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Dimensionality of Hallucinogen and Inhalant/Solvent Abuse and Dependence Criteria: Implications for the Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition

Bradley T. Kerridge[a], **Tulshi D. Saha**[b,*], **Sharon Smith**[b], **Patricia S. Chou**[b], **Roger P. Pickering**[b], **Boji Huang**[b], **June W. Ruan**[b], and **Attila J. Pulay**[b]

[a]Department of Epidemiology and Biostatistics, School of Public Health, University of Maryland, College Park, MD 20740

[b]Laboratory of Epidemiology and Biometry, Division of Intramural Clinical and Biological Research, National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, 5635 Fishers Lane, Bethesda, MD 20892

Abstract

Background—Prior research has demonstrated the dimensionality of Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition (DSM-IV) alcohol, nicotine, cannabis, cocaine and amphetamine abuse and dependence criteria. The purpose of this study was to examine the dimensionality of hallucinogen and inhalant/solvent abuse and dependence criteria. In addition, we assessed the impact of elimination of the legal problems abuse criterion on the information value of the aggregate abuse and dependence criteria, another proposed change for DSM- IV currently lacking empirical justification.

Methods—Factor analyses and item response theory (IRT) analyses were used to explore the unidimisionality and psychometric properties of hallucinogen and inhalant/solvent abuse and dependence criteria using a large representative sample of the United States (U.S.) general population.

Results—Hallucinogen and inhalant/solvent abuse and dependence criteria formed unidimensional latent traits. For both substances, IRT models without the legal problems abuse criterion demonstrated better fit than the corresponding model with the legal problem abuse criterion. Further, there were no differences in the information value of the IRT models with and without the legal problems abuse criterion, supporting the elimination of that criterion. No bias in the new diagnoses was observed by sex, age and race-ethnicity.

[*]Corresponding author: Tulshi D. Saha, Laboratory of Epidemiology and Biometry, Division of Intramural Clinical and Biological Research, National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, 5635 Fishers Lane, Room 3083, Bethesda, MD 20892, Tel. 301-443-0017, Fax. 301-443-1400, sahatd@mail.nih.gov.

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Contributors

Mr. Kerridge wrote the first draft of the manuscript and reviewed the statistical analyses. Dr. Saha conducted statistical analyses. Drs. Smith, Chou, Huang and Pulay commented on subsequent drafts of the manuscript. Drs. Saha, Smith, Chou, Huang and Pulay and Mr. Pickering and Ms. Ruan collected the data and administered the study.

Conflict of Interest

There are no conflicts of interest.

Conclusion—Consistent with findings for alcohol, nicotine, cannabis, cocaine and amphetamine abuse and dependence criteria, hallucinogen and inhalant/solvent criteria reflect underlying dimensions of severity. The legal problems criterion associated with each of these substance use disorders can be eliminated with no loss in informational value and an advantage of parsimony. Taken together, these findings support the changes to substance use disorder diagnoses recommended by the DSM-V Substance and Related Disorders Workgroup, that is, combining DSM-IV abuse and dependence criteria and eliminating the legal problems abuse criterion.

Keywords

Hallucinogen use disorder; inhalant/solvent use disorder; DSM-V; item response theory; dimensionality

1. Introduction

The Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV: American Psychiatric Association, 1994) defines two categories of substance use disorders; abuse and dependence. According to the DSM-IV only individuals not meeting criteria for dependence can be classified with an abuse diagnosis. Generally, dependence is considered to be a more serious condition than abuse. However, numerous recent studies applying item response theory (IRT) modeling to alcohol (Borges et al., 2009; Keys et al., 2010; Proudfoot et al., 2006; Saha et al., 2006, 2007; Shmulewitz et al., 2010),), nicotine (McBride et al, 2010; Saha et al., 2010; Shmulewitz et al., 2011), cannabis (Beseler et al., 2010; Compton et al, 2009; Martin et al., 2006; Teesson et al., 2002) and cocaine, amphetamine and opioid use disorders (Gillespie et al., 2007; Langenbucher et al., 2004; Lynskey and Agrawal, 2007; Wu et al., 2009) have demonstrated that criteria for DSM-IV abuse and dependence empirically constitute a single dimensional construct and not two distinct and discrete conditions. In view of this accumulating evidence on dimensionality, the Draft Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition (DSM-V: American Psychiatric Association, 2011) Substance and Related Disorders Workgroup has proposed combining abuse and dependence criteria into a single unitary diagnosis of substance use disorder.

However, very little comparative information exists concerning the dimensionality of hallucinogen and inhalant/solvent abuse and dependence criteria (Perron et al., 2010; Wu et al., 2010). Perron et al. (2010) found support for a single unitary construct of inhalant use disorder severity using DSM-IV abuse and dependence criteria among adolescent inhalant users in treatment. Similarly, Wu et al. (2010), found that DSM -IV abuse and dependence criteria were arrayed along a