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Examination of the Inventory of Drug Use Consequences with Individuals with Serious and Persistent Mental Illness and Co-occurring Substance Use Disorders

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Abstract

Background—The Inventory of Drug Use Consequences (InDUC) (1) is a 50-item measure that evaluates lifetime and recent consequences of substance use.

Objectives—This study examined the psychometric properties of a modified version of the Inventory of Drug Use Consequences (InDUC-M) in individuals with serious and persistent mental illness and cooccurring substance use disorders.

Methods—We examined self-reported consequences in the sample, evaluated internal consistency, identified items for a brief form of the InDUC-M, and explored relationships with indicators of substance use severity.

Results—InDUC-M Lifetime and Recent subscales showed good internal consistency and were related to other measures of substance use and problems. A brief version of the InDUC-M Recent showed excellent internal consistency and was highly correlated with both Lifetime and Recent subscales.

Conclusion—The InDUC-M and the SIP-M performed well in individuals with SPMI and SUDs.

Scientific Significance—Overall, these findings are a useful first step in determining the utility of the InDUC-M in people with SPMI and SUDs.

Keywords

InDUC; serious and persistent mental illness; substance use disorders; assessment; consequences

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Introduction

The Inventory of Drug Use Consequences (InDUC) (1) is a 50-item measure of lifetime and recent consequences of substance use in five domains: Physical, Interpersonal, Intrapersonal, Impulse Control, and Social Responsibility. The InDUC has demonstrated good test-retest reliability, internal consistency, sensitivity to change, and correspondence with other measures of consequences in primary substance abusers (1, 2). A brief version, the Shortened Inventory of Problems – Alcohol and Drugs (SIPAD), is highly correlated with the InDUC Recent, shows significant yet low correlations with other measures of drug use and psychiatric severity, and shows sensitivity to change (3).

Because it was developed for people with primary substance use disorders (SUDs), it is unclear if the InDUC is useful in other groups of substance abusers. People with serious and persistent mental illness (SPMI) are an especially important subgroup: they experience high rates of SUDs (4) that lead to impairments in most areas of functioning (5). However, the applicability of the InDUC to people with SPMI is uncertain. Gonzalez and colleagues (6) used the InDUC to assess consequences in an SPMI sample, but did not examine its psychometric properties. Bender, Griffin, Gallop, and Weiss (7) examined a version of the SIP in 57 participants with bipolar disorder. Internal consistencies for the total scale and subscales were strong (total scale $\alpha=.93$; subscale alphas ranged from .62-.88), and 1-week test-retest correlations were good (.63-.77). More data are needed on the InDUC in SPMI.

The aims of the present study were to: (1) examine consequences of substance use in SPMI; (2) evaluate the psychometric properties of a version of the InDUC that was modified for SPMI (InDUC-M); and (3) examine relationships among InDUC-M subscales and other indicators of substance use and severity.

Methods

Participants and Setting

Data were collected as part of a longitudinal study of substance use and motivation to change in people with SPMI and current cocaine dependence or cocaine dependence in remission (N=240). Participants were recruited from outpatient mental health clinics affiliated with a Veterans Administration Medical Center and a division of psychiatry at a public university [see Nidecker et al., 2008 (9) for a description of the parent study]. The present study included participants who completed the InDUC-M Lifetime (n=195). A subset of these completed the InDUC-M Recent (n = 105); participants who were in remission and denied recent cocaine use did not complete Recent items. The total sample was 64% male and 77.2% African-American, with a mean age of 43.4 (SD=7.4) and a mean of 11.9 (SD=2.1) years of education. Overall, 29.2% met DSM criteria for Affective Disorder and Current Cocaine Dependence, 24.1% for Affective Disorder and Cocaine Dependence in Remission, 26.2% for Schizophrenia and Current Cocaine Dependence, and 20.5% for Schizophrenia and Cocaine Dependence in Remission.

