohibited in all areas). Normative influence was evaluated with 'in the past seven days have you been in a car with someone who was smoking?' (yes/no).

Five alcohol-related items were measured and all are reported in this paper. Alcohol use was assessed with 'How often do you have a drink containing alcohol?' (1 = never, 2 = monthly or less, 3 = two to four times per month, 4 = two to three times per week, 5 = four or more times per week). Amount was measured with 'How many drinks containing alcohol do you have on a typical day when you are drinking?' (1 = one or two, 2 = three or four, 3 = five or six, 4 = seven or eight, 5 = 10 or more). We measured frequency with 'How often do you have six or more drinks on one occasion?' (1 = never, 2 = less than monthly, 3 = monthly, 4 = weekly, 5 = daily or almost daily). We measured the degree to which alcohol adversely affects one's life with three separate questions on a five-point scale (1 = never, 2 = less than monthly, 3 = monthly, 4 = weekly, 5 = daily or almost daily), including 'How often during the last year have you found that you were not able to stop drinking once you had started' and 'How often during the last year have you failed to do what was normally expected of you because of drinking?'.

RESULTS

Because interviews were conducted in either Spanish or English, it was possible that sensation seeking scores varied systematically by language. To test for this, we examined scores on each sensation seeking item separately by interview language. As displayed in Table 1, independent-samples *t*-tests indicated that scores were significantly higher when administered in English than in Spanish on six of the eight sensation seeking items (or five of the eight when adjusting alpha downwards for the number of comparisons). The means indicate that there were systematic differences attributable to language, therefore all subsequent analyses were conducted separately for English- and Spanish-speaking participants.

A review of the scores for the eight items shows that only the first two items in Table 1, both of which represent the experience seeking subscale, were not significantly different by interview language. Otherwise, despite language differences, most item means hovered around the scale mid-point of 2.5, with scores ranging from 2.11 to 3.44. Additionally, standard

deviations were generally stable and consistent across all eight items, ranging from 0.89 to 1.34 (albeit slightly lower for Spanish-speaking items). Tables 2 and 3 provide inter-item correlation matrixes for all BSSS-8 items in both Spanish and English.

Confirmatory factor analyses

To establish the structural validity, we subjected the eight items to a confirmatory factor analysis. Multivariate normality was evaluated using Mardia's coefficient. Although the normalized estimates varied significantly—1.3 for the English-speaking interviewees and 15.5 for the Spanish-speaking interviewees—neither estimate indicated departure from normality that would preclude maximum likelihood estimation.

Omnibus fit was evaluated with the comparative fit index (CFI) [40] and the root mean square error of approximation (RMSEA) [41]. CFI is based on the non-central χ^2 and indexes the relative reduction in lack of fit of a specified model versus the null model. For confirmatory factor models, values of 0.95 or greater are considered indicative of a good fit [42]. With regard to RMSEA, a measure of close fit, Browne & Cudeck [43] recommend 0.05 as a value indicative of close fit, 0.08 as indicative of marginal fit and 0.10 as indicative of poor fit of a model taking into model complexity.

Based on previous psychometric evaluations [31], the baseline model was specified as a single-factor model with the eight items loading on this single latent variable. Additionally, consistent with Hoyle *et al*. [30], two pairs of uniquenesses were allowed to covary (specifically, the two items for thrill and adventure seeking and the two items for disinhibition).

English-speaking interviewee data

Estimation of the single-factor baseline model indicated that the data were marginally consistent with this specification, χ^2 (18, $n = 257$) = 60.15, $P < 0.001$; CFI = 0.90; RMSEA = 0.096 (90% confidence interval = 0.069–0.122). A statistical specification search (the Lagrange multiplier test and the Wald test) indicated two sources of misspecification in the model. First, the covariance between the uniquenesses for disinhibition was not significant. Secondly, the assumption of no covariance between the uniquenesses for the two experience seeking items was not consistent with the data. Implementing these two changes resulted in acceptable values of the omnibus fit indices, χ^2 (18, $n = 257$) = 36.88, $P = 0.025$; CFI = 0.955; RMSEA = 0.064 (90% confidence interval = 0.034–0.093). Thus, for English-speaking respondents, the data are well described by a one-factor solution provided that the pair of uniquenesses for experience seeking and thrill and adventure seeking are allowed to freely covary.

Although the evidence suggests that the one-factor solution explains the observed variances and covariances, there are two alternative models worthy of consideration. The first includes four factors corresponding to the four components of sensation seeking (experience seeking, thrill and adventure seeking, disinhibition and boredom susceptibility) individually—but without any single, overarching factor. This suggests that there is not one source of commonality underlying the four factors. Although this is not hypothesized, it is important to rule out alternative models in order to identify the factor structure that is most consistent with the data. To evaluate this four-factor model, each factor is modeled as a latent variable with its two items serving as indicators. Additionally, the four factors are allowed to covary. For the English-speaking interviews, this model was consistent with the data, χ^2 (14, $n = 257$) = 26.54, $P = 0.022$; CFI = 0.970; RMSEA = 0.059 (90% confidence interval = 0.022–0.093). Because the one-factor model includes correlated uniquenesses, it is not nested in the four-factor model; however, an informal comparison of the values of the omnibus fit indices suggests that the four-factor model provides a better account of the data.

