

MEASUREMENTS INSTRUMENTS SCALES TESTS

Development and Psychometric Evaluation of Scales that Assess Stigma Associated With Illicit Drug Users

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This study established validity evidence for scales that assess perceived public stigma and stigmatization of illicit drug use. These concepts were measured with respect to five commonly used drugs: marijuana, powder cocaine, ecstasy, and nonmedical use of opioids and amphetamine. Data were collected from a diverse sample of 1,048 emerging adults in New York City in 2009. Exploratory and confirmatory factor analyses suggested two distinct factors, which were inversely related to exposure to users and recent use of each drug. These measures demonstrated good criterion, construct, and incremental validity and effectiveness in analyzing predictors of use. Study limitations were discussed.

Keywords illicit drug use, stigma, disapproval, exposure, religiosity, emerging adults

INTRODUCTION

Illicit drug use is a stigmatized, yet prevalent, behavior in the United States. Although the effects of some drugs are safer than the effects of others (Gable, 2004; Nutt, King, Saulsbury, & Blakemore, 2007), all illicit drug use is associated with social penalties or disapproval (Johnston, O'Malley, Bachman, & Schulenberg, 2010). Despite potential medical, legal, psychological, and social consequences, use of marijuana, powder cocaine, ecstasy (MDMA), and nonmedical use of psychotherapeutics (e.g., opioids, amphetamine) remains common (Johnston et al., 2010; Substance Abuse and Mental Health Services Administration [SAMHSA], 2010). For each of these drugs, prevalence of use is highest among individuals aged 18–25 years, also known as “emerging adults” (Arnett, 2000); therefore, particular attention should be focused on this population.

Stigma, “an attribute that is deeply discrediting” (Goffman, 1963, p. 3), occurs when an individual is dis-

qualified from social acceptance due to a specific attribute or flaw (Goffman, 1963). Those who stigmatize will label, stereotype, or attempt to exert social control by reinforcing their higher social position over others using downward comparison (Link & Phelan, 2001; Wills, 1981). This often leads to separation, status loss, and discrimination (Link & Phelan, 2001). The research on the stigma associated with illicit drug use is limited; however, evidence suggests that level of stigma varies according to perceived levels of dangerousness and social acceptability associated with each drug (Williams & Parker, 2001). For example, only about half of emerging adults in the United States disapprove of marijuana experimentation, but more dangerous drugs such as powder cocaine (herein referred to as “cocaine”) remain associated with higher levels of disapproval (about 90%; Johnston et al., 2010). Further investigation is required to understand how stigma may help to explain the use of various illicit drugs.

This study builds upon existing empirical studies of drug-related stigma, which have tended to focus on injectors or socially disadvantaged respondents such as those who had psychiatric disorders, the homeless, or minorities from low-income urban areas (e.g., Link, Struening, Rahav, Phelan, & Nuttbrock, 1997; Young, Stuber, Ahern, & Galea, 2005). Similarly, existing stigma measures have mainly assessed devaluation of drug users in treatment or attitudes about “addicts” (Luoma et al., 2007). While some large-scale surveys have utilized single-item measures to assess disapproval of use of various drugs (Johnston et al., 2010), to our knowledge, no studies have focused on the stigma related to drug use reported by a general, nonclinical sample. Specifically, current literature does not provide measures calibrated to assess the perceived public stigma or stigmatization of general use (i.e., recreational or experimental use) of illicit drugs. This study seeks to address this gap in the literature by creating validated measures and allowing stigma of use (not necessarily abuse) to be measured in a reliable

manner in a general sample of the population. Such measures will be useful to public health and social science researchers who seek to assess patterns of stigma in samples at risk for drug use.

A sample of both users and nonusers of illicit drugs was assessed to develop scales to measure two concepts: (1) stigmatization of users and (2) perceived public stigma associated with users. We define the first, stigmatization of users, as the negative social response to those who use illicit drugs. This definition is based on the theoretical foundation laid out by Gilmore and Somerville (1994) who hypothesized that stigmatization is the act of negatively labeling or branding an individual as disgraceful in response to a specific flaw. Specifically, Gilmore and Somerville defined stigmatization as treating individuals or groups as unworthy in response to a "negative" characteristic; therefore, stigmatization is a personal reaction in which the stigmatizer blames, shuns, or excludes individuals with these characteristics. This response occurs because the negative characteristic conflicts with a particular value (Gilmore & Somerville, 1994). Thus, such responses often result from anger or discomfort and a desire for the community to purge the undesirable trait (Link & Phelan, 2001). It is important to reliably measure such personal responses to understand how they may explain drug use in the general population.

