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DEVELOPMENT OF A BRIEF SUBSTANCE USE SENSATION SEEKING SCALE: VALIDATION AND PREDICTION OF INJECTION-RELATED BEHAVIORS

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Abstract

Sensation seeking, a personality trait, has been shown to predict engagement in high-risk behaviors. However, little is known regarding the impact of sensation seeking on substance use among street youth. We therefore sought to modify a sensation seeking scale (SSS) for use among this population. Street youth from the Vancouver-based At-Risk Youth Study (n = 226) completed the modified SSS. Exploratory and confirmatory factor analysis (EFA/CFA) were undertaken to establish the scale's dimensionality and internal validity. The association between SSS score and injection-related behaviors was tested using generalized estimating equation (GEE) analysis. EFA results indicated scale unidimensionality. The comparative fit index (CFI) suggested acceptable fit (CFI = 0.914). In multivariate analysis, sensation seeking was independently associated with injection drug use, crystal methamphetamine use, polysubstance use, and binge drug use (all p < 0.05). Our findings provide preliminary support for the use of the modified SSS among street youth.

Keywords

injection; crystal methamphetamine; sensation seeking; street youth; injection initiation

INTRODUCTION

Sensation seeking, a personality trait first identified in the 1950s and frequently measured using the Sensation Seeking Scale (SSS) developed by Zuckerman, can be briefly defined as a desire for novel and potentially risky experiences [1]. A large body of scientific literature

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has demonstrated that sensation seeking increases dramatically between the ages of 12 to 14, remains relatively stable throughout young adulthood, and declines slightly between the ages of and 25, though individual trajectories vary [2, 3]. While consisting of four subdomains, sensation seeking has been modeled as a single unidimensional trait, and past research has shown sensation seeking to be a reliable measure of an individual's willingness to engage in risky behaviors [4–8]. In particular, the SSS has been employed as a tool to identify individuals who may be at higher risk of substance use [6]. For instance, anti-drug public service announcements have been designed for an audience of high sensation seekers in order to reduce the initiation of drug use among this group [9, 10]. A recent randomized controlled trial also found that cognitive-behavioral interventions that worked to lower sensation seeking among youth were efficacious in reducing levels of alcohol misuse [11]. Additionally, changes in sensation seeking level have been associated with changes in adolescent use of alcohol, marijuana and tobacco. For instance, one study found that youth who experienced a slower decrease in sensation seeking level over time were subsequently more likely to increase their alcohol use [2]. This may be related to the fact that higher sensation seeking among adolescents has been shown to be associated with childhood sexual abuse, which in turn has been identified as a risk factor for substance use [12]. As such, an investigation of sensation seeking among street-based drug-using populations may contribute to a greater understanding of the linkages between distal factors and psychosocial variables that may heighten the risk of drug-related behaviors such as injecting.

Relatedly, Kalichman and colleagues suggest that sensation seeking may act as a mediating factor in sexual transmission of HIV, but that the SSS may be an inappropriate tool for individuals in subpopulations at high risk because many scale items refer to behaviors that are inappropriate for certain subpopulations (e.g., the SSS item regarding a willingness for "Discussing your sex life with friends" would likely not be a valid measure of sensation seeking among a cohort of individuals who report engaging in sexual risk-taking; similarly, "Trying the drug LSD" would not accurately measure a desire for risk-taking among a cohort of experienced illicit drug users) [13, 14]. To address this limitation, Kalichman and colleagues adapted a brief version of the SSS to specifically measure sexual risk-taking among a cohort of gay men with a history of high risk sexual activity. The authors found that their adapted SSS consistently predicted sexual risk-taking among the sample, as indicated by higher frequency of unprotected sexual intercourse and a greater number of sexual partners [15].

Though prior studies have been undertaken among IDU samples incorporating the SSS [16, 17], these have not ensured the cultural appropriateness of the scale for this street-based drug-using population and have not sought to modify this scale to correct this potential source of error. Experts have also previously suggested that future research in the area of sensation seeking and drug-related risk-taking requires a clinically-validated scale [18]. Indeed, to our knowledge, no research has been conducted on the role of sensation seeking in increasing the risk of injection drug use among street-involved youth.