An additional alternative specifies a single second-order factor that accounts for the commonality between the four factors. This model would be consistent with sensation seeking as the common source of influence among the four factors. For the English-speaking interviews, this second-order model was consistent with the data, χ^2 (16, $n = 250$) = 268.78, $P = 0.025$; CFI = 0.970; RMSEA = 0.036 (90% confidence interval = 0.019–0.088). It is nested in the four-factor model, and therefore its fit can be compared directly to it. Specifically, the second-order model is produced by placing restrictions on the covariances between the factors, resulting in a net gain of two degrees of freedom. The magnitude of the increase in the model χ^2 going from the four-factor to the second-order model can be tested for significance. The difference is not significant, $\Delta\chi^2$ (2, $n = 257$) = 2.24, $P > 0.05$, indicating that the second-order model provides a more parsimonious account of the data with no loss in fit. This finding suggests that sensation seeking is the single source of commonality across the four first-order factors (see Fig. 1).

The data for the English-speaking interviews clearly show a single construct—sensation seeking—that underlies responses to the items. A single scale score can be used when measures are second-order unidimensional [44]. Consequently, this scale score can be computed and examined further for its construct validity. Towards this end, the correlations between the BSSS-8 single scale score and multiple substance use variables that are in the broader nomological network were examined. Historically, single scale sensation seeking scores have varied by gender and age [11,12,30,31]. Therefore, prior to examining correlations, we conducted a two-way analysis of variance with gender (male, female) and age (24 and under, 25 and older) as independent variables and the composite BSSS-8 score as the dependent variable. The results showed a main effect for gender on sensation seeking, suggesting that sensation seeking scores differed significantly by gender. Specifically, males (M = 3.23, SE = 0.13) scored significantly higher than females (M = 2.72, SE = 0.10), $F_{1,110}$ = 9.29, $P < 0.01$, η^2 = 0.08. No other main effects or interactions were detected.

The patterns of correlations for tobacco-related items, as displayed in Table 4, are in the intended direction. Specifically, across all English-speaking Latinos, sensation seeking is related positively to intention to smoke in the next year and being in a car with individuals who smoked over the past 7 days. Additionally, sensation seeking is related negatively to the belief that smoking is addictive and that smoking should be prohibited in bars and taverns. Correlations varied slightly for males and females. Three of five correlations are significant and in the intended direction for females compared to one for males. Hence, the relationships between sensation seeking and the tobacco-outcome variables are generally stronger for females than males.

The relationships between sensation seeking and alcohol-related items are stronger than for the tobacco-related items. Overall, sensation seeking is related positively to frequency of alcohol use, number of drinks consumed on a typical day, having 6+ drinks in one sitting and failing to perform normally expected behaviors because of drinking. Across the board, the patterns of correlations are stronger, but not significantly stronger ($P < 0.05$), for females than males.

Spanish-speaking interviewee data

As with the English-speaking sample, the first confirma-tory factor analysis (CFA) model to be estimated was a first-order single-factor model with the eight items loading on the latent variable and two pairs of correlated error terms (for the thrill and adventure seeking and dis-inhibition subfactors). This model provided a marginally acceptable account of the data, χ^2 (18, $n = 500$) = 68.69, $P < 0.001$; CFI = 0.90; RMSEA = 0.075 (90% confidence interval = 0.057–0.094). A statistical specification search identified two sources of misspecification. First, the Wald test indicated that the correlated uniquenesses for the thrill and adventure

seeking items should be constrained to zero. Secondly, the Lagrange multiplier test indicated that the uniquenesses for the two experience seeking items should be allowed to covary. These changes (implemented individually) resulted in an improved-fitting model, χ^2 (18, $n = 500$) = 35.18, $P = 0.008$; CFI = 0.971; RMSEA = 0.044 (90% confidence interval = 0.021–0.065).

The two alternative models discussed previously in the English-speaking interview section were also specified and estimated for the Spanish-speaking participants. The first alternative model specified the four factors of sensation seeking as latent variables, thereby in effect removing the assumption of a single underlying factor. As before, the two items representing each factor were allowed to load on their respective latent variables. This model was consistent with the data, χ^2 (14, $n = 500$) = 13.40, $P = 0.495$; CFI = 1.00; RMSEA = 0.000 (90% confidence interval = 0.000–0.042), and provided a superior account of the data compared to the single-factor model, $\Delta\chi^2$ (4, $n = 500$) = 21.78, $P < 0.001$. The second alternative model, which modeled the four factors as first-order latent variables with a second-order latent variable, also provided a good fit to the data, χ^2 (16, $n = 500$) = 33.46, $P = 0.006$; CFI = 0.970; RMSEA = 0.047 (90% confidence interval = 0.024–0.069). This model is nested in the four-factor model, and therefore can be compared to it statistically. This comparison yielded a significant χ^2 difference, $\Delta\chi^2$ (2, $n = 500$) = 20.06, $P < 0.001$, evidence that the restrictions required to produce the second-order model are not tenable.

