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Brief measures of sensation seeking for screening and large-scale surveys

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Abstract

Sensation seeking is central to research on the prevention of risky health behaviors, but current measures of sensation seeking are fairly long, thereby reducing their chances of inclusion in some research projects. Hence, we developed and evaluated two brief indices of sensation seeking, a four-item measure that retains the framework of the Sensation Seeking Scale-Form V (SSS-V) and a shorter two-item measure focusing on the risk-taking elements of sensation seeking. We compared the performance of the new indices with that of two well documented but longer measures of sensation seeking. The evaluation was based on data provided by more than 5000 teens and pre-teens in grades 7 through 11. Psychometric analyses revealed that the internal consistency of the two new measures was very good overall and across grade and sex categories. Additionally, the new indices correlated as expected with a series of risk and protective factors as well as tobacco, alcohol, and marijuana use. Both indices performed in ways remarkably similar to the established measures of sensation seeking and should prove useful for future research involving risky health behaviors.

Keywords: Sensation seeking measure; Risk factor; Protective factor; Marijuana use; Tobacco use

1. Introduction

Sensation seeking is a personality trait believed to have a biological basis that expresses as a need for physiological arousal, novel experience, and a willingness to take social, physical, and financial risks to obtain such arousal (Bardo et al., 1996; Zuckerman, 1979, 1994). Sensation seeking is associated with a variety of illegal and/or risky behaviors such as the use of illicit drugs (Newcomb and McGee, 1991; Palmgreen et al., 2001; Stephenson et al., 2002; Zuckerman et al., 1993), sexual risk-taking (Donohew et al., 2000; Hoyle et al., 2000), reckless driving (Heino et al., 1996), smoking (Zuckerman et al., 1990), and alcohol use (Stacy et al., 1993).

Until recently, virtually all research on sensation seeking assessed the construct using Form V of the Sensation Seeking Scale (SSS-V; Zuckerman et al., 1978), which consists of 40 items in forced-choice format. The SSS-V comprises four subscales that correspond to key features of the construct: experience seeking, disinhibition, thrill and adventure seeking, and boredom susceptibility. Some researchers have developed and tested predictions at the subscale level (Orlebeke et al., 1990), or used subscale scores as indicators of a latent variable (Newcomb and McGee, 1991). However, the preponderance of research on sensation seeking that has made use of the SSS-V has involved the computation of a single score based on responses to the complete set of 40 items.

The present research was motivated by the need for more economical measures of sensation seeking. Of specific concern is the need to include measures of risk factors, such as sensation seeking, in large-scale survey studies of problem behavior that influence prevention policy. These surveys typically tap many constructs using only one or two items. For instance, in a recent publication based on data from the Monitoring the Future National Survey, school bonding was measured with three items, school misbehavior was measured by four items, and academic achievement was assessed with a single item (Bryant et al., 2000). A recent National Household Survey on Drug Abuse allocates a single item to measuring perceived risks associated with use of specific

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substances (SAMHSA, 2000). Moreover, such surveys typically are dominated by questions that tap demographic or behavioral factors, while overlooking potent psychological risk factors such as sensation seeking. Because heritable risk factors such as sensation seeking likely give rise to or moderate the influence of more proximal factors such as perceived risks, it is important that influential, large-sample surveys tap into these factors.

There are, of course, risks involved with the move from a 40-item measure to the two–four-item composites characteristic of large-scale surveys. Sensation seeking is manifest in a broad range of behaviors and preferences and, therefore, content validity concerns would suggest the need for a large, heterogeneous pool of items that exhaust the content domain (Epstein, 1983). Moreover, each item on a scale such as the SSS-V is a fallible indicator of the construct. Some portion of the variability in responses to each item corresponds to the sensation seeking construct; the remaining portion of variability is either random or systematic measurement error (Nunally, 1978). By aggregating over multiple items, the influence of random error is minimized (Cronbach, 1951). In short, all else being equal, longer measures are better.