Measures

Structured Clinical Interview for DSM-IV (SCID-I) (10)—The SCID was used to determine psychiatric and substance use diagnoses. Diagnoses utilized all available information (i.e., participant report, medical record, treatment provider). Inter-rater reliability (kappa) for the SCID-P diagnoses was greater than 0.80. Interviewers received bi-monthly supervision during which assessments were viewed and consensus ratings obtained.

Inventory of Drug Use Consequences-Maryland (InDUC-M)—The original version of the InDUC includes 50 items that evaluate both lifetime and recent (past three months) consequences of substance use. Individuals are first asked the Lifetime items, which inquire if a consequence has ever happened (0=No, 1=Yes). Individuals then complete the Recent items in which they are asked if a consequence has happened in the past three months; response choices are: 0=Never, 1=Once or few times, 2=Once or twice a week, 3=Daily or almost daily. As noted above, the InDUC was modified (InDUC-M) in several ways to reduce the number of items and time for administration, to increase relevance to SPMI, and to accommodate the symptom burden and cognitive impairment experienced by many with SPMI. First, several items were removed to avoid redundancy and to decrease the length of the measure. These included all items in the Control scale designed to detect careless responding (Tonigan & Miller, 2002), and two items that contained overlapping content. Specifically, the InDUC-M retained the items “I have lost a friend because of my drinking or drug use” and “My marriage or love relationship has been harmed by my drinking or drug use” and eliminated the items “A friendship or close relationship has been damaged by my drinking or drug use” and “I have lost a marriage or a close love relationship because of my drinking or drug use” due to overlapping content. Second, items that tap domains that are generally less applicable to many people with SPMI and SUDs, including three items related to employment (e.g. “I have missed days of work or school because of my drinking or drug use”) and one item related to social status (“My drinking or drug use has damaged my social life, popularity, or reputation”) were removed. Third, to accommodate the cognitive deficits experienced by many with SPMI, we removed items that we identified as too abstract or future-oriented to be meaningfully understood by an SPMI sample. These included the following items: “My spiritual or moral life has been harmed by my drinking or drug use,” and “My drinking or drug use has gotten in the way of my growth as a person.” Finally, an item linking increased cigarette smoking as a negative consequence of substance use (“I have smoked tobacco more when I am drinking or using drugs”) was removed. Because of the high rates of cigarette smoking in SPMI (8) we judged it too fine a distinction to make as to whether one smoked more than usual when drinking or using drugs. Table 1 lists the items included in the InDUC-M.

Addiction Severity Index (ASI; 11)—The ASI was used to assess last-month drug use frequency and severity. The drug, alcohol, family/social, and legal sections of the ASI were administered (12, 13). A modified version of the **Time Line Follow-Back (TLFB)** (14) was used to reconstruct daily drug use for the past month. Variables used in the present analysis included baseline substance use (number of days of use in the past month) and composite scores from the ASI drug and alcohol subscales. Composite scores were derived from days of use, days of problems from use, distress from substance use/problems, perceived

importance of treatment, and amount of money spent (for alcohol composite only; 15). Higher composite scores reflect greater recent distress/problems.

Biological assessment of drug use—Urine was analyzed for traces of cocaine, cannabinoids, and opiates using the Sylva RapidTest (formerly called Accusign) which provides results on site within five minutes. The RapidTest is set according to SAMSHA screening standards, and has been shown to have good sensitivity (96.3% and 96.5%) and specificity (99.8% and 99.3%) for cocaine and THC, respectively. Because some participants were in remission for cocaine and so would be less likely to have a positive urinalysis for cocaine, two variables were created: (1) OBJECTIVE1 included all three test drugs; OBJECTIVE1=1 if the test was positive for cocaine, cannabinoids, or opiates; (2) OBJECTIVE2 did not include cocaine; OBJECTIVE 2=1 if the test was positive for cannabinoids or opiates.