Researchers have identified a variety of risk factors for injection initiation, including binge drug use, polysubstance use, childhood trauma, neighbourhood of residence, and sociodemographic factors [12, 19–27], while recent research suggests that crystal

methamphetamine use may also be associated with an increased risk of injection drug use among street-involved youth [28, 29]. This study seeks to extend the scientific evidence base regarding factors associated with injection drug use among street-involved youth by considering the potential role of sensation seeking in heightening such risk. Specifically, determining the association between drug-related behaviors identified as predictors of injection drug use and sensation seeking may further improve our understanding of the role of sensation seeking in youth drug use behavior. We therefore sought to modify and validate a brief SSS for use among street-involved youth and to then examine its potential utility in assessing risk of injection drug use, crystal methamphetamine use, polysubstance use, and binge drug use among a sample of street-involved youth.

METHODS

This study included individuals enrolled in the At-Risk Youth Study (ARYS), an open and ongoing prospective cohort of street-involved youth based in Vancouver, Canada [20]. Youth, defined as individuals aged 14 to 26 (largely consistent with the World Health Organization definition of youth [30]), were recruited through street-based outreach and were eligible if they had used illicit drugs other than marijuana in the past 30 days, provided written informed consent, and were street-involved. While recruitment began in 2005, rolling recruitment continued throughout the study period. There was no specific requirement that youth spend a minimum amount of time on the street to qualify for the study; however, the street-based recruitment process elicited a sample of youth who spent extensive time on the street, a large proportion of whom were homeless. At baseline, ARYS participants completed an interviewer-administered questionnaire and provide blood samples for diagnostic testing, along with other physical and mental health assessments. Participants then completed semi-annual interviewer-administered questionnaires soliciting sociodemographic, behavioral, and drug use data, including data on drug injecting. As part of this specific study, ARYS participants also completed the modified SSS during one follow up interview. Participants are provided with a $20 CND honorarium at each visit. The study has been approved by the University of British Columbia/Providence Health Care Ethics Review Board, and all study participants provided written consent prior to enrolment.

Scale Development and Evaluation

The modified SSS was developed by adapting items from the SSS Form-V [1] using a four-stage process. First, 11 items in the SSS Form-V that were amenable to adaptation for a high-risk drug-using population were identified. These 11 items were drawn from each of the four sensation seeking subdomains (i.e., disinhibition, thrill and adventure seeking, boredom susceptibility, and experience seeking) to ensure that the modified scale measured all of the aspects of the sensation seeking construct. Second, item modification was undertaken in consultation with experts in psychology, drug use, and youth behavior to ensure that the modified scale items reflected themes relevant to a street-involved youth population.

The modified scale was then administered to ARYS participants and exploratory factor analysis (EFA) was conducted on these data in order to assess the dimensionality of the

modified scale. Confirmatory factor analysis (CFA) was then undertaken to assess the internal validity and reliability of the modified scale.

With respect to the EFA, this was undertaken to ensure that the modified SSS was essentially unidimensional, consistent with the original SSS [31]. To do so, we engaged in a series of tests to determine the optimal number of factors to retain in the measurement model, as previously recommended [32]. To accommodate potential skewing, the ordinal nature of the item responses, and to allow for correlated factors, robust EFA was performed. This is because the estimated correlation matrix derived through classical EFA techniques is susceptible to bias in cases when the distribution of data departs from normality [33]. To account for non-normal distributions, robust EFA employs Weighted Least Squares Estimation with Mean and Variance Adjustment (WLSMV) with a GEOMIN rotation supporting oblique factors, which is less susceptible to influence from outliers and skewed data [33]. Cronbach's α was also generated to provide a measure of internal consistency [34]. These were done using Mplus Version 6 (Mplus, Los Angeles, CA) [35].