The four-factor model for Spanish-speaking Latinos is displayed in Fig. 2 and includes inter-factor correlations. It is evident that, although the covariances among the factors cannot be accounted for by a single second-order factor, the inter-factor correlations are quite strong and, on the whole, similar to those for English-speaking interviewees (presented in Fig. 3).

Because the Spanish-language factor structure is modeled most accurately (with these data) as a four-factor model, we opted to present the correlations between the tobacco and alcohol variables separately by subscale. As with English-speaking Latinos, we tested for differences in the four scale scores by gender and age. Results from the four one-way analyses of variance (ANOVAs) indicate that there are differences attributable to gender among all subscales except experience seeking. Specifically, males (M = 2.73, SE = 0.076) scored higher than females (M = 2.29, SE = 0.062) for thrill and adventure seeking, $F_{1,275}$ = 20.79, $P < 0.001$, $\eta^2 = 0.07$; males (M = 2.59, SE = 0.081) scored higher than females (M = 2.18, SE = 0.066) for disinhibition, $F_{1,274}$ = 15.49, $P < 0.001$, $\eta^2 = 0.05$; and males (M = 2.80, SE = 0.076) scored higher than females (M = 2.57, SE = 0.062) for thrill and adventure seeking, $F_{1,275}$ = 5.16, $P < 0.05$, $\eta^2 = 0.02$. One significant difference for age was detected on thrill and adventure seeking, $F_{1,275}$ = 7.95, $P < 0.01$, $\eta^2 = 0.03$, with younger adults (ages 18–24) (M = 2.37 SE = 0.065) scoring lower than older adults (25–30) (M = 2.65, SE = 0.074). Because an age difference was detected for only one subscale, no further comparisons will be made by age.

Therefore, subscale correlations for Spanish-speaking Latino respondents, broken down by gender, are provided in Table 5.

The numbers indicate that the correlations between the four subscales and cigarette use in the previous year are, surprisingly, small for both males and females. Correlations increase slightly for intention to use tobacco. The strongest correlations occur in the disinhibition sub-scale for both males and females on the tobacco-related items. In contrast, for alcohol, the majority of subscales are correlated with frequency of alcohol use for males but perhaps paradoxically, not for females. Correlations between alcohol-related variables and disinhibition sub-scale scores also tend to be the highest. Most associations between subscale scores and the tobacco- and alcohol-related variables are non-significant.

DISCUSSION

With a focus on working Latino young adults, this research was designed to test the psychometric properties of the BSSS-8 as a reliable and valid measure of sensation seeking. The motivation for this study was to fill a large gap in the knowledge base about the role of sensation seeking in this specific demographic, including those Latinos who are either bilingual or speak only Spanish. While we have some knowledge about the performance of the BSSS-8 with adolescents from overwhelmingly Caucasian samples [9,30,31], we know little about the viability of the BSSS-8 as a reliable and valid indicator of sensation seeking for young adult Latinos, particularly when the scale is presented in either the English or Spanish language. Moreover, although others have demonstrated amply that young adult Latinos engage in many risky health behaviors [45], the link between sensation seeking and tobacco and alcohol use for young adult Latinos was also missing. Therefore, this new knowledge will significantly inform and advance our ability to predict substance use by young adult Latinos and use it as a segmenting variable for future interventions [6,7,16,46]. This is important, because 'developing and testing culturally relevant interventions … is a necessary step in addressing the needs of growing Mexican-American population in the U.S.' ([39], p. 321). Such information is particularly timely, because drug and alcohol use by older adolescents and young adult Latinos remains higher than most other demographic subgroups [33].

English-language interviews

Several noteworthy outcomes emerged from this study. First, analyses of the structural validity of the BSSS-8 indicate that it is both a reliable and valid indicator of sensation seeking for English-speaking young adult Latinos. Specifically, the structure of the BSSS-8 was best fitted as a second-order model with the four factors that represent each of the four subscales originally theorized by Zuckerman [11]. Although the outcome is slightly different from that found by Hoyle *et al.* [31] in a sample of adolescents (dominated largely by Caucasians), both studies are similar in that there is a single source of commonality across all eight items. Moreover, reliability, which was assessed by coefficient alpha, was acceptable across both age and gender of participants (with alphas ranging from 0.60 to 0.74), with the reliability of the total sample being 0.70. Coefficient alphas from this research were similar to those reported by Aluja *et al.* [37] in their evaluation of a Spanish version of Zuckerman's Form V.

Secondly, the correlations between sensation seeking and measures related to tobacco and alcohol use were in the expected direction. Sensation seeking was associated positively with life-time cigarette use, intention to smoke in the future and riding in a car with someone else who smoked. Those higher in sensation seeking were less likely to believe smoking is addictive, less likely to believe smoking should be prohibited in bars and taverns, less concerned about breathing smoke from other cigarettes and less likely to believe that those close to them would be upset if the individual smoked. For alcohol, sensation seeking was related positively both to amount and frequency of alcohol consumption, not being able to stop drinking alcohol once started, failing to do what was normally expected because of drinking and needing a drink first thing in the morning. For alcohol, the correlations between the BSSS-8 and alcohol constructs for females were modestly stronger than they were for males. This is not surprising, given the prevalent cultural rejection of alcohol drinking by Latinas.