General Procedures

All procedures were approved by the University of Maryland, School of Medicine Institutional Review Board. Participants provided informed consent following a standardized process with trained recruiters. Before providing consent, participants were advised that a Federal Certificate of Confidentiality would protect their information. Data for the present study were collected at the baseline assessment, which generally occurred within one week of consent. Several procedures were employed to increase the validity of self-reports (16) including: (1) administering urinalysis at the time of the interview, (2) accessing data from medical records and case managers before the interview (so inconsistent participant reports can be questioned), and (3) assuring the participant of the confidentiality of his/her responses and that information would not affect eligibility for services. InDUC-M items were read aloud to accommodate those with poor vision or who could not read.

Results

Item Frequencies

Participants endorsed a mean of 25.39 Lifetime items ($sd=8.6$, range=0-36) and a mean of 14.70 ($sd=9.42$, range 0-32) Recent items (Table 1). Having spent or lost a lot of money was the most frequently endorsed lifetime item (90.8%), followed by having a hangover/feeling bad (89.7%), and being unhappy because of drug use (88.7%). The most frequently endorsed recent items were feeling bad about oneself (70.5%), being unhappy because of using drugs (69.5%), and not having the kind of life desired (67.6%).

Reliability

Internal consistency reliabilities were examined for the five InDUC-M subscales for both the Lifetime and Recent versions (Table 2). All Lifetime subscales had good to excellent reliability (Chronbach's alphas = 0.76 or higher), with the exception of the Social Responsibility scale, which had moderate reliability ($\alpha = 0.68$). For Recent consequences, alpha coefficients were high, ranging from .80 for the Physical subscale to .89 for the Intrapersonal subscale. The one exception was the Impulse Control subscale, which had moderate reliability ($\alpha=0.69$). One Impulse Control subscale item ("I have

been arrested for driving under the influence of alcohol and drugs”) had a zero variance, and was excluded from the reliability analysis.

To examine interrelationships among the subscales, we performed two correlations (Spearman Rank) – one among InDUC-M Lifetime subscales and another among InDUC-M Recent subscales (Table 3). Correlation coefficients among the five InDUC-M Lifetime subscales ranged from .53 to .68 ($p<.0001$). Coefficients among the InDUC-M Recent subscales ranged from .67-.81 ($p<.0001$); all but one were .75 or higher. This pattern suggests that the Recent subscales are more interrelated than the Lifetime subscales and may be measuring a common construct.

We then replicated a procedure used by Blanchard and colleagues (3, 17) in which each subscale was regressed onto the other four in order to examine the inter-relationships among the subscales. If the squared multiple correlation coefficients are $>.70$, the subscales are considered highly inter-related. The R-square coefficients for the InDUC-M Lifetime subscales ranged from 0.59 for Impulse Control and Social Responsibility subscales to 0.67 for the Interpersonal subscale. The R-square coefficients for the InDUC-M Recent subscales were all above .70 (Physical=0.71, Intrapersonal=0.72, Interpersonal=0.74, Social Responsibility=0.78) with the exception of the Impulse Control subscale ($r^2=0.68$).

Item Selection for a Short Inventory of Problems-Maryland (SIP-M)

We replicated Blanchard and colleagues (3) and identified 15 Recent items to include in a shortened version that would be most relevant to people with SPMI (SIP-M). To select these items, we correlated each item with the total scale score and selected the 15 items with the highest correlation coefficients (Table 1). Correlations between the SIP-M and both the InDUC-M Lifetime total score (0.94, $p<.01$) and InDUC-M Recent total score (0.98, $p<.01$) were high, indicating that the SIP-M is strongly related to the full scale. Internal consistency of the SIP-M was high ($\alpha=0.944$).