Although longer measures are advantageous for addressing content validity and measurement error concerns, they are not without their drawbacks. One cost of high internal consistency in a set of items is the perception by respondents that they are repeatedly being asked the same thing. For lengthy measures, this validity-threatening problem is very likely (Bollen and Lennox, 1991). Another potential drawback, the one that motivated our research, is that the constraints present in many testing situations preclude the use of lengthy measures of constructs. As noted earlier, the typical large-sample survey study targets a large number of constructs within the context of a relatively short survey instrument. Short instruments also characterize most "screener" surveys used to determine eligibility for large surveys, experiments, or focus groups. If the only means of measuring a construct is with a lengthy scale, then that construct will most certainly not be represented in such studies. Thus, there are clear advantages to brief measures of constructs, and, in some testing situations, those advantages outweigh the benefits of longer measures.

Recently, a number of alternative measures of sensation seeking have been proposed. Although, in some cases, the measures differ in substantive ways from the SSS-V (see Arnett, 1994; Zuckerman et al., 1993), a feature they all share is that they are shorter than the SSS-V. For instance, the impulsive sensation seeking item set from the Zuckerman–Kuhlman Personality Questionnaire comprises 19 items. The Arnett Inventory of Sensation Seeking (Arnett, 1994) includes 20 items. In addition to these measures, which reflect a reconceptualization of the sensation seeking construct, several shorter measures comprise a subset of the SSS-V item set. The Sensation Seeking Scale for Children (Russo et al., 1993) includes 26 items, of which all but a few are edited versions of items from the SSS-V. Huba et al. (1981) described a measure in which each of the four aspects of sensation seeking is measured using four items chosen from the 40-item SSS-V. An abbreviated and revised eight-item form of this measure, the Brief Sensation Seeking Scale (BSSS; Hoyle et al., 2002), includes two items representing each aspect of sensation seeking. An important feature of all of these measures is that their associations with variables such as drug and alcohol use and various risk and protective factors are at levels consistent with those based on measurement of sensation seeking using the SSS-V.

Although the BSSS comprises only eight items and has been used in a number of large-scale survey studies (Palmgreen et al., 2001), it is not brief enough to warrant inclusion generally in nationwide studies such as the Monitoring the Future National Survey and the National Household Survey on Drug Abuse. As noted earlier, most constructs in such surveys are represented by a single item, and a ceiling for number of items devoted to a single construct is about four. Hence, we endeavored to develop a reliable and valid measure of sensation seeking consisting of no more than four items.

A logical starting point for the development of such a measure is the Brief Sensation Seeking Scale, which traces its roots to the SSS-V and, like the SSS-V, includes equal numbers of items from the four content areas identified in early descriptions of the construct (see Zuckerman, 1979; Zuckerman et al., 1978). An alternative strategy is to build on work coupling sensation seeking and impulsivity in a comprehensive psychobiological model of personality (Zuckerman et al., 1993). This work has given rise to a measure of impulsive sensation seeking (ImpSS) that does not make explicit reference to the four content areas apparent in the SSS-V and its derivatives. Rather, items on this measure refer more broadly to the preferences of sensation seekers (e.g., "I like doing things just for the thrill of it") and impulsive individuals (e.g., "I tend to begin a new job without much advance planning on how I will do it"). Rather than choosing one approach over the other, we set out to develop and evaluate two brief indices of sensation seeking, a four-item measure that preserves the basic framework of the SSS-V and a two-item measure that focuses more closely on the risk-taking elements of sensation seeking.

2. Method

2.1. Participants

The data on which our evaluation is based were generated in a large-scale investigation of the Office of National Drug Control Policy's (ONDCP) National Youth Anti-Drug Media Campaign (Crano and Burgoon, 2002). In this study, systematic random sampling with geographic and grade stratification were employed to draw monthly samples of about 200 teens and pre-teens from the Knoxville, Tennessee and Lexington, Kentucky public schools. For this analysis,

we used 29 months of data collected from November 2000 to March 2003. We analyzed data from participants in 7th through 11th grades, yielding 5187 participants. When missing data were eliminated, analyses were based on responses from 5135 to 5187 participants. One conditional item, regarding the respondent's intention to try marijuana in the future (conditioned on their never having tried it), generated only 4211 valid responses.