Evaluating the results of the EFA involved a series of *a priori* determined steps, including generating a scree plot of eigenvalues and comparing the size of the largest eigenvalue relative to that of the next largest eigenvalue. A parallel analysis approach suitable for ordinal data was employed as previously recommended by experts in the field [32, 36]. Specifically, this technique uses a Monte Carlo simulation modeling approach [37], in which the eigenvalues derived from an original dataset are compared with eigenvalues extracted from a series of random datasets matched to the original on the number of cases and scale items [36]. The mean eigenvalues of the random data generated at a desired percentile, generally recommended as the 95^{th} percentile, then serve as the comparative baseline to assess the dimensionality of the scale [36]. Those eigenvalues generated from the scale data are subsequently retained if they are greater than the corresponding eigenvalues generated by the random dataset, and the number of eigenvalues retained by this process is interpreted as the number of factors measured by the scale items. When only one eigenvalue is retained, this indicates that the pool of items being assessed is essentially unidimensional [36]. This calculation was performed using a macro package developed by O'Connor for use in SPSS 20.0 (IBM, New York, NY) [36].

The CFA approach involves the use of statistical methods to assess the fit of the model derived from the EFA, and also provides a measure of construct validity for the scale. As with the EFA, WLSMV was employed to accommodate potential skewing and the ordinal nature of the data [35]. Construct reliability was then calculated according to the approach recommended by Gerbing and Anderson [38], which assesses reliability based on the variance across items explained by one underlying latent construct (e.g., sensation seeking). This approach is used for measuring scale reliability in cases wherein scale items load onto the same construct but have loadings unequal in magnitude [38, 39]. In addition to assessing construct reliability, the Comparative Fit Index (CFI) [40], and the Root Mean Square Error of Approximation (RMSEA) were used to evaluate the fit of the CFA model [41, 42]. The CFA was performed using Mplus Version 6 (Mplus, Los Angeles, CA) [35].

Hypothesis testing

The hypothesis that the modified SSS scores was associated with drug-related behaviors identified as risk factors for injection initiation, as well as injection drug use itself, among street-involved youth was tested using a series of generalized estimating equation (GEE) models. This approach allows for the determination of factors independently associated with injection drug use among participants throughout the study period [43]. It also provides modified standard errors adjusted by multiple observations per person using a first-order autoregressive correlation structure [43]. Specifically, four multivariate GEE models were constructed, all of which included participant score on the modified SSS as the primary independent variable of interest. The dependent outcomes for the four models were defined as: recent injection drug use (i.e., in the six months previous to follow-up interview), recent crystal methamphetamine use, recent polysubstance use, and recent binge drug use. To allow for longitudinal analysis and given the relative stability of sensation seeking level among youth aged 19–25, participant sensation seeking score was assigned to individuals across the study period, with models employing ARYS data retrospectively. Injection drug use was defined as illicit injection of any drug. Length of drug-using career was included in all four models as a within-subject variable. Sociodemographic and drug-related variables potentially associated with the four outcome variables and included in the analyses were: age, gender, Aboriginal ancestry (yes *vs.* other), recent non-injection heroin use, recent non-injection powder cocaine use, recent non-injection crack cocaine use, and recent non-injection crystal methamphetamine use. All drug-related variables except for length of drug-using career refer to behaviors undertaken in the previous six months, and all were lagged by one follow-up questionnaire to protect against reverse causality whereby factors associated with the outcome variables for each GEE model may instead result from this behavior. The multivariate models were fit using an *a priori* defined model building protocol of adjusting for all variables that were statistically significant at the $p < 0.05$ level in bivariate analyses along with basic sociodemographic variables (e.g., age, gender, and ethnicity).

All statistical analyses for hypothesis testing were performed using SAS software version 9.2 (SAS Institute Inc., Cary, North Carolina, USA). All *p*-values are two-sided.

RESULTS

Overall, between October 2005 and May 2012, 226 ARYS participants completed the SSS and were eligible for the present study. This sample included 73 (32.3%) female participants, and 66 (29.2%) participants reporting Aboriginal ancestry. Median age at baseline was 22 years (Interquartile Range [IQR]: 20 – 23). Median follow up was 33 months (IQR: 27 – 46).