The second concept, perceived public stigma, is defined as an individual's perception of the extent to which the public collectively stereotypes or discriminates against a stigmatized individual or group (Corrigan, 2004)—in this case, the users of illicit drugs. The "public" refers to the general population, and this term often relates to whether "most people" would devalue or discriminate against individuals who possess the negative characteristic (e.g., Link, 1987). Stereotypes represent collectively agreed-upon notions about stigmatized groups (Corrigan, 2004), so it is likely that witnessing or experiencing such stereotyping or discrimination by individuals, organizations, or governments contributes to the perception of public stigma. Illicit drug use is disapproved by the majority of the population (Johnston et al., 2010), and level of disapproval likely varies between users and nonusers; therefore, further investigation is required in order to examine how perception of public stigma explains whether or not an individual uses a particular drug. Perceived public stigma appears to predict whether stigmatized individuals internalize stigma (Link, 1987), but this "self-stigma" was beyond the scope of this study.

To reliably assess these two concepts, we must also consider the level of personal exposure to drug users. Research has shown that contact with stigmatized populations is related to lower levels of stigmatization because a diverse range of experiences often lead to greater tolerance and acceptance (Batson et al., 1997; Blau & Schwartz, 1984; Corrigan et al., 2002). Therefore, exposure may help lower the perception of "us" and "them" (Corrigan & Watson, 2004), dispel any misinformation or stereotypes, and create empathy resulting in lower stigmatization (Allport, 1954; Brewer & Miller, 1984). Level of

personal contact with drug users is particularly important because many individuals feel that drug use is a major crisis in the United States, yet rarely witness such a phenomenon first-hand (Blendon & Young, 1998). Therefore, exposure and stigma should be examined in unison in order to understand this complex phenomenon.

This study also examines how these concepts relate to level of religiosity. Disapproval of illicit drug use has been tied to high levels of religiosity (Bachman, Johnston, & O'Malley, 1998), and illicit drug use is dependent on religiosity (Degenhardt, Chiu, Sampson, Kessler, & Anthony, 2007). However, research is needed to determine whether the stigma of drug use is explained by religiosity or associated morals. Since religion is a major force in the formation of societal values (Gilmore & Somerville, 1994), examining whether religiosity relates to the stigma is important when assessing the stigma of drug use.

Finally, it is important to examine different drugs separately because rates of use vary over time, fluctuate in level of social acceptance (Johnston et al., 2010), and each is associated with its own level of harm (Gable, 2004; Nutt et al., 2007). Similarly, popular assessments have been shown to vary in reliability or factor structure between different drugs (e.g., Carroll, Rounsaville, & Bryant, 1994).

This psychometric study sought to establish validity of scales that measure stigmatization and perception of public stigma associated with illicit drug users. In addition, since exposure appears to be an important predictor of stigma, an index of level of perceived exposure to users was created. These scales were created as a part of a public health investigation, which assessed how stigma explains illicit drug use among emerging adults in New York City. We hypothesized that (1) two distinct stigma factors would emerge and be confirmed in separate analyses; (2) each scale would load in a unique manner across each of the five drugs; (3) both perceived public stigma and stigmatization will be negatively related to the level of exposure to users of each drug; and (4) exposure to users would increase the odds of recent drug use and both stigma variables would decrease the odds of recent drug use, above and beyond common predictors.

METHODS

Procedure

To pilot early versions of our scales, we first assessed a convenience sample of adults via Internet survey from July through September of 2008. Links to the survey were posted weekly on message board sites for numerous major cities on *Craigslist*. The survey was anonymous and respondents had the option to enter a drawing to win an iPod.

We then obtained a new study sample through targeted sampling strategies in order to obtain a purposive sample of emerging adults. We used two recruitment methods that were separately applied: (1) paper survey administration on the street and (2) street-based recruitment for an Internet version of the same survey. To meet inclusion criteria, potential respondents must have been (1) between the ages 18 and 25; (2) fluent in English; and (3) for the online

survey, have access to the Internet. Those who were recruited to fill out the paper survey were compensated \$3.00 cash for their time upon completing the survey, while Internet respondents were given the opportunity to anonymously enter an e-mail address for a chance to win an iPod. With regard to recruitment for the Internet version of the survey, upon accepting a recruitment card, the participant's age, gender, race/ethnicity, and level of educational attainment were recorded. After recruitment, interested respondents later entered the URL for the survey website (on any computer with the Internet) and unique password listed on the recruitment card. The demographics recorded at recruitment were later compared with those entered in the survey (by unique ID) to examine whether the same participants responded. Both methods of recruitment took place in city parks, at city college campuses, and near other venues frequented by emerging adults (e.g., coffee shops) in Manhattan, New York. Recruitment took place from May through October of 2009. The study protocol for both studies was approved by the Institutional Review Board of the New York University.

Sample

Seven hundred adults completed the Internet pilot study, and 1,048 adults were assessed in the latter study. With respect to Internet survey recruitment for the latter study, 279 (24%) of those approached took the online survey. Of these respondents, 266 (97%) entered the unique ID listed on the card. There was a high level of association between demographic data gathered in person and online. Specifically, responses to the online survey were more than 90% accurate in comparison with demographic variables assessed at recruitment. This suggests that the majority of respondents who took the online survey were the same individuals approached on the street. In regard to the paper version, 74% of those approached completed the survey. About three quarters of the sample were recruited near institutions of higher education. Table 1 reports demographic characteristics and rates of drug use for both the pilot and study samples.