Thirdly, means and standard deviations for the English-speaking sample were also stable. Mean scores among the eight items hovered around the mid-point of the scale and standard deviations were consistent. As with other studies, sensation seeking scores were significantly higher among males and younger participants [10,29–31]. This should not be surprising, because sensation seeking peaks typically during adolescence [11].

Therefore, the reliability and validity data support the psychometric properties of the BSSS-8 as administered to Latino young adults who reside in urban settings and speak English. With a second-order model, the four sub-scales retain not only specific qualities unique to each component of the construct; they also possess a general commonality across factors. Therefore, practically speaking, the BSSS-8 can be computed into a single score or subscale scores can be examined separately [44,47]. The results of this study are consistent with previous studies on the BSSS-8 [30,31]. Because this is the first study that we know of to examine the BSSS-8 with English-speaking Latino young adults, future research replicating these findings is clearly desirable.

Spanish-language interviews

Unlike the data for English-speaking participants, the results did not correspond to expectation for those interviews that were conducted in Spanish. In fact, subsequent research is needed to provide some insight to the findings that are reported here. It is helpful to discuss both the conclusions of the research as well as our understanding of where the properties of the BSSS-8 differed for this group.

Principally, the structure of the BSSS-8 was most consistent with that of a four-factor model, with two items loading on their respective latent factors. The factors are inter-correlated substantially. The primary implication here is that the covariances between the four factors do not have one common source of influence, one which we had believed to be sensation seeking. Statistically, the reason for this difference may be apparent. If Figs 2 and 3 are compared, there is only one significant difference between the two models. Specifically, the relationship between experience seeking and disinhibition is substantially lower for the Spanish-speaking participants. While certainly speculative, in our estimation if the inter-factor correlation was closer to the model for English-speaking participants it is likely that the second-order model would fit the data equally well. A secondary and more practical implication is that, instead of using a single unitary scale score to assess sensation seeking, the four subscales should be examined separately for this population [47].

By examining the psychometric properties of the three different estimated models and comparing them with their English-language counterparts, there is other evidence showing where the Spanish and English versions diverge. First, a comparison of the items in Table 1 shows that Spanish-language interviewees scored lower on six of the eight items. With the exception of experience seeking, Spanish-language participants scored significantly lower across the remainder of the items in the BSSS-8. Moreover, the standard deviations are smaller, indicating less variation in the responses by the Spanish-speaking participants. We can only speculate that these outcomes were a result of the sample of participants being from working-class homes with lower incomes, thereby decreasing the likelihood that these individuals would think very often about the activities listed in the scale. Indeed, almost three of five participants had incomes of less than $25 000. Hence, the sensation seeking items on the BSSS may be phrased in such a way that they are perceived to be economically prohibitive. Moreover, it is interesting that it is the experience seeking items which do not differ between groups. With little doubt, migrating to the United States from another country would be considered a risky behavior that qualifies as experience seeking, particularly if the individual who is migrating is undocumented. Hence, the individuals may have sensation seeking tendencies that are not captured as well as they might otherwise be. We speculate further on this and address language issues later in the paper.

Thirdly, while related to the previous two, the multivariate normality as indicated by Mardia's coefficient was considerably larger for the Spanish language participants (15.5 compared to 1.3). Although maximum likelihood estimators used for these analyses are generally believed to be robust to violations of non-normality [48,49], there exists at least the possibility that this

issue may have been problematic with this sample. Although we leave that possibility open it is highly unlikely, as these data did not approach the skewness and kurtosis values where univariate non-normality becomes problematic [48]. The way to handle such problems would be to use estimators, other than maximum likelihood, which do not maintain assumptions of multivariate normality.

One can review the correlation matrixes in Tables 2 and 3 to understand differences in the relations between sensation seeking and the tobacco- and alcohol-related items. For instance, all but four of the correlations in the English-language matrix (Table 2) are stronger than those obtained in the Spanish-language matrix (Table 3). Take, for example, the average inter-item correlation between item 8 and the other seven items in the scale (as displayed in the last line of the correlation matrix). The average correlation for those items in English is 0.33 and for Spanish is 0.25. Although the difference is not substantial, the correlations in the Spanish-language matrix appear weaker across the board.

In an attempt to rule out other rival explanations, we also estimated models with the Spanish-language data after removing the influence of several demographic variables (including time spent living in the United States and marital status among others). These steps also produced no visible changes in the factor structure.

Finally, empirical issues aside, we should consider fundamental issues of translation from English to Spanish. It is entirely possible that the scale items lost something in translation. We do know, for example, that in pilot-testing the BSSS-8 it was necessary to change the item referencing bungee-jumping because it was not well understood by this sample of blue-collar young adult Latinos. We considered a number of alternatives as a substitution for this item from the thrill and adventure seeking domain. For example, the research team considered substituting 'street car racing' for 'bungee-jumping', as it is a familiar and popular activity among many of the study's participants. However, car racing is illegal and we feared that individuals would be unlikely to admit to engaging in illegal behavior on the BSSS-8. In addition, conceptually, a sensation seeking behavior which involves violating the law (street car racing) may not be a valid equivalent to a perfectly legal activity (bungee-jumping). Further consideration led us to consider substituting parachute-jumping (skydiving) for bungee-jumping; indeed, this item resonated well in pilot testing. It may not have been a perfect substitution, and the likelihood of actually performing such a behavior may be beyond the financial means of most individuals in the study. However, the data in Tables 1–3 suggest no abnormalities by its inclusion. To the contrary, there may be other items in the BSSS-8 that warrant further scrutiny for translation from English to Spanish.