Relationships Among the InDUC-M and Other Substance Use Variables

We examined relationships among Lifetime and Recent total scores and other indicators of substance use and severity that should be related to consequences, including substance use disorder status (i.e., remitted versus dependent; higher scores=remitted), baseline substance use (number of days of use of any substance use), ASI drug and alcohol composite scores, and urinalysis results. First, relationships among the InDUC-M Lifetime, SIP-M total score, substance use disorder status, baseline substance use, ASI drug and alcohol composite scores, and urinalysis results (OBJECTIVE2) were examined using Spearman Rank correlations. InDUC-M Lifetime total scores showed low but significant correlations with remission status (0.37, $p<.01$) and baseline substance use (-0.36 , $p<.01$). There were no associations between Lifetime scores and ASI composite scores or urinalysis results. Second, relationships among the InDUC-M Recent total score, SIP-M total score, baseline substance use, ASI drug and alcohol composite scores, and urinalysis results (OBJECTIVE1) were examined using Spearman Rank correlations. Recent total scores were positively correlated with the ASI drug (0.60, $p<.01$) and alcohol (0.20, $p<.01$) composite

scores. There were no associations between Recent scores and baseline substance use or urinalysis results.

Discussion

The InDUC-M and the SIP-M performed well in individuals with SPMI and SUDs. The most frequently reported lifetime consequences centered on poor use of money and feeling badly about using, while the most frequently reported recent consequences centered on feelings of guilt, shame, and unhappiness. Lifetime and Recent subscales showed good internal consistency reliability. The Recent subscales showed a fair degree of overlap. Current drug users may experience impairment in many areas and thus report consequences in multiple domains. This could, in turn, lead to subscales that are interrelated and measuring a more general construct of “impairment” or “distress”.

The 15 items that were most related to total InDUC-M Recent scores were selected to form the SIP-M. SIP-M total scores were highly correlated with InDUC-M Lifetime and Recent scores, suggesting that SIP-M items are strongly related to the overall measure. The SIP-M showed excellent internal consistency. Given its brevity, the SIP-M may be save time during assessment and accommodate individuals who may have difficulty completing a longer measure.

The InDUC-M was related to other measures of substance use and problems. Lifetime total scores were related to being in remission from cocaine dependence and to fewer days of recent drug use. Thus people with SPMI who report more lifetime consequences are those who are using drugs less frequently than those who report lower numbers of consequences. InDUC-M Recent and SIP-M total scores were related to ASI drug and alcohol composite scores. Higher numbers of recent consequences were associated with higher (more problematic) composite scores. Thus among participants with current cocaine dependence, those who reported a greater number of recent consequences were those who were most bothered by their recent use and who believe additional treatment is needed. InDUC-M Recent scores were not related to positive urinalysis results, suggesting that participants did not use drugs in the few days leading up to the assessment. The fact that participants were recruited from mental health settings may signal that they were a higher functioning cohort who could remain abstinent for blocks of time. There is evidence to suggest that individuals with SPMI and SUDs use less overall than primary substance abusers, but report equivalent numbers of negative consequences of use (18, 19). Such a pattern could account for our findings that participants with cocaine dependence reported many recent consequences but were less likely to have used drugs before the assessment.

Limitations include the fact that participants were recruited from mental health centers, and could thus be higher functioning than individuals with SPMI and SUDs who are not participating in mental health treatment. Recent items were not administered to participants who were in remission from cocaine dependence and denied recent cocaine use. However, those in remission can still experience consequences from use of other substances. Other indicators of psychometric utility, such as test-retest reliability and sensitivity to change,

were not included and must be addressed in future research. Overall, these findings are a useful step in determining the utility of the InDUC-M in SPMI.