Measures

Demographic Characteristics. Respondents were asked to provide their age (in years), gender, and level of educational attainment. In addition, respondents were asked to check off their race/ethnicity.

Level of Religiosity. Respondents' level of religiosity was measured through two items. Religious salience was measured through a four-point scale that asked "How important is religion in your life?" Choices ranged from (1) "Not important" to (4) "Very Important." Level of religious service attendance was also assessed: "How often have you attended religious services (such as church or temple) within the last year?" Answer options ranged from (1) "Never" to (4) "About once a week or more." Means of these items were calculated into composite scores.

Illicit Drug Use. Recent use was defined as use of a particular drug within the last 12 months, and lifetime use

TABLE 1. Descriptive statistics of pilot and study samples

Demographic variable	Pilot sample N = 700 %	Study sample N = 1,048 %
Age, <i>M</i> (<i>SD</i>)	29.32 (9.2)	20.31 (1.9)
Male	31.0%	46.9%
Race/ethnicity		
White	67.1%	43.6%
Black/African	7.3%	13.5%
American/Caribbean		
Hispanic/Latino	12.2%	16.6%
Asian American/Pacific	9.1%	18.2%
Islander		
Other	4.3%	8.1%
Educational attainment		
High school diploma or less	8.7%	33.9%
Some college	31.5%	46.4%
College graduate (B.A., B.S.)	40.3%	17.4%
Graduate school	19.5%	2.3%
Lifetime illicit drug use		
Marijuana	69.1%	65.4%
Powder cocaine	39.5%	17.8%
Ecstasy	33.9%	13.7%
Opioids (nonmedical use)	33.5%	17.4%
Amphetamine (nonmedical use)	19.4%	16.4%

was defined as whether a drug was ever used in one's lifetime. Use was assessed for each of the five drugs: marijuana, powder cocaine, ecstasy, and the nonmedical use of select amphetamine and opioid prescription drugs. Amphetamine was defined as Adderall or Dexedrine, while opioids were defined as Oxycontin, Vicodin, or Percoset. Nonmedical use was defined as when a drug was used (1) without a prescription or (2) to experience or achieve a desired feeling (e.g., a "high"; SAMHSA, 2010). Each drug was listed along with its street names to ensure clarity.

Scale Validation

Exposure to Drug Users. Respondents were assessed for level of perceived exposure to illicit drug users via our *Exposure to Drug Users Index*. These items were modified from scales used to assess level of contact and familiarity with individuals with mental illness (Holmes, Corrigan, Williams, Canar, & Kubiak, 1999; Corrigan, Markowitz, Watson, Rowan, & Kubiak, 2003). We modified seven items from these previous scales and pretested them in the pilot survey ($\alpha = .75$); however, our piloted version of this index only assessed general "drug use." To improve the piloted index, this study assessed for exposure to each of the five drugs individually (Table 2). Answer choices included "Yes," "No," and "Not sure." Affirmative responses were coded as "1" and answers of "No" and "Not sure" were coded as "0" in order to signify absence of awareness of exposure.

Stigma Concepts. Item development took place through numerous phases. First, literature searches were conducted in order to find potential items that could be modified and examined in this investigation. The most

TABLE 2. Exposure to drug users index

Item
1. I have observed people who use _____ frequently.
2. I have worked with a person that uses _____.
3. I have a friend who uses _____.
4. I have been in class with a person that uses _____.
5. I have a family member or relative who uses _____.
6. I have lived with a person who uses _____.
7. People in my neighborhood use _____.

Note: Items were assessed for all the five drugs separately. Answer choices included “Yes,” “No,” and “Not sure.”

relevant items were related to the concept of perceived public stigma, but examined this construct with respect to individuals with mental disorders and those who have been in drug treatment. Chosen items were derived from a scale developed by Luoma et al. (2007), who worded items to assess perceived devaluation and discrimination of drug users who have been in treatment ($\alpha = .89$). Luoma and colleagues modified these items from Link (1987) who used the scale to assess the perceived stigma of patients with mental illness (15 items, $\alpha = .82$). Items chosen to be included in our initial pool were reworded to assess level of perceived public stigma of illicit drug users (e.g., “Most people think less of a person that uses drugs”). Additional items were also created to assess respondents’ level of stigmatization toward illicit drug users. These items assessed level of agreement with a list of negative characterizations about drug users (e.g., “Drug users are weak-minded”). Answer options for all items ranged from (1) “Strongly disagree” to (5) “Strongly agree.”