The sample was 52% female. Regarding ethnicity, the sample was 84.8% White, 11.8% African-American, and 1% or less Asian-American, Native American, Hispanic, or other. In terms of school grade level, 16.4% were in the 7th grade, 23.8% were in the 8th grade, 22.8% were in the 9th grade, 21.9% were in the 10th grade, and 15.0% were in the 11th grade. The median age was just over 14 years.

In order to describe the student sample in terms of substance use, we compared substance use means in several Gender by Grade analyses of variance (ANOVAs). For these analyses, we grouped 7th and 8th graders and compared them against 9th–11th graders. Consistent with other findings (Johnston et al., 2002), substance use was greater among older than younger participants: monthly marijuana use (24% versus 11%, $\eta^2 = 0.03$), lifetime marijuana use (26% versus 8%, $\eta^2 = 0.05$), monthly alcohol use (30% versus 13%, $\eta^2 = 0.04$), lifetime alcohol use (61% versus 33%, $\eta^2 = 0.08$), monthly tobacco use (24% versus 11%, $\eta^2 = 0.03$), and lifetime tobacco use (43% versus 22%, $\eta^2 = 0.05$). Gender differences were far less pronounced, with slightly more males reporting lifetime marijuana use than females (19% versus 15%, $\eta^2 = 0.003$). No significant Gender by Grade interactions were detected. For a comprehensive discussion on the relationship between substance use and sensation seeking, see Zuckerman (1994) or Bardo et al. (1996).

2.2. Recruiting protocol

Students were recruited by phone survey research centers at the University of Kentucky and the University of Tennessee. Recruiters first described the study to the participant's parent and then obtained permission to talk with the adolescent. The recruiter subsequently discussed the study with the adolescent, and if the adolescent agreed to participate, scheduled a time for the survey to be administered in the adolescent's home. Both the parent and the adolescent were informed, both verbally on the phone and during the interview in the parent's consent and adolescent's assent form, that the study was about adolescent drug use, feelings and perceptions about drugs, feelings about TV anti-drug ads, and things that might lead the adolescent to use or not use drugs.

2.3. Interview protocol

At the scheduled time, a trained interviewer from the university-affiliated survey research center administered the survey. Most were administered in the adolescents' home (78%) although some chose to complete the survey at one of the survey research centers. Prior to administering the survey, written parental consent and student assent were obtained. The questionnaire was administered via a laptop computer, with the great majority of items (especially sensitive ones) self-administered. This procedure provided privacy to the participants, particularly when responding to items concerning substance use. Parents were asked to leave the area where the adolescent completed the survey. Interviewers reported that 94% of the interviews were fairly to completely private. Upon completion, participants received a US$ 15 payment.

2.4. Survey instrument

The survey contained approximately 200 questions and was completed, on average, in about 45 min. Questions were randomized by the computer program where appropriate. At the outset, participants reported their media and program preferences just prior to completing the ImpSS and the BSSS (the BSSS-4 sensation seeking items were contained within the BSSS). Participants then answered questions about their beliefs, attitudes, and intentions regarding the use of tobacco, alcohol, marijuana, and inhalants as well as monthly and lifetime use for each. Approximately midway through, interviewers used a portable video player to show participants six anti-drug ads employed in the ONDCP media campaign. Participants rated each ad on a scale assessing message sensation value and perceived persuasiveness. Finally, participants completed items measuring their risk and protective factors as well as the SS2 items. While a large amount of data were collected, only those relevant to our evaluation of the sensation seeking measures are reported here.