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Table 1Frequencies of InDUC-M Lifetime and Recent Items¹ and Item-Total Correlations for SIP-M Items²

Item Number and Content (Subscale) ³	Lifetime (n=195)	Recent ⁴ (n=105)	Item-Total Correlations for SIP-M Items (n=105) ⁵
1) Had hangover or felt bad (PHYS)	89.74%	58.10%	
2) Felt bad about self (INTRA)	87.18%	70.48%	0.72
3) Family/friends have worried/complained (INTER)	85.64%	62.86%	0.67
4) Ability to be good parent harmed (INTER)	52.31%	28.57%	
5) Trouble sleeping/staying asleep/nightmares (PHYS)	77.95%	60.95%	0.76
6) Driven motor vehicle while under the influence (IC)	61.54%	20.95%	
7) Caused me to use other drugs more (IC)	68.21%	41.90%	
8) Been sick/vomited (PHYS)	84.62%	30.48%	
9) Been unhappy (INTRA)	88.72%	69.52%	0.77
10) Lost weight/not eaten properly (PHYS)	81.54%	56.19%	
11) Failed to do what is expected of me (SR)	82.56%	54.29%	0.77
12) Felt guilty/ashamed (INTRA)	84.62%	66.67%	0.73
13) Said/done embarrassing things (INTER)	80.51%	49.52%	0.68
14) Personality changed for worse (INTRA)	77.95%	50.48%	0.72
15) Taken foolish risks (IC)	84.10%	53.33%	0.79
16) Gotten into trouble (SR)	72.82%	34.29%	
17) Said harsh/cruel things to someone (INTER)	77.95%	45.71%	
18) Done impulsive things that I regretted later (IC)	78.97%	44.76%	0.74
19) Gotten into physical fight (IC)	63.08%	17.14%	
20) Physical health harmed (PHYS)	72.31%	48.57%	
21) Had money problems (SR)	87.69%	63.81%	0.78
22) Marriage/love relationship harmed (INTER)	74.36%	39.05%	
23) Physical appearance harmed (PHYS)	72.82%	45.71%	
24) Family hurt (INTER)	77.44%	46.67%	0.73
25) Spent time in jail/prison (IC)	58.97%	13.33%	
26) Sex life has suffered (PHYS)	60.51%	33.33%	
27) Lost interest in activities/hobbies (INTRA)	82.05%	57.14%	0.77
28) Not had kind of life that I want (INTRA)	85.13%	67.62%	0.72
29) Spent too much/lost a lot of money (SR)	90.77%	61.90%	0.80
30) Arrested for driving under the influence (IC)	22.05%	0.00%	
31) Arrested for other offenses (besides DUI) (IC)	58.97%	13.33%	
32) Lost a friend (INTER)	52.82%	16.19%	
33) Had an accident (IC)	30.26%	8.57%	
34) Have been physically hurt/injured/burned (PHYS)	48.21%	18.10%	
35) Have injured someone (IC)	30.26%	4.76%	
36) Broken things/damaged property (IC)	54.87%	15.24%	

¹Most frequently endorsed items are in bold.²The SIP-M includes 15 items.

³ PHYS=Physical subscale, INTRA=Intrapersonal subscale, INTER=Interpersonal subscale, SR=Social Responsibility subscale, IC=Impulse Control Subscale

⁴ In the full InDUC-M, all items reference alcohol and drug use as the reason for each consequence.

⁵ Coefficients are Spearman Rank correlations.

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Table 2

Internal Consistency of InDUC-M Subscales

Subscale	Total Items	Mean (SD)	Alpha coefficient
Lifetime (N=195)			
Physical	8	5.88 (2.08)	.76
Interpersonal	7	5.01 (2.09)	.81
Intrapersonal	6	5.06 (1.71)	.88
Impulse Control	11	6.11 (3.00)	.82
Social Responsibility	4	3.34 (1.05)	.68
Total	36	25.39 (8.60)	.94
Recent ¹ (N=105)			
Physical	8	6.14 (5.08)	.80
Interpersonal	7	5.11 (4.84)	.82
Intrapersonal	6	8.08 (5.82)	.89
Impulse Control	11	3.66 (3.61)	.69 ²
Social Responsibility	4	4.01 (3.54)	.82
Total	36	27.00 (20.45)	.95 ²

¹ Past 3 months

² The item that asks “*I have been arrested for driving under the influence of alcohol and drugs*” in the past 3 months had zero variance and was removed from each scale prior to reliability analysis.