After developing the initial pool of untested items, two experts in the psychology of risk behavior were consulted to confirm face validity of the items, and some items were rephrased. In the next phase, our pool of items was tested through our pilot sample and respondents were encouraged to comment on the items in an available text box. A frequent comment was that items should assess each drug individually instead of general drug use. An expert panel of four professors in the health professions re-evaluated items and agreed that items should be repeated separately for each drug. In the final phase of item development, each item from the final pool ($n = 17$) was worded to individually assess each of the five drugs studied in this investigation. Since we sought to compare responses between drugs, instead of assessing one drug at a time, we presented an item (e.g., “Most people think less of a person that uses [drug name]”) and listed each of the five drugs with its own Likert response items. This allowed respondents to provide answers for each drug, relative to the other drugs listed.

Factor and Validity Analyses

In order to establish validity evidence of the stigma scales, exploratory factor analysis (EFA) was utilized to determine the true factor structure of all items simultaneously to ensure that they are separate constructs. Confirmatory

factor analysis (CFA) was conducted to verify EFA results. To conduct these analyses, the sample was randomly split in half; EFA was conducted on the first half ($n = 524$), and then CFA was conducted on the remaining half ($n = 524$). The two samples did not differ in demographic characteristics or drug use.

EFA was conducted using PASW 18 (2010). Items were entered into separate models for each drug (e.g., all marijuana items were entered together into one EFA model). Entering all items into an EFA model helped us reduce items that did not have adequate fit and ensured that each represented its own distinct concept with no overlapping items.

Before factor extraction, each model was set to retain factors with eigenvalues greater than 1 to ensure that all values represent substantial variation (Kaiser, 1960). Scree plots were examined to confirm the number of factors extracted. Oblimin rotation was utilized with Kaiser normalization in order to rotate clusters of items onto different factors without orthogonal constraints. As recommended by Stevens (1992), only items with loadings higher than .4 were retained. Items that cross-loaded (having a loading of less than a .4 difference from a loading on another factor) were removed one-by-one, and the model was rerun until each factor had its own distinct cluster of non-cross-loading items. Although items were ordinal, they were normally distributed and not kurtotic; therefore, underlying assumptions necessary for EFA were met.

After the items for each drug were reduced into specific factors, CFA was conducted on the second sample using LISREL 8.8 (Jöreskog & Sörbom, 2006). CFA confirms whether items and hypothesized factor structures have good fit. To assess fit, we examined the root mean square error approximation (RMSEA) and the root mean residual (RMR). For a model to have good fit, RMSEA and RMR values should ideally be less than .08, although values of less than .10 still suggest reasonable fit (Hair, Anderson, Tatham, & Black, 1998). We also examined the comparative fit index (CFI; Bentler, 1990) and the incremental fit index (IFI) (Tucker & Lewis, 1973). Values above .95 represent the best fit (Hu & Bentler, 1999).

The exposure index was not factor analyzed because it is intended to be used as a count of dichotomous items and not a measurement of latent psychosocial concepts. Further, assumptions for EFA (e.g., normality) could not be met and preliminary factor analyses showed these items were unacceptable for further analyses.

In addition to EFA and CFA, we calculated correlations between factor scores to determine convergent validity because perceived public stigma and stigmatization are similar concepts. As a crude indicator of construct validity, we calculated point-biserial correlations to determine whether recent drug use was related to level of exposure to users, perceived public stigma, or stigmatization. Significant associations would suggest that these scales meet concrete criteria in explaining drug use behaviors. Hierarchical logistic regression models were then run for each drug to examine the incremental validity of each new scale. Recent use was the criterion variable, and

the corresponding measures for the same drug were entered as independent variables. Models were adjusted for age and gender, and since it is well established that religiosity predicts drug use (e.g., Degenhardt et al., 2007), the religiosity composite was entered into Step 1. Level of perceived public stigma, stigmatization, and exposure were entered into Steps 2, 3, and 4, respectively. Therefore, our hierarchical models tested whether each of the new scales contributed to incremental validity, stepwise, above and beyond age, gender, and religiosity, for each individual drug.

In order to examine internal consistency (reliability) of each scale, Cronbach's alphas were calculated for stigma concepts derived from factor analysis, and Kuder–Richardson formula 20 (KR-20) alphas were calculated for exposure measures because answer options were dichotomous. Finally, we built regression models to determine which demographic variables explained stigma variables.

RESULTS

Exploratory Factor Analysis and Internal Consistency

Prior to running all models, we accounted for missing data. Less than 5% of cases had any missing data; therefore, missing values were not imputed. Cases that were missing more than two items were deleted before analyses, and when a case was missing one or two items, the mean value was used to replace the missing value(s). We then ensured that multicollinearity ($r > .7$) did not exist and further examined normality of each item. None of the items were kurtotic in the marijuana model. For the cocaine, ecstasy, opioid, and amphetamine models, two items were kurtotic ($> .2$) and removed before EFA analyses. The two items were “Most employers will not hire a person who uses [drug name]” and “Most people would not accept a [drug name] user as a teacher of young children in a public school.” Thus, all 17 items were acceptable and entered for marijuana, but only 15 items were entered into models for all other drugs.