Limitations

There are limitations to most research and this study is no exception. Our participants, while Hispanic, are from a single state located in the Southwestern United States. Moreover, the participants live largely in urban areas, precluding us from understanding the way sensation seeking manifests itself among more rural residents. Participants reported lower incomes, with 57% of the sample earning less than $25 000 in annual income. Consequently, the results cannot be extended beyond the geographical region from which the participants were interviewed. Moreover, the alcohol- and tobacco-related items were largely single-item measures, leaving room for future studies to investigate the construct validity with other scales.

CONCLUSION

This study provides new and important information on the relationship between sensation seeking and alcohol and tobacco use among Latino young adults who live in urban settings and do not attend college. Primarily, we examined the BSSS with this sample and found that

factor structures vary by language (English or Spanish). These data are certainly valuable, in that they provide information that we do not currently have. Perhaps more importantly, however, these data indicate that future work is needed to develop a better understanding of how sensation seeking manifests itself among Spanish-speaking Latinos living in urban settings. In particular, researchers may need to consider how to incorporate issues related to the risks taken by these individuals to migrate to the United States, whether legally or illegally. This is, in and of itself, an activity full of risk and adventure that may make parachute-jumping and wild parties pale in comparison.

Acknowledgments

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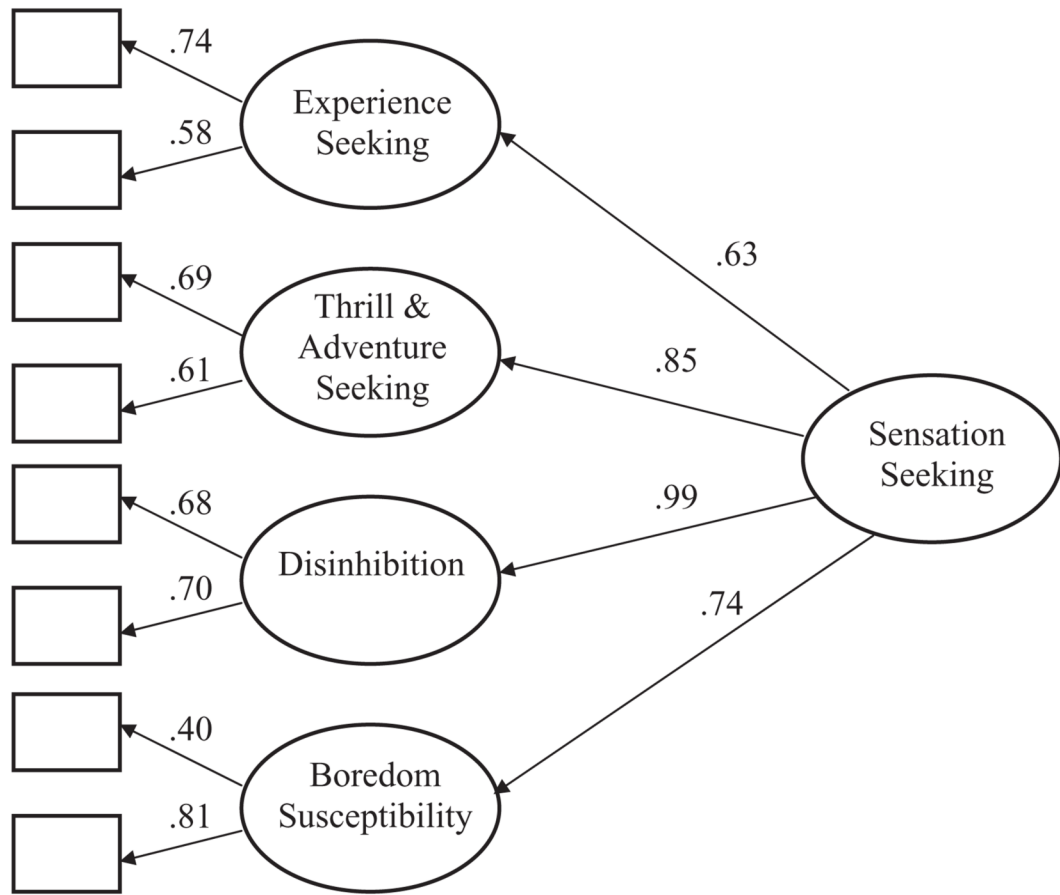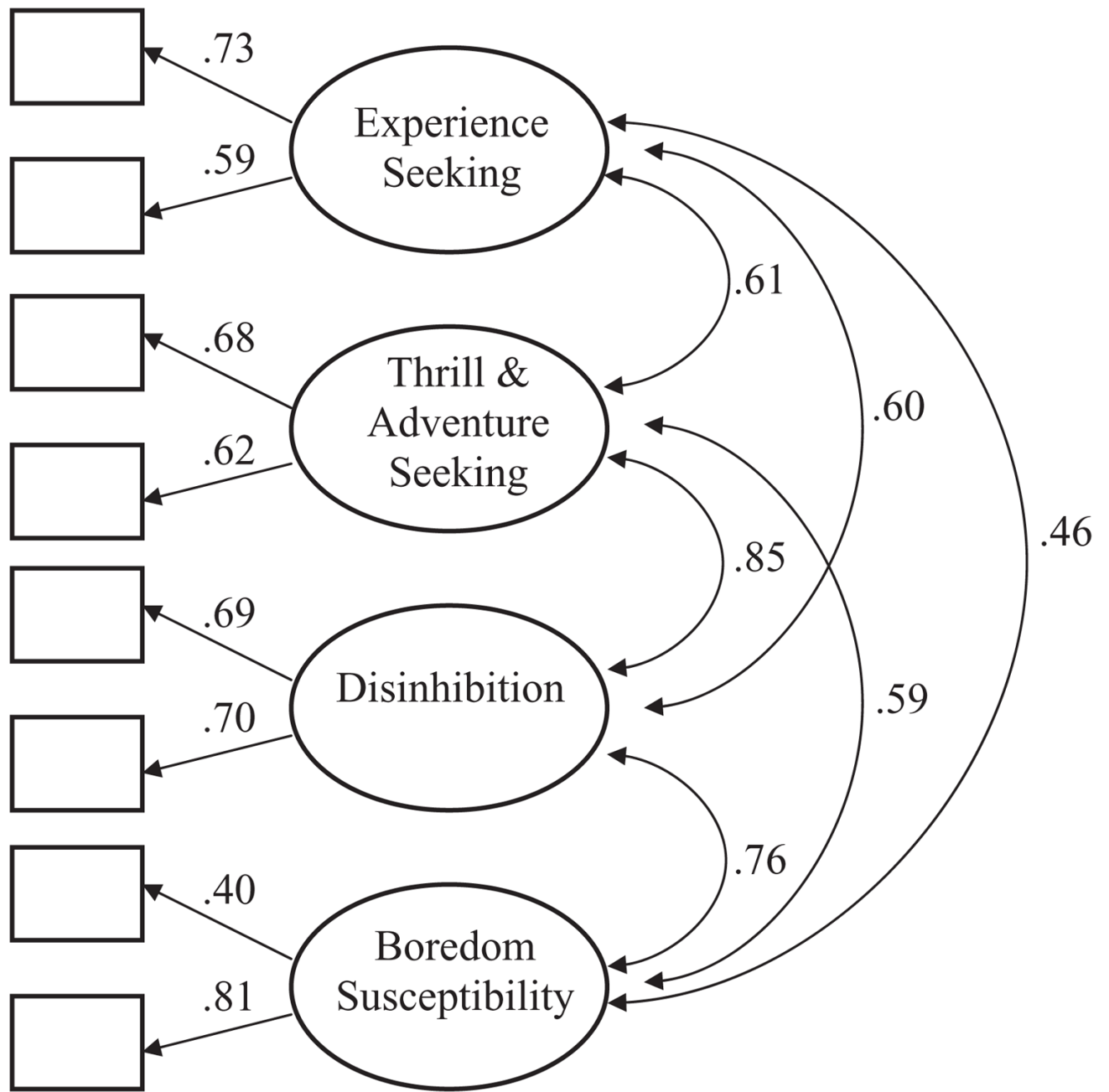
Figure 1.
Second-order model for English-speaking Latinos
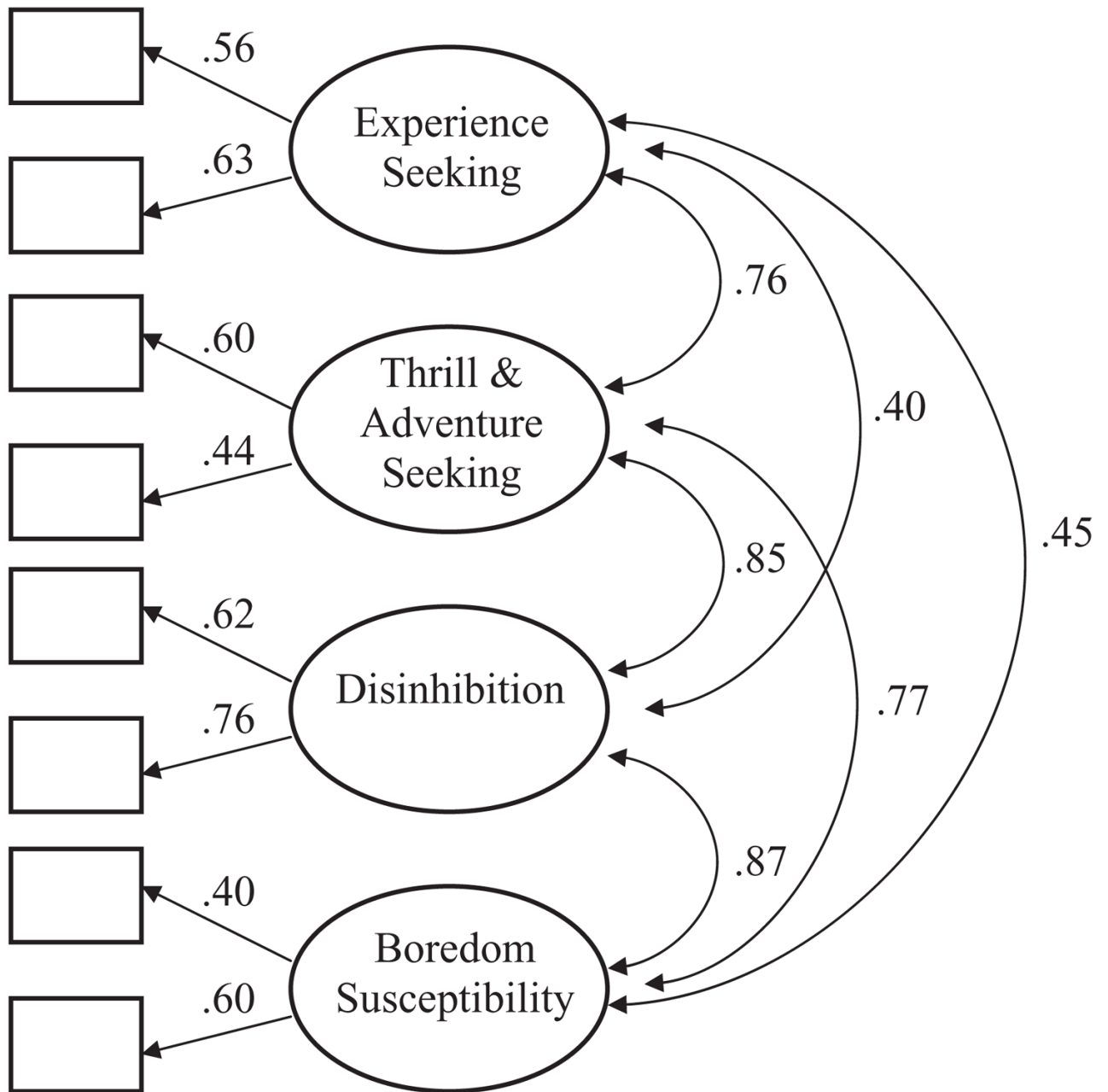
Figure 2.
Four-factor model for Spanish-speaking interviewees