One hundred and sixty-three (72.1%) participants reported injection drug use during the study period. Compared to the overall ARYS sample ($n = 991$), the subsample of ARYS participants that completed the modified SSS did not differ significantly on age, Aboriginal ancestry, frequency of injecting at baseline, or length of drug-using career (all $p > 0.05$). Participants completed a median of 5 follow-up visits (IQR: 4–7) over the study period.

Frequency distribution of scale responses

Table I presents the modified SSS items and potential responses measured on a 5-point Likert scale. Among ARYS participants, median SSS score was 21 (IQR = 15 – 27, Standard Deviation [SD] = 8). While the test statistics for the distribution of scale items 2 and 10 suggest that these were particularly right-skewed, the skewness for the test statistic assessing the distribution of responses for the total score was 0.75 (Standard Error [SE] = 0.16), denoting moderate skewing and an approximately symmetrical distribution [44]. Additionally, the computation of kurtosis suggested that the distribution of scale items 3 and 10 were highly leptokurtic (i.e., data points lie close to the mean), though the test statistic for the distribution of responses for the total score was 0.73, suggesting that the frequency distribution approached mesokurtosis (i.e., the distribution approached normality) [45].

Exploratory Factor Analysis

Figure 1 shows a scree plot delineating the eigenvalues from the EFA solution. As can be seen, the plot demonstrates a sharp drop in eigenvalues between the first and second factors, with the eigenvalue for the first factor almost five times larger than the eigenvalue for the second largest factor. Furthermore, in parallel analysis [36], the first eigenvalue generated at the 95^{th} percentile of the random dataset was 1.37. By contrast, the eigenvalue associated with the first factor in the EFA for the modified SSS dataset was 5.43, while the eigenvalue associated with the second factor was 1.19. The second eigenvalue associated with the 95^{th} percentile of the random dataset was 1.27, and thus exceeded that associated with the second factor in the dataset of responses to the modified SSS. Further, the coefficient of consistency was above the generally accepted threshold cut-off for acceptability (Cronbach's $\alpha = 0.776$) [46]. The results of the scree plot, parallel analysis, and Cronbach's α test therefore support a one-factor or unidimensional solution for the modified SSS items [36].

Confirmatory Factor Analysis

A construct reliability estimate of 0.804 was derived for the unidimensional model [47, 48]. The CFI suggested an acceptable level of agreement between the model and the data (CFI = 0.914) [49], and while the point estimate for the RMSEA was high, the range estimate approached the cutoff point indicating acceptable fit (RMSEA = 0.111, 95% CI: 0.093 – 0.129, $p < 0.001$) [40, 41]. Alternative models to improve fit were tested by removing select items and specifying a two-factor solution, though these did not improve fit.

Hypothesis Testing

Table II presents results from the four multivariate GEE models. As shown, total SSS score was significantly associated with injection drug use (Adjusted Odds Ratio [AOR] = 1.04, 95% CI: 1.02 – 1.05 [per one unit score increase]), non-injection crystal methamphetamine use (AOR = 1.03, 95% CI: 1.00 – 1.07 [per one unit score increase]), polysubstance use (AOR = 1.06, 95% CI: 1.03 – 1.09 [per one unit score increase]), and binge drug use (AOR = 1.03, 95% CI: 1.01 – 1.05 [per one unit score increase]) (all $p < 0.05$), despite adjustment for potential confounders. These correspond to an AOR of 1.37 for injection drug use, an AOR of 1.27 for crystal methamphetamine use, an AOR of 1.59 for polysubstance use, and

an AOR of 1.27 for binge drug use, for each increase of one standard deviation (i.e., 8 point increase) in total score.