Separate EFA models for each drug were run and were reduced until all eigenvalues and factor loadings met the previously described criteria. The majority of retained factor loadings were greater than .63, representing very good measures of the concept (Comrey & Lee, 1992). For each of the five drug models, the stigma subscales were factored into unique components. Although factor structures were comparable across drugs, items making up components varied across drugs. This was anticipated and demonstrates the importance of examining scales for each drug individually. The stigma items loaded as two distinct concepts, and Table 3 compares factor loadings, eigenvalues, variance explained, and reliability calculations for each drug.

Confirmatory Factor Analysis

To confirm the fit of the two-factor models, CFA was conducted on the second subsample. The RMSEA for each model was below the cutoff of .10, suggesting acceptable

fit (Table 4). The marijuana RMSEA was below .8, suggesting better fit than the models for other drugs. All RMR values were below .8, and the CFI and IFI indices were above the cutoff of .90, many of which were .95, also suggesting good fit. Taking all evidence into account, the CFA confirmed acceptable fit of the reduced two-factor stigma models for each of the five drugs. Thus, we have confirmed two distinct stigma subscales: the *Stigma of Drug Users Scale* and the *Drug Use Stigmatization Scale*.

Reliability Analysis

The *Exposure to Drug Users Index* had acceptable reliability: marijuana (KR-20, $\alpha = .79$), cocaine ($\alpha = .79$), ecstasy ($\alpha = .77$), opioids ($\alpha = .82$), and amphetamine ($\alpha = .82$). As is seen in Table 3, stigmatization consistently demonstrated the highest reliability and perceived public stigma demonstrated lower, but adequate, reliability.

Scale Validity

Mean scores were computed for each scale to determine convergent, construct, and incremental validity. All mean score composites were reasonably normally distributed. There was a small negative skew associated with perceived public stigma of drug users (skew $< .1$), as most respondents tended to report high levels of perceived public stigma regarding drug users. In addition, respondents also tended to report higher levels of exposure to marijuana users and lower levels of stigmatization and perceived public stigma compared with other drugs (Table 5).

Table 6 demonstrates convergent validity of the stigmatization and perceived public stigma scales for each drug. Across all drugs, stigmatization was moderately associated with perceived public stigma, suggesting that these two concepts are similar, yet different forms of stigma. Results also demonstrated that exposure was inversely associated with stigmatization and more weakly inversely associated with perceived public stigma.

To test construct validity, point-biserial correlations were calculated to assess whether scale scores were related to recent use of the corresponding drug. As shown in Table 7, exposure to users of each drug was associated with recent use. Perceived public stigma of users was negatively associated with recent use, although associations were not as great for recent cocaine use. Stigmatization was also negatively associated with recent use of each drug. The strong associations between scale scores and recent use serve as a crude indicator of construct validity.

Incremental Validity

Stepwise addition of the new scales led to significant improvements in each step of the models predicting recent use (Table 8). Added steps were each associated with significant Omnibus tests upon entry of each block, significant increases in variance explained, and, often-times, small p values. Perceived public stigma tended to provide adequate incremental validity; however, effects diminished in marijuana and cocaine models when

TABLE 3. Final factor loadings of scales for each separate drug model

	Model 1 Marijuana	Model 2 Cocaine	Model 3 Ecstasy	Model 4 Opioids	Model 5 Amphetamine
Stigmatization (Factor 1)					
1. Using _____ is morally wrong	.72	.70	.63	.67	.66
2. _____ users should go to prison	.73	.69	.69	.72	.69
3. _____ users are weak minded	.79	.76	.75	.75	.76
4. _____ users have no future	.80	.77	.76	.72	.78
5. Most _____ users are not well educated	.69	.65	.64	.60	.61
6. _____ users are dishonest	.77	.63	.72	.68	.67
7. _____ users make me angry	.78	.70	.69	.70	.70
Eigenvalue	5.62	4.47	4.78	4.37	4.56
Variance (%)	35.15	34.41	31.86	33.59	32.60
Reliability	.88	.84	.84	.83	.84
Perceived public stigma (Factor 2)					
1. Most people believe _____ users cannot be trusted	.65	.80	.67	.72	.72
2. Most people believe that _____ users are dangerous	.65	.79	.67	.68	.71
3. Most people would not accept a _____ user as a close friend	.52	.53	.55	.68	.56
4. Most people feel that _____ use is a sign of personal failure	.72	.65	.64	.74	.69
5. Most people will take a known _____ user's opinions less seriously	.55	.50	.54	.63	.60
6. Most people think less of a person that uses _____	.74	.76	.72	–	.76
7. Most people would treat a _____ user just as they would treat anyone else (R)	.53	–	.52	–	.52
8. Most employers will not hire a person who uses _____ ^a	.66	–	–	–	–
9. Most people would not accept a _____ user as a teacher of young children in a public school ^a	.57	–	–	–	–
10. Most young women would not date someone who uses _____	–	–	.52	.62	–
Eigenvalue	2.21	1.86	1.89	1.85	2.04
Variance%	13.83	14.28	12.56	14.21	14.55
Reliability	.82	.77	.78	.81	.79

Note: Due to limitations of space, loadings are only provided for items that loaded on the corresponding factor, making it a distinct factor. Blank spaces indicate that the item did not load on the factor for the corresponding drug and that the item was consequently dropped. R: reverse-coded item.