Figure 3.
Four-factor model for English-speaking Latinos

Table 1

Items and descriptive statistics for the brief sensation-seeking scale (BSSS-8).

Item (by content domain)	English	Spanish	t
Experience seeking			
1. I would like to explore strange places	3.07 (1.29)	3.11 (1.15)	0.46
Me gustaría explorar lugares extraños/raros			
2. I would like to take off on a trip with no pre-planned routes or timetables	2.98 (1.29)	2.95 (1.16)	0.31
Me gustaría hacer un viaje sin tener planeado las rutas o los horarios			
Thrill and adventure seeking			
3. I like to do frightening things	2.60 (1.23)	2.11 (0.90)	6.21[***]
Me gusta hacer cosas que causan temor (atemorizantes)			
4. I would like to try parachute-jumping	2.95 (1.23)	2.76 (1.20)	1.98[*]
Me gustaría intentar tirarme en paracaídas			
Disinhibition			
5. I like wild parties	2.88 (1.34)	2.18 (0.94)	8.43[***]
Me gustan las fiestas locas			
6. I like new and exciting experiences, even if I have to break the rules	2.73 (1.25)	2.37 (1.04)	4.22[***]
Me gusta experimentar cosas nuevas y excitantes, aunque tenga que romper las reglas			
Boredom susceptibility			
7. I get restless when I spend too much time at home	3.44 (1.22)	3.06 (1.17)	4.15[***]
Me siento impaciente cuando paso mucho tiempo en casa			
8. I prefer friends who are excitingly unpredictable	3.07 (1.20)	2.25 (0.89)	10.6[***]
Prefiero tener amigos que sean arriesgados e impredecibles			

$n = 789$. Responses were five-point scales labeled 'strongly disagree', 'disagree', 'neither disagree nor agree', 'agree' and 'strongly agree'.

[*] $P < 0.05$;

[**] $P < 0.01$;

[***] $P < 0.001$.

Table 2

English-language data—correlation, means and standard deviations for BSSS-8 items.

	1	2	3	4	5	6	7	8
1								
2	0.43							
3	0.24	0.26						
4	0.34	0.23	0.42					
5	0.23	0.20	0.46	0.34				
6	0.42	0.21	0.37	0.36	0.48			
7	0.12	0.15	0.15	0.15	0.22	0.20		
8	0.25	0.28	0.32	0.30	0.43	0.42	0.32	–
M	3.07	2.98	2.60	2.95	2.88	2.73	3.44	3.07
SD	1.29	1.29	1.23	1.42	1.34	1.25	1.22	1.20

M = mean; SD = standard deviation; *n* ranged from 136 to 257. Correlations greater than |0.15| are statistically significant at *P* < 0.05. 1 = I would like to explore strange places; 2 = I would like to take off on a trip with no pre-planned routes or timetables; 3 = I like to do frightening things; 4 = I would like to try parachute-jumping; 5 = I like wild parties; 6 = I like new and exciting experiences, even if I have to break the rules; 7 = I get restless when I spend too much time at home; 8 = I prefer friends who are excitingly unpredictable.