DISCUSSION

The present study sought to develop a brief SSS suitable for use among a street-based drug-using population. The results of the EFA and CFA provided preliminary support for the reliability and validity of the modified SSS. Furthermore, despite adjustment in multivariate confounding GEE models, participant score on the modified SSS was independently associated with injection drug use, non-injection crystal methamphetamine use [20], as well as polysubstance use and binge drug use, both previously identified as predictors of initiation of injection drug use [26, 27]. Additionally, while the AORs for sensation seeking and all four drug-related outcomes were relatively small for a one-point increase in total score, the differences between scores one standard deviation apart were substantial. As such, there may be a role for the use of the modified SSS to assess the impact of the intersection of sensation seeking and traditional risk factors for injection drug use within investigations focusing on specific drugs or the socio-structural context of injecting [22, 28, 50].

The street-involved youth population in our study setting is marked by high levels of crystal methamphetamine and polysubstance use [51], ready access to drugs [28, 52, 53], a high level of exposure to injecting [25], ongoing structural and social barriers to housing [54], overdose [19], and high levels of involvement in the illicit drug trade [55]. These intersecting factors increase the risk of negative health outcomes, most notably injection initiation [24, 26, 56–60]. Future research should therefore determine whether preventing these behaviors, and in turn injection initiation, may be achieved by reducing the level of sensation seeking among high-risk street-based drug users. Relatedly, previous research has found that among a sample of polysubstance users in Chicago, high sensation seeking was associated with risky sexual practices among HIV-seropositive participants [61], while multiple studies of gay men have found that sensation seeking partially accounts for the association between drug use and high-risk sexual behaviors [62, 63].

More research is therefore needed to determine what specific role sensation seeking may have on risks related to injection initiation, and whether behavioral interventions, or the use of particular drugs, may impact the expression of this personality trait. To begin, future research should seek to determine the incremental validity of the modified SSS presented herein over the existing SSS used among the general population. Effort should then be directed towards seeking to disentangle the association between non-injection crystal methamphetamine, as well as the other drug-related risk behaviors identified in this study, which are both associated with sensation seeking and may be associated with an increased risk of injection initiation. Of critical importance in this regard is determining the direction of causality between drug use and sensation seeking, given that research has demonstrated that use of amphetamines and other stimulants by youth may increase levels of sensation seeking [64]. This, then, presents multiple potential causal pathways for injection drug use related to sensation seeking and crystal methamphetamine use: first, the relationship between sensation seeking and injection initiation may be mediated by crystal methamphetamine use among street-involved youth [65]. Second, crystal methamphetamine

use might cause neurological changes that may then impact the degree of sensation seeking and risk-taking that street-involved youth engage in, which in turn may precipitate the initiation of injection drug use. Additionally, it is imperative that future work in this area test the divergent validity of the modified scale from measures of addiction, given the focus of the modified scale on risky drug-related behaviours that may lead to or be symptomatic of drug dependence. Indeed, previous work suggests that street-involved youth seeking to initiate injection in our study setting and others may not be motivated primarily by drug dependence [22, 66]. Determining individuals' level of sensation seeking prior to and after their initiation of injection drug use, as well as their relative scores on assessments of drug dependence, may provide valuable insight into the relationship between sensation seeking and drug dependence.

Prior research has also demonstrated that sensation seeking may be a mediating factor between childhood sexual abuse and increased HIV risk among adolescents [67, 68]. Importantly, the ARYS sample of street-involved youth is, consistent with street-involved youth samples in other settings [59], characterized by high levels of childhood sexual abuse [69]. Indeed, while childhood sexual abuse has been shown to be positively associated with sensation seeking [67], future research should, as above, focus on ensuring the divergent validity of the modified SSS from closely related psychosocial constructs such as impulsivity [2, 3], given that both have been found to be associated with childhood sexual abuse [70, 71]. Future research employing ARYS data should include prospective longitudinal methods to assess the association between participant score on the modified scale and subsequent risk behaviors. For example, survival analyses could be used to investigate whether increased score on the modified scale influences time to engaging in a range of risky drug-related behaviors such as initiating injection drug use, entering the drug trade, or binge drug use, among street-involved youth enrolled in the ARYS cohort. Additionally, growth mixture modeling approaches could be employed to determine whether participant score on the modified scale is associated with subsequent trajectories of drug use [72]. This analytic approach involves identifying latent classes represented by different change trajectories over time, while allowing individual differences in trajectories within and between the latent classes [73–75]. In such an analysis, latent classes could be defined based on the types of drugs used, frequency of use, or modes of administration (i.e., injection *vs.* intranasal *vs.* smoked) that participants report, and analyses could determine whether participant sensation seeking score is associated with any particular latent class. Finally, future research should also involve retesting ARYS participants' modified scale score in order to identify any changes in score and to determine whether changes are related to type of drug use, frequency, and mode of drug administration. Research should also focus on comparing results from the modified scale with the general SSS to ensure discriminant validity.