^aItems were only included for the marijuana scale because distributions were kurtotic for all other drugs.

controlling for stigmatization and exposure to users. Stigmatization was a strong predictor, and exposure to users was the most consistent and robust predictor. Across each drug model, these new variables have adequate to strong incremental validity regarding recent use of each drug.

Additional Linear Associations

There were numerous significant bivariate associations between demographic and stigma variables. To examine independent associations, we entered significant correlates of scale scores into separate multivariate regression models for each drug. As shown in Table 9, exposure

to users was negatively associated with religiosity and often positively associated with identifying as White or having a college education. Stigmatization was negatively

TABLE 5. Descriptive statistics of each scale

Scale by drug	Mean	SD
Exposure to _____ users		
Marijuana	7.17	2.80
Powder cocaine	3.03	2.94
Ecstasy	2.54	2.69
Opioids	1.68	2.55
Amphetamine	1.81	2.59
Stigmatization of _____ users		
Marijuana	2.10	0.84
Powder cocaine	2.69	0.88
Ecstasy	2.64	0.86
Opioids	2.73	0.86
Amphetamine	2.71	0.86
Perceived public stigma of _____ users		
Marijuana	3.08	0.73
Powder cocaine	3.66	0.68
Ecstasy	3.54	0.64
Opioids	3.55	0.70
Amphetamine	3.62	0.67

TABLE 4. Confirmatory factor analysis of two-factor solutions

Drug	χ^2	RMSEA	RMR	CFI	IFI
Marijuana	420.48	0.078	0.067	0.96	0.96
Powder cocaine	266.44	0.082	0.075	0.95	0.95
Ecstasy	344.76	0.082	0.074	0.95	0.95
Opioids	270.68	0.084	0.072	0.95	0.95
Amphetamine	316.96	0.083	0.076	0.94	0.94

Note: All χ^2 and p values were $<.01$.

TABLE 6. Pearson correlations between scale scores for each drug

Scale	Stigmatization	Perceived public stigma
Exposure to users		
Marijuana	-.49	-.32
Powder cocaine	-.35	-.15
Ecstasy	-.29	-.16
Opioids	-.26	-.10
Amphetamine	-.27	-.11
Stigmatization		
Marijuana		.43
Powder cocaine		.40
Ecstasy		.40
Opioids		.39
Amphetamine		.36

Note: All correlations had p values of $<.001$. Correlations for each concept are relevant to the drug reported in the corresponding row.

associated with college education and positively associated with religiosity. Few variables were correlated with perceived public stigma (not included in graph). Using similar models, identifying as White ($b = -0.28$, $p < .001$) or religious ($b = 0.07$, $p = .002$) explained perceived public stigma of marijuana users, and having a bachelor's degree or higher ($b = -0.15$, $p = .037$) was associated with perceived public stigma of opioid users.

DISCUSSION

This study was among the first to develop scales measuring the stigma associated with general illicit drug use. Previous scales measuring stigma associated with illicit drug use tended to focus on addicts and those in drug treatment. Likewise, most studies that examined the stigma associated with drug use have relied on socioeconomically disadvantaged samples. Although socioeconomic status was not directly assessed in this study, almost half of the sample identified as White and the majority had at least some college education. Therefore, these indicators suggest that this sample was not as socially disadvantaged as previous samples. This study developed and validated three scales in a diverse sample of emerging adults in New York City: the *Exposure to Drug Users Index*, the

Stigma of Drug Users Scale, and the *Drug Use Stigmatization Scale*. These scales were validated for use of the five separate drugs: marijuana, cocaine, ecstasy, and non-medical use of opioids and amphetamine. Composition of each scale slightly differed across drugs, highlighting the importance of exploring and confirming the factor structure and fit of scales as their components may vary across different drugs. Regardless, items clustered together in a similar fashion across all drugs, further confirming the relative stability of factor structure across multiple drugs. If using one of the scales validated in this manuscript to examine stigma associated with another drug, we suggest exploring and confirming the factor structure beforehand.