2.5. Measures

2.5.1. Sensation seeking

Items forming four measures of sensation seeking were included in the survey, including: the 19-item set measuring impulsive sensation seeking (ImpSS) from the Zuckerman–Kuhlman Personality Questionnaire (Zuckerman et al., 1993) ($\alpha = 0.86$); the eight-item BSSS (Hoyle et al., 2002) ($\alpha = 0.74$); and the two-item SS2 (Slater, 2003) ($\alpha = 0.81$). The four items comprising the BSSS-4 are contained in the longer BSSS. Hence, those four items were culled from the larger scale ($\alpha = 0.66$).

Participants indicated responses to all sensation seeking items on five-point scales. For the ImpSS, BSSS, and BSSS-4, the scale was anchored by *strongly disagree* and *strongly agree*. For the SS2, the scale was anchored by *not at all* and *very often*. We examined the internal consistency for all combinations of sex and grade and found only trivial differences between groups.

The first of the two new indices, the BSSS-4, reflects an abbreviated version of the BSSS. We selected the four

items for the BSSS-4 only after examining the psychometric properties of the BSSS administered previously to a different group of 6368 adolescents (see Hoyle et al., 2002; Palmgreen et al., 2001). In developing the BSSS-4, we sought to retain one item from each of the four original SSS-V subscales. For three of these four subscales, the selected item had a higher item-total correlation. For the fourth item, the one representing the experience seeking domain, the item-total correlations were equivalent. Therefore, the item with the most appropriate wording for the widest range of potential respondents was selected. The four items are: (a) I would like to explore strange places; (b) I like to do frightening things; (c) I like new and exciting experiences, even if I have to break the rules; and (d) I prefer friends who are exciting and unpredictable.

The second new index (SS2) comprised two items developed by Slater (2003): (a) How often do you do dangerous things for fun? and (b) How often do you do exciting things, even if they are dangerous? These items were developed after revisiting the conceptual elements of sensation seeking and assessing orientations toward risky activities in general rather than specific risky behaviors.

2.5.2. Substance use

Lifetime use of tobacco, alcohol, and marijuana were assessed using the single item, "Have you ever used [name of substance]?" (1 = yes, 0 = no). These items were moderately intercorrelated (*r*s ranging from 0.41 to 0.54). Participants also indicated if they had used tobacco, alcohol, or marijuana during the past 30 days (1 = yes, 0 = no). These items also were also moderately intercorrelated (*r*s ranging from 0.42 to 0.47).

2.5.3. Risk and protective factors

Protective factors assessed included school belongingness, religiosity, family cohesion, and GPA. Responses were indicated on five-point scales (1 = strongly disagree, 5 = strongly agree). School belongingness was assessed via a five-item composite ($\alpha = 0.71$; e.g., "I feel like I belong at my school), religiosity using a four-item composite ($\alpha = 0.81$; e.g., "I am a religious person"), and family cohesion employing a four-item composite ($\alpha = 0.76$; e.g., "My family is very close"). GPA was assessed with a single-item self-report measure of average grades received during the past year. Risk factors assessed included deviance, perceived approval of marijuana, and perceived use of marijuana. Deviance was measured via nine items (e.g., "Have you ever cheated on a school assignment?") employing a three-point scale (1 = never, 2 = once or twice, 3 = three or more times; $\alpha = 0.78$). Perceived peer use of marijuana was assessed by two items (e.g., "How many of your friends do you think use marijuana?") on a five-point scale (1 = none, 5 = all) ($\alpha = 0.71$). Perceived peer approval of marijuana was measured with two items (e.g., "What do you think people at your school, in general, would think of you using marijuana?") on a five-point scale (1 = strongly disapprove, 5 = strongly approve) ($\alpha = 0.78$).