Table 3

Spanish-language data—correlation, means and standard deviations for BSSS-8 items.

	1	2	3	4	5	6	7	8
1								
2	0.35							
3	0.24	0.28						
4	0.22	0.20	0.26					
5	0.14	0.12	0.33	0.23				
6	0.19	0.20	0.37	0.30	0.48			
7	0.12	0.08	0.16	0.11	0.23	0.27		
8	0.16	0.19	0.32	0.14	0.30	0.41	0.24	–
M	3.11	2.95	2.11	2.76	2.18	2.37	3.06	2.25
SD	1.15	1.16	0.89	1.20	0.94	1.04	1.17	0.89

M = mean; SD = standard deviation; n ranged from 195 to 500. Correlations greater than |0.15| are statistically significant at $P < 0.05$. 1 = I would like to explore strange places; 2 = I would like to take off on a trip with no pre-planned routes or timetables; 3 = I like to do frightening things; 4 = I would like to try parachute-jumping; 5 = I like wild parties; 6 = I like new and exciting experiences, even if I have to break the rules; 7 = I get restless when I spend too much time at home; 8 = I prefer friends who are excitingly unpredictable.

Table 4

Correlations between BSSS-8 scores for English-language Latinos and responses to cigarette- and alcohol-related items.

Item (by substance)	All	M	F
Cigarettes			
Smoked in previous year	0.19**	0.17*	0.17*
Intention to smoke in the next year	0.27***	0.30**	0.18*
Believe smoking is addictive	−0.10*	−0.09	−0.11
People close to me upset at my smoking/if I smoked	−0.08	−0.15	−0.03
Smoking should be prohibited in bars and taverns	−0.12*	−0.12	−0.13*
In the past 7 days, been in a car with someone who smoked	0.22***	0.14	0.23**
Alcohol			
Frequency of current alcohol use	0.28***	0.17***	0.30***
On a typical day, how many drinks would you drink?	0.33***	0.26***	0.32***
How often do you have 6 + drinks on one occasion	0.28***	0.14***	0.32***
During last year, how often not able to stop drinking once started	0.10	−0.02*	0.19
During last year, how often have you failed to do what was normally expected of you because of drinking?	0.22***	0.14***	0.30**

For tobacco-related items, *n* ranged from 203 to 257 for all, from 81 to 106 for males (M) and from 122 to 151 for females (F). For alcohol-related items, *n* ranged from 251 to 257 for all, from 83 to 87 for males and 98 to 106 for females.

*
$P < 0.05$;

**
$P < 0.01$;

***
$P < 0.001$.

Table 5

Correlations between subscale scores for Spanish-language Latinos and responses to cigarette- and alcohol-related items.

Item (by substance)		ES	TAS	Dis	BS
Cigarettes					
Smoked in previous year	Male	0.01	−0.03	0.00	0.12*
	Female	0.00	0.00	0.05	0.03
Intention to smoke in the next year	Male	0.12*	0.08	0.12	0.00*
	Female	0.12*	0.16**	0.03	0.10*
Believe smoking is addictive	Male	0.14*	0.05	−0.09	0.08
	Female	0.04	−0.06	−0.21***	−0.12*
People close to me upset at my smoking/if I smoked	Male	−0.02	−0.07	−0.18***	−0.16*
	Female	−0.07	−0.07	−0.23***	−0.15*
Smoking should be prohibited in bars and taverns	Male	−0.14*	−0.13*	−0.15*	−0.13*
	Female	0.15**	−0.09	−0.05	−0.08
In the past 7 days, been in a car with a smoker	Male	−0.01	0.12	0.13*	0.17**
	Female	0.04	0.14**	0.02	−0.04
Alcohol					
Frequency of current alcohol use	Male	0.19**	0.04	0.18**	0.17**
	Female	0.06	0.10*	0.07	0.01
On a typical day, how many drinks would you drink?	Male	0.05	−0.15*	0.02	−0.08
	Female	0.01	−0.01	0.05	0.06
How often do you have 6+ drinks on one occasion?	Males	0.13	−0.04	0.18**	0.01
	Female	−0.03	0.01	0.24**	0.18*
During last year, how often not able to stop drinking once started?	Male	0.10	0.02	0.19**	0.17
	Female	−0.08	−0.06	0.05	0.08
During last year, how often have you failed to do what was normally expected of you because of drinking?	Male	0.06	0.00	0.10	−0.09
	Female	−0.08	−0.13	−0.04	−0.08

For tobacco-related items, n ranged from 140 to 192 for males and from 278 to 308 for females. For alcohol-related items, n ranged from 140 to 192 for males and 106 to 110 for females. BS = boredom susceptibility; Dis = disinhibition; ES = experience seeking; TAS = thrill and adventure seeking.

*
$P < 0.05$;

**
$P < 0.01$;

***
$P < 0.001$.