This study demonstrates significant relationships between the constructs underlying these new scales. Specifically, perceived public stigma and stigmatization of drug users were shown to be distinct, yet related, concepts. As expected, the two forms of stigma were negatively related to level of exposure to users; therefore, respondents who reported higher levels of stigmatization or greater perceived public stigma tended to be less exposed to users. This corroborates findings from Blendon and Young (1998), who reported that those who stigmatize drug users tend to lack exposure to users. Likewise, we corroborated findings from previous studies that suggest exposure to individuals with stigmatized conditions is related to decreased levels of stigma (e.g., Corrigan et al., 2002). It was also found that in comparison to nonusers, recent users of each drug reported higher levels of exposure to users and lower levels of perceived public stigma and stigmatization. Likewise, in our stepwise logistic regression models, high exposure and low levels of both forms of stigma increased the odds of recent drug use.

The stigma of illicit drug use is also dependent on demographic characteristics. For example, White and college educated individuals reported higher levels of exposure to users of each drug as well as lower levels of stigmatization. On the contrary, highly religious individuals reported low levels of exposure to users and expressed high levels of stigmatization toward users of all the five drugs. The high levels of stigmatization reported by religious respondents might have served as a protective factor against exposure to users and to recent use. Specifically, religious respondents reported higher levels of stigmatization, lower levels of exposure to users, and demonstrated lower odds for recent use. Likewise, lack of exposure may have allowed stigmatization to continue. Longitudinal

TABLE 7. Point-biserial correlations between recent drug use and scale scores

	Marijuana	Cocaine	Ecstasy	Opioids	Amphetamine
Exposure to users	.45	.43	.37	.46	.41
Perceived public stigma	-.25	-.10*	-.19	-.15	-.15
Stigmatization	-.52	-.23	-.24	-.21	-.19

Note: All correlations had p values of $<.001$ except for * ($p < .01$). Correlations for each concept are relevant to recent use of the drug in the corresponding column.

TABLE 8. Final step of logistic regression models explaining recent drug use

Predictor	Wald	OR	95% CI	<i>p</i>	Nagelkerke (R^2)	Nagelkerke (ΔR^2)
Recent marijuana use					.46	.35
Religiosity	17.90	0.69	0.58–0.82	<.001		
Perceived public stigma	0.03	0.98	0.77–1.25	.862		
Stigmatization	102.81	0.27	0.21–0.35	<.001		
Exposure to users	55.17	1.34	1.24–1.44	<.001		
Recent powder cocaine use					.38	.27
Religiosity	9.19	0.63	0.47–0.85	.002		
Perceived public stigma	0.08	1.05	0.73–1.52	.779		
Stigmatization	8.14	0.61	0.43–0.86	<.001		
Exposure to users	77.63	1.57	1.42–1.73	.004		
Recent ecstasy use					.37	.23
Religiosity	16.36	0.48	0.34–0.69	<.001		
Perceived public stigma	6.25	0.58	0.38–0.89	.012		
Stigmatization	10.21	0.54	0.37–0.79	.001		
Exposure to users	53.15	1.43	1.30–1.57	<.001		
Recent nonmedical opioid use					.36	.29
Religiosity	6.62	0.68	0.50–0.91	.010		
Perceived public stigma	4.10	0.69	0.48–0.99	.043		
Stigmatization	7.93	0.62	0.45–0.87	.005		
Exposure to users	96.38	1.50	1.39–1.63	<.001		
Recent nonmedical amphetamine use					.31	.26
Religiosity	5.70	0.70	0.52–0.94	.017		
Perceived public stigma	4.64	0.67	0.46–0.96	.031		
Stigmatization	3.26	0.74	0.53–1.03	.071		
Exposure to users	80.37	1.46	1.34–1.58	<.001		

Note: OR = odds ratio, CI = confidence interval, Nagelkerke (ΔR^2) = increase in R^2 from first step. The predictor variables correspond to each drug criterion variable. For example, the criterion variable, recent marijuana use, corresponds to exposure, perceived public stigma, and stigmatization of marijuana users. All models were adjusted for age and gender.

research is needed to examine temporal relationships, and such scales are beginning to help us delineate stigma-related reasons for illicit drug use.

Future studies are needed to examine larger, more representative samples, and more studies are needed to examine how these concepts explain frequency and patterns of drug use over time. Finally, empirical studies need to explore why individuals stigmatize use, and whether use

is deterred by stigma or associated with further adverse psychological or social consequences.