2.5.4. Beliefs, attitudes, and intentions

Attitudes toward tobacco, alcohol, and marijuana use were assessed using three items with a five-point response scale (1 = strongly disagree, 5 = strongly agree): "People should not use [substance]"; "The idea of using [substance] scares me"; and, "Using [substance] is okay." For marijuana only, two additional attitudinal items were employed: "I don't want to hang around people who smoke marijuana." and "I have bad feelings toward people who smoke marijuana". The internal consistencies of the alcohol ($\alpha = 0.75$), tobacco ($\alpha = 0.64$), and marijuana ($\alpha = 0.87$) attitude scales were fair to very good. These scales were scored so that higher scores reflected more positive attitudes toward use of the substance.

Belief and intention measures were assessed for marijuana use only. Ten items measured beliefs about the negative consequences of using marijuana (e.g., "I believe that using marijuana can make your problems worse.") using five-point scales (1 = strongly disagree, 5 = strongly agree). The items were scored so that higher scores meant more positive beliefs about marijuana. Internal consistency of the belief items was 0.91. One item measured intent to try marijuana "at least once" in the future for respondents who reported never having tried it. A separate item assessed intent to use marijuana "regularly" in the future; all participants responded to this item.

3. Results

Descriptive statistics for the four measures of sensation seeking are reported in Table 1. Statistics for the BSSS-4 are comparable to those for the established measures, ImpSS and BSSS. The means for SS2 were slightly lower. In terms of mean scores, there were no problems with floor or ceiling effects for either of the new indices. Standard deviations for the BSSS-4 and SS2 were consistent across subsamples, although slightly higher for SS2.

We compared means on each measure in Gender × Grade analyses of variance (ANOVAs). For these analyses, we grouped 7th and 8th graders and compared them against 9th–11th graders. These analyses revealed statistically significant effects of both grade and gender on all four measures of sensation seeking, although the sample size provided enough power to detect even small differences. For gender, means were slightly higher for males than for females across all scales ($P < 0.05$). The magnitude of the difference in male and female scores were comparable on the BSSS-4, ImpSS, and BSSS, although the differences were trivial (η^2 ranged from 0.012 to 0.015). The gap between males and females was notably larger on the SS2 as indicated by the higher effect size ($\eta^2 = 0.05$). Regarding grade level differences, the new measures performed no differently than

Table 1
Descriptive data for responses to measures of sensation seeking by sex and by grade

	Full sample[a]	Sex[b]		Grade[c]	
		Male	Female	7–9	10–11
ImpSS					
M	2.92	3.00	2.85	2.88	2.97
S.D.	0.67	0.66	0.67	0.67	0.67
Skew	0.01	−0.08	0.12	0.01	0.03
Kurt	−0.40	−0.32	−0.40	−0.39	−0.41
BSSS					
M	3.14	3.24	3.07	3.01	3.26
S.D.	0.80	0.80	0.80	0.82	0.79
Skew	−0.10	−0.21	0.00	−0.04	−0.13
Kurt	−0.53	−0.45	−0.54	−0.55	−0.52
BSSS-4					
M	3.13	3.24	3.02	3.03	3.22
S.D.	0.88	0.87	0.87	0.90	0.85
Skew	−0.12	−0.24	−0.03	−0.08	−0.15
Kurt	−0.57	−0.49	−0.57	−0.64	−0.52
SS2					
M	2.45	2.69	2.22	2.42	2.49
S.D.	1.06	1.10	0.97	1.07	1.05
Skew	0.47	0.27	0.63	0.54	0.43
Kurt	−0.44	−0.64	−0.13	−0.36	−0.49

[a] $N = 5187$.
[b] Males, $n = 2485$ and females, $n = 2702$.
[c] Grades 7–9 $n = 2085$ and grades 10–11 $n = 3102$.

conventional measures; that is, scale means for the upper grade levels were statistically greater than the lower grade levels on all scales. Although the BSSS and BSSS-4 displayed slightly larger increases by grade, the effect sizes for all scales were also trivial (η^2 ranged from 0.002 to 0.016). No significant gender by grade interactions were detected.