If future research further confirms that the modified SSS can reliably identify street-involved youth at high risk for injecting initiation, it may aid in the development of novel, evidence-based preventive interventions for this high-risk population, which has been largely overlooked by policymakers [76]. For example, recent research has demonstrated the potential effectiveness of interventions specifically focused on reducing an individual's level

of sensation seeking through cognitive behavioral therapy [11, 77], and studies have also examined the impact of sensation seeking on retention in addiction treatment [5, 78, 79]. Potential preventive approaches should not, however, replicate previous social marketing interventions that have employed sensation seeking without a strong consideration of the socio-structural context of drug-related behaviors and have proven ineffective [80, 81].

This study has limitations. First, it should be noted that the modified SSS presented in this study represents a first step in this scale's development. Additionally, the EFA and CFA reported in this study were performed on the same dataset in order to maximize the amount of information obtained on the performance of the modified SSS. Additional studies are therefore needed to further evaluate the scale's reliability and validity in independent samples. In particular, the less than optimal CFA results and skewed response patterns for several items indicate that additional revisions to the SSS involving item wording, response options and the addition of new items should be considered by researchers working to further refine this tool. Further, the less than optimal RMSEA estimate suggests that approaches using multiple factor solutions reflecting the potential presence of the four sensation seeking subdomains (e.g., disinhibition, thrill and adventure seeking, experience seeking, and boredom susceptibility) may be required. Second, the relatively small sample size may have impacted the results of the analyses. However, recent research on the evaluation of scale dimensionality suggests that the results of the parallel analysis conducted for this study are likely unaffected by the size of the ARYS sample or the skewness of the data [82]. Nevertheless, assessing unidimensionality becomes untenable with a sample size of 100 [82], and we were therefore unable to perform EFA and CFA tests by splitting the sample into two independent subsamples. Third, the nature of the dataset and a low incidence of individuals transitioning into injecting during the study period precluded the option of conducting a longitudinal survival analysis to test the association between participant SSS score and the incidence of initiation into injection drug use. Additionally, to take advantage of the longitudinal aspects of the ARYS study, we opted for a retrospective study design in which participant sensation seeking score was assigned across the study period. This was done given the general stability of sensation seeking levels among individuals aged 19–25 (the IQR age range of the study sample was 20–23) [2, 3]. Nevertheless, this limits the generalizability of the findings and we therefore caution against inferring a causal relationship between higher participant SSS score and the initiation of drug injection. Fourth, ARYS is not a randomly-selected sample and its generalizability to the broader population of street-involved youth in Vancouver cannot be assumed, though the existence of comparative datasets suggest similarities between ARYS and other samples of street-involved youth in Vancouver [83, 84]. Fifth, as noted previously, because we relied on self-report, and given the stigmatized nature of drug use and of injection drug use in particular, these behaviors may have been underreported [85–87]. Sixth, previous studies have observed differences in the inter-individual variability of sensation seeking among youth [2, 88]. As such, it is possible that the variability in the rate of sensation seeking change differs among the study sample. Finally, though previous research has demonstrated that sensation seeking is generally stable among individuals aged 14 to 25 [3], future research should examine the stability of sensation seeking scores on the modified SSS over individuals' drug using careers.