Limitations

A limitation of this study is that the sample was targeted and not randomly selected. Specifically, recruitment occurred in areas frequented by young adults—often in close proximity to institutions of higher education. With regard

TABLE 9. Regression models evaluating demographic predictors of exposure to users and stigmatization

Variables explaining exposure to users	Marijuana		Cocaine		Ecstasy		Opioids		Amphetamine	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Age 23–25	0.37	0.28	1.26***	0.29	0.44	0.27	0.46	0.25	0.08	0.26
Some college	0.25***	0.06	0.18**	0.07	0.06	0.06	0.14*	0.06	0.15*	0.06
B.A. or higher	0.59*	0.29	0.34	0.29	0.05	0.28	0.32	0.26	0.56*	0.27
White	1.07***	0.18	1.22***	0.18	0.62***	0.17	1.10***	0.16	1.07***	0.17
Religiosity	−0.52***	0.09	−0.58***	0.09	−0.66***	0.09	−0.42***	0.08	−0.38***	0.08
Variables explaining stigmatization										
Age 23–25	−0.15	0.08	−0.15	0.09	−0.12	0.09	−0.11	0.09	−0.07	0.09
Some college	−0.06**	0.02	−0.04*	0.02	−0.04	0.02	−0.05*	0.02	−0.05**	0.02
B.A. or higher	−0.18*	0.08	−0.33***	0.09	−0.27**	0.09	−0.30***	0.09	−0.32***	0.09
White	−0.25***	0.05	−0.10	0.06	−0.09	0.06	−0.08	0.05	−0.08	0.06
Religiosity	0.22***	0.03	0.17***	0.03	0.20***	0.03	0.17***	0.03	0.16***	0.03

Note: Age 18–22, high school diploma or less, and non-White were the comparison groups for age, college variables, and White, respectively.

* $p < .05$, ** $p < .01$, *** $p < .001$.

to the Internet version of the survey, respondents were recruited on the street and confirmed eligibility; however, web-administered surveys still have limitations and biases. Likewise, it should be noted that Likert scales have limitations due to their ordinal nature and increased likelihood of acquiescent response patterns. Finally, a main limitation of this study was the cross-sectional design. Cross-sectional studies rarely allow us to determine temporal relationships; therefore, it is not known whether levels of stigma, exposure, and religiosity fluctuated over time. Moreover, it is unknown whether stigma typically preceded exposure to users or if exposure affected level of stigma.

CONCLUSION

The stigma associated with illicit drug use is an understudied concept, and this is among the first studies to analyze it in an empirical manner. Results provide newly developed scales with adequate reliability and allow us to continue to investigate this phenomenon. Likewise, researchers now have validated measures to examine the stigma related to illicit drug use in a time when such scales are needed to continue to investigate psychosocial predictors of illicit drug use. To this end, results suggest that high levels of perceived public stigma and stigmatization are negatively related to level of exposure to users of many different drugs. Likewise, high levels of perceived public stigma and stigmatization, and low levels of exposure to users, have shown to be protective factors against recent use of marijuana, cocaine, ecstasy, and nonmedical use of opioids and amphetamine. While stigma appears to be a protective factor against drug use, future studies need to examine such associations to further understand how stigma affects the psychological well being of users who reject abstinence.

Declaration of Interest:

None.

RESUME

Le développement et l'évaluation psychométrique des échelles qui déterminent le stigmatisme associé aux utilisateurs de drogues illicites

Cette étude a établi la preuve de validité pour les échelles qui évaluent le stigmatisme tel que perçu par le public et la stigmatisation de l'usage de drogue illicite. Ces concepts ont été mesurés par rapport à cinq drogues ordinairement utilisées: la marijuana, la cocaïne en poudre, l'extase ainsi que les opioïdes et l'amphétamine à usage non médical. Les données ont été recueillies sur divers échantillons appartenant à 1,048 adultes émergents, à New York en 2009. L'analyse exploratoire et confirmative a suggéré deux facteurs distincts, qui ont été inversement reliés à l'exposition aux utilisateurs et l'usage récent de chaque drogue. Ces mesures ont démontré les bons critères,

construction et validité cumulative ainsi que l'efficacité de l'analyse des tests de prédiction d'usage. Les facteurs limitatifs de l'étude ont été discutés.

RÉSUMÉN

Desarrollo y Evaluación Psicométrica de escalas que determinan el estigma asociado con los usuarios de drogas ilícitas

Este estudio estableció evidencia de validez para escalas que valoran y determinan el estigma y estigmatización del uso de drogas ilícitas. Estos conceptos fueron medidos con respecto a cinco drogas comúnmente utilizadas: marihuana, cocaína de polvo, éxtasis, y el uso no medicinal de opioides y anfetamina. Los datos fueron colectados de una muestra diversa de 1,048 adultos surgidos en la Ciudad de Nueva York en 2009. El factor exploratorio y confirmativo analizado sugirió dos factores claros, que fueron relacionados a lo inverso a la exposición de usuarios y el uso reciente de cada droga. Estas medidas demostraron un buen criterio, constructivo, e incrementó la validez, y la eficacia al analizar pronosticadores de uso. Las limitaciones del estudio fueron discutidas.

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GLOSSARY

Nonmedical use: Use of a controlled drug without a prescription or to achieve a desired feeling such as a "high".

Perceived public stigma: An individual's perception of the extent to which the public collectively stereotypes or discriminates against a stigmatized individual or group.

Stigmatization: The act of negatively labeling or branding an individual as disgraceful in response to a specific flaw.

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