The correlations among the four scales are reported in Table 2. The ImpSS, BSSS, and BSSS-4 share a substantial amount of variance, suggesting a consistency in the measurement of the sensation seeking construct. Although the SS2 shares about a third of the variance with the longer scales, it appears to capture some variance unique to its focus on thrill and danger seeking.

Finally, the internal consistency of the BSSS-4 and the SS2 was very good and varied only trivially as a function of gender and grade. Coefficient alpha was higher for the SS2 than the BSSS-4; however, the broad-band strategy reflected in the latter likely explains this difference. Differences in internal consistency between the new and established measures were small. Average corrected item-total correlations for the two new measures (0.44 for BSSS-4. and 0.67 for SS2) were similar to those for the longer scales (0.45 for the ImpSS, 0.45 for BSSS).

Table 2
Correlations between four different measures of sensation seeking

	ImpSS	BSSS	BSSS-4	SS2
ImpSS	(0.86)			
BSSS	0.83	(0.74)		
BSSS-4	0.81	0.89	(0.66)	
SS2	0.61	0.59	0.58	(0.81)

All *r*s are significant at $P < 0.001$; values in parentheses on the diagonal are coefficient alpha.

Table 3
Correlations of sensation seeking scores with responses to substance-related items

Substance	ImpSS	BSSS	BSSS-4	SS2
Tobacco				
Ever used	0.31	0.32	0.28	0.27
30-Day use	0.29	0.29	0.26	0.26
Favorable attitude	0.33	0.32	0.28	0.28
Alcohol				
Ever used	0.30	0.35	0.30	0.26
30-Day use	0.29	0.32	0.27	0.25
Favorable attitude	0.32	0.35	0.30	0.28
Marijuana				
Ever used	0.28	0.30	0.27	0.28
30-Day use	0.23	0.25	0.23	0.24
Favorable attitude	0.42	0.42	0.38	0.37
Favorable beliefs	0.35	0.35	0.32	0.32
Intention to try once	0.34	0.34	0.30	0.31
Intention to try regularly	0.27	0.27	0.25	0.26

All *r*s are statistically significant at $P < 0.001$.

3.1. Nomological network

Correlations of each measure of sensation seeking with tobacco, alcohol, and marijuana-related attitudes and behaviors followed the expected pattern. These correlations are displayed in Table 3. The correlations are arrayed by category of substance. Overall, sensation seeking as measured by all four scales was positively related to lifetime and 30-day use of every substance. Additionally, higher sensation seeking was associated with more positive attitudes toward the use of every substance. Moreover, higher sensation seeking was associated with more positive beliefs about the consequences of marijuana and with stronger intentions to use marijuana both casually and regularly in the future.

Comparing the established measures to the new indices, there was only slight variability in the correlations with the substance-related outcomes. Although the BSSS-4 and SS2 correlations were slightly lower on the whole than for the longer scales, the largest difference is 0.09 (between SS2 and BSSS for lifetime alcohol use). Given the large sample size, correlation coefficients that differed by 0.02–0.03 *r*-units were significantly different. But when cast in practical terms, none of the coefficients differed to an extent that would result in different inferences in a research study.

The correlations of the sensation seeking measures with the risk and protective factors are shown in Table 4. The expectation was that sensation seeking would be positively correlated with the risk factors and negatively correlated with the protective factors. For all four measures, higher sensation seeking was associated with lower school belongingness,

Table 4
Correlations of sensation seeking scores with risk and protective factors

Factor	ImpSS	BSSS	BSSS-4	SS2
Protective factors				
School belongingness	−0.20	−0.20	−0.21	−0.25
Religiosity	−0.18	−0.16	−0.18	−0.20
Quality of home life	−0.26	−0.27	−0.23	−0.29
GPA	−0.29	−0.19	−0.21	−0.19
Risk factors				
Perceived peer use of marijuana	0.31	0.34	0.29	0.27
Perceived peer approval of marijuana	0.33	0.33	0.31	0.26
Deviance	0.42	0.45	0.42	0.46

All *r*s are statistically significant at $P < 0.001$.

religiosity, quality of home life, and self-reported GPA. In contrast, higher sensation seeking was associated with greater perceived use of marijuana by peers, greater peer approval of marijuana use, and more deviant behaviors. The associations involving the new indices were very consistent with those involving the established measures of sensation seeking. Overall, the deviations among correlations involving the four sensation seeking measures were small with the largest difference of 0.10 (between SS2 and ImpSS for GPA).