CONCLUSIONS

In sum, the results of the explanatory and confirmatory factor analyses provide preliminary support for the reliability and validity of the modified SSS as a tool to measure sensation seeking among street-involved youth. Further, analyses suggested that participant SSS score is independently associated with injection drug use, as well as with crystal methamphetamine use, binge drug use, and polysubstance use, which have been identified as potential risk factors for injection initiation. While the intersection of sociodemographic, structural, policy and peer-based factors heavily influence the context within which street-involved youth make decisions regarding injection drug use, the results of this study nevertheless suggest that sensation seeking may independently heighten risk of participation in drug-related behaviors previously identified as predictors of injection initiation. While preliminary, these results may be useful for future research aiming to prevent such behaviors through the development of targeted interventions for street-involved youth exhibiting high sensation seeking.

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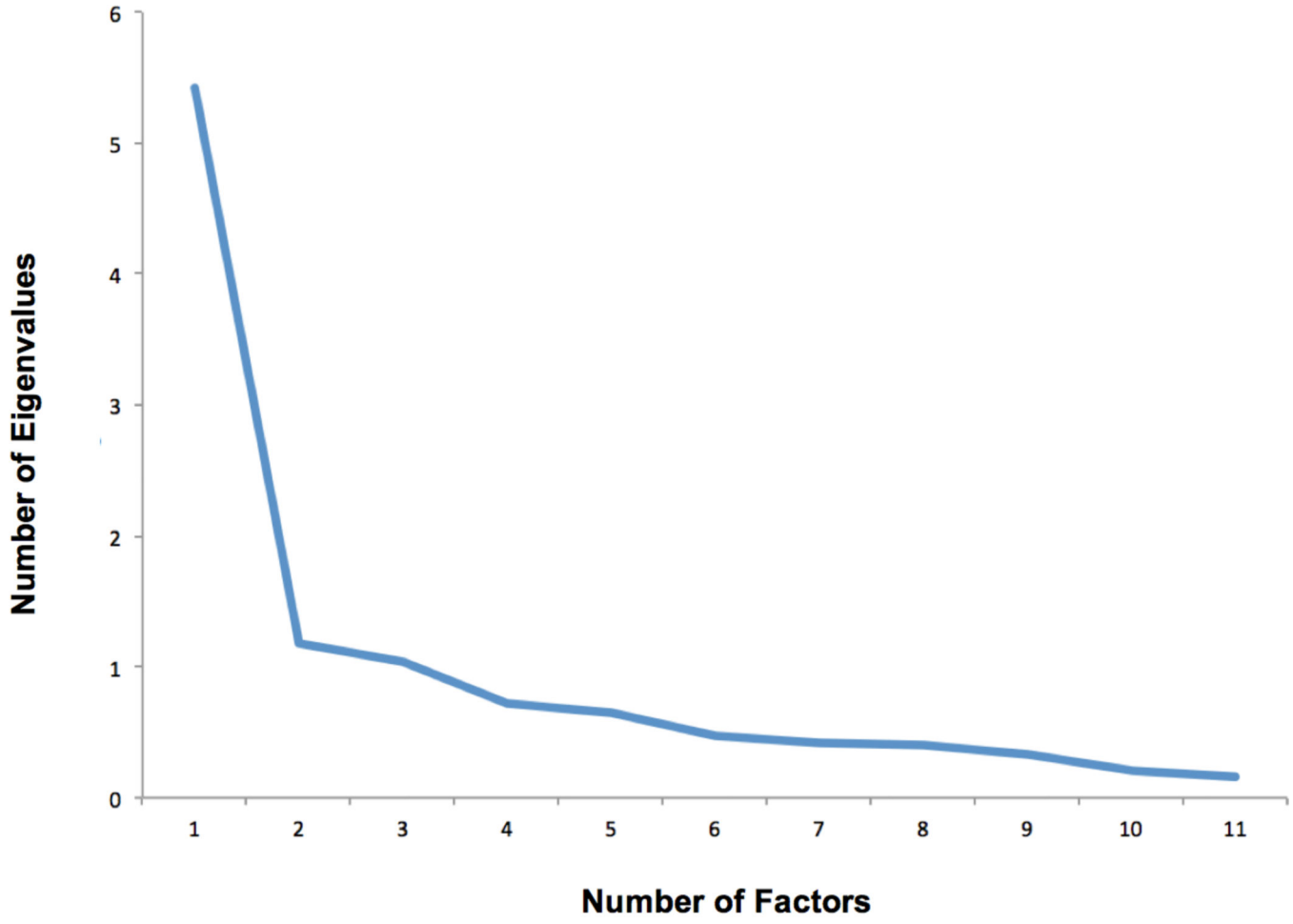