We observed a few significant differences between males and females in the strength of associations, although the differences were small. The mean correlations between the sensation seeking measures and substance-related beliefs, attitudes, and use averaged 0.05 greater for females than males on the new indices as well as on the two established scales. Additionally, scale correlations between sensation seeking and risk factors averaged 0.04 higher for females than males on the new indices and 0.05 greater on the established measures. Finally, the correlations between sensation seeking and protective factors averaged 0.03 greater for females than males on all four measures. Thus, the lower mean sensation seeking scores for females reported in Table 1 did not translate into less predictive power for the SS scales among females. Both the new and established measures yielded results that were quite similar.

As with gender, differences in grade level were, in practical terms, very small. The correlations between the sensation seeking measures and the substance-related beliefs, attitudes, and use averaged 0.06 greater for older than younger students on the new indices and 0.05 on the two established scales. For protective factors, correlations for older students averaged only 0.01 higher than younger students according to the new scales and the established scales. For risk factors, correlations for older students averaged 0.02 greater than younger students according to the new indices and 0.01 greater when based on the established measures. Among the substance-related items, what small differences that exist appeared mostly in the marijuana-related items. However, the standard deviations for marijuana-related attitudes, intentions, and use were considerably larger for older students than younger students. The restricted range of responses for younger students (especially for marijuana), then, helps explain the slightly larger correlations between the sensation seeking measures and substance-related outcomes for older students.

4. Discussion

Sensation seeking in central to much of the substance use research, yet it is generally absent from large-scale surveys. Hence, our goal in this investigation was to establish the predictive and convergent validity of two very brief measures of sensation seeking suitable for screening and inclusion in lengthy surveys. Results of our evaluation established the empirical utility of two new sensation seeking indices, a four- and a two-item measure (BSSS-4 and SS2). Both new measures displayed conceptual ties to their longer counterparts with only slight loss in predictive power. Although both of the measures are brief, they differ in their approach to operationally defining the sensation seeking construct. Whereas the four-item measure references a range of novel and exciting experiences, the two-item measure focuses more generally on dispositions toward behaviors that are exciting and risky. Our findings indicate that both operational definitions are valid with reference to alcohol and drug-related attitudes and behavior.

The BSSS-4 and SS2 exhibited stable psychometric properties across both gender and grade level. Reflecting the moderate corrected item-total correlations among items within each index, the reliability of both indices is quite good despite their brevity (Cortina, 1993). For evidence of convergent validity, we desired strong correlations between the new indices and two well-established measures of the sensation seeking construct. In the main, the BSSS-4 performed exceptionally well. Understandably, the BSSS-4 is strongly correlated with the BSSS, from which it is drawn, but it also is strongly correlated with the ImpSS. The BSSS-4, then, appears to adequately capture the tendencies of impulsive sensation seekers while also exhibiting a strong conceptual link to the original four-dimensional conceptualization of sensation seeking. These findings are not entirely surprising since all share a conceptual link to the original Zuckerman Form V scale. The SS2, despite having only two items, still correlated moderately and consistently with the other three measures of sensation seeking. The SS2 is slightly different from the other three scales in that it focuses specifically on the orientation toward risky and exciting behaviors. In contrast, items in the other three scales concentrate on a broader range of novel, exciting, and risky experiences. Hence, it is not surprising that the correlation between the SS2 and the other scales is slightly less than the intercorrelations among the other three measures. As we subsequently describe, the fact that all four scales correlated similarly with substance use underscores the

robustness of the sensation seeking construct within this research context.

Further attesting to their construct validity, the BSSS-4 and SS2 integrated nicely into the nomological network of associations between sensation seeking and substance use, attitudes and beliefs about such use, intentions to use, and risk and protective factors for drug use. As expected, both indices were negatively related to protective factors and positively related to risk factors (Newcomb and Felix-Ortiz, 1992; Newcomb et al., 1986) as well as use, attitude, belief, and intention measures. In sum, the findings reported here established the reliability and construct validity of two very brief measures of sensation seeking. Both new measures performed in ways strikingly consistent to their longer counterparts, are reliable indices, and maintain the predictive properties for other constructs in the nomological network of alcohol- and drug-related constructs.

We have reason to believe these new measures can be used successfully in other countries and cultures beyond the United States. First, Zuckerman's Form V scale, from which the BSSS and BSSS-4 are derived, has been utilized extensively in other countries with results very similar to those in the United States (see Zuckerman, 1994, for a discussion). Second, whereas the Form V and, to a lesser extent, the ImpSS contain items referencing culture-bound behaviors or practices (e.g., water skiing, parachute jumping), both the BSSS-4 and the SS2 contain items that are much more general. Hence, these items should, with some ease, be applicable to other cultures. Finally, Cheah (2003) employed the BSSS (which contains the items comprising the BSSS-4) in Malaysia, Singapore, and England and found the measures reliable in these non-US samples. Only further use of the scales in other cultures will provide evidence of the cultural appropriateness of the BSSS-4 and SS2. Clearly translations of these items and other cross-cultural replication is desirable.

Both new indices are currently, or were previously, used in large-scale surveys of the adolescent population and anti-drug communication. The BSSS-4 has been utilized in a nationwide survey of substance use. The National Survey of Parents and Youth (NSPY), which was designed in part to evaluate the effects of the ONDCP's national anti-drug campaign, incorporates the BSSS-4 (although not the BSSS) in its youth questionnaires. The measure has been a strong predictor among teens in the national NSPY waves of all measures of marijuana use, intentions, attitudes, beliefs, perceptions of social norms, and offers of marijuana, and most measures of inhalant use, intentions, beliefs and attitudes (Hornik et al., 2001). The brevity of the BSSS-4 sensation seeking measure was instrumental in fostering its inclusion in the evaluation of this national campaign. The campaign strategy, in part, rests on targeting high sensation seeking adolescents with high sensation value (i.e., visually, aurally, and emotionally stimulating) anti-drug messages. Activation and arousal needs of high sensation seekers can be met through such messages (Donohew et al., 1998). Researchers have documented substantial drops in monthly marijuana use by high sensation seekers when this television advertising strategy is employed (Palmgreen et al., 2001).

The SS2 was used in a study by Slater et al. (2001), and the findings from that study underscore those reported here. The two-item index was administered to over 3000 students in the eighth grade in ten different geographical locales across the US. As in the present study, the SS2 proved reliable and was correlated with key substance use measures even after controlling for a wide variety of other risk factors. Slater (2003) also found that the SS2 was a strong predictor of adolescent use of violent media. In both of these studies, sensation seeking was one of a large number of constructs of interest to the researchers and could be assessed easily because a very brief index was available.

Our evaluation indicates that the four- and two-item measures of sensation seeking are psychometrically sound and, when necessary, can be substituted for their longer counterparts without significant loss of predictive power. The four-item measure retains the four content domains of the original SSS-V and may be preferred by those researchers committed to this conceptualization or wishing to model a latent variable. The content of the two-item measure is more homogenous, but the composite score is a viable representation of the sensation seeking construct for surveys that allocate no more than two or three items for each construct. Importantly, the availability of these measures provides survey researchers with two ways of including in their protocol a potent predictor of alcohol- and drug-related attitudes and behaviors. The utility of these scales with adult populations, however, is unknown as our data only reflect the responses of adolescents. Subsequent research with older populations and in other cultures is warranted.

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