Figure 1.
Scree plot for modified brief sensation seeking scale

Table I

Items for a modified brief sensation seeking scale

These questions are designed to help us understand how you feel about your current drug use and how it might change in the future. Please rate how much you agree or disagree with the following statements by circling a number from 1 to 5 below.					
RESPONSES:					
1 – Very much disagree					
2 – Somewhat disagree					
3 – Undecided					
4 – Somewhat agree					
5 – Very much agree					
1. I am interested in trying out drugs that I have never tried before	1	2	3	4	5
2. When I get high, I always like to take a little bit more	1	2	3	4	5
3. I would like to try doing drugs in new ways (i.e., Inject, smoke, snort)	1	2	3	4	5
4. I am curious about trying drugs that I know can be dangerous.	1	2	3	4	5
5. I like getting high with people who are unpredictable.	1	2	3	4	5
6. I often like to get high without worrying about what drugs I'm doing or how much	1	2	3	4	5
7. I get bored doing the same drugs over and over.	1	2	3	4	5
8. I like to hang out with people who use different drugs than I do.	1	2	3	4	5
9. I am curious about many different drugs	1	2	3	4	5
10. I like doing drugs with groups of people I don't known well	1	2	3	4	5
11. I prefer to hook up with people who take drugs	1	2	3	4	5

Table II

Adjusted odds ratios for multivariate models on factors related to sensation seeking score on a modified brief scale among street-involved youth in Vancouver, Canada, 2005–2010 (*n* = 226).

Characteristic	Model 1: Injection Drug Use	Model 2: Crystal Methamphetamine Use	Model 3: Polysubstance Use	Model 4: Binge Drug Use
Sensation Seeking Score	1.04 (1.02 – 1.05)*	1.03 (1.00 – 1.07)*	1.06 (1.03 – 1.09)*	1.03 (1.01 – 1.05)*
Age (Per Year Older)	0.99 (0.94 – 1.03)	1.01 (0.87 – 1.17)	0.93 (0.87 – 0.99)*	0.98 (0.93 – 1.04)
Female Gender	1.75 (1.34 – 2.29)*	1.25 (0.73 – 2.05)	1.37 (0.91 – 2.05)	0.91 (0.66 – 1.25)
Aboriginal Ancestry *vs*. Other	0.88 (0.68 – 1.16)	0.74 (0.49 – 1.13)	0.78 (0.53 – 1.15)	0.90 (0.65 – 1.24)
Recent Crystal Methamphetamine Use	1.14 (0.88 – 1.47)	--	1.64 (1.21 – 2.23)*	--
Recent Heroin Use	1.46 (1.04 – 2.06)*	--	2.30 (1.35 – 3.91)*	--
Recent Powder cocaine Use	0.45 (0.34 – 0.60)*	--	1.86 (1.36 – 2.55)*	1.14 (0.87 – 1.51)
Recent Crack Use	1.06 (0.83 – 1.37)	--	1.75 (1.27 – 2.41)*	2.28 (1.70 – 3.06)*

Note: All drug use variables refer to non-injection use in the previous six months and are lagged by one follow-up.
Note: Models adjust for length of drug-using career as a within-subject variable
Note: OR = hazard ratio; CI = confidence interval

* significant at $p < 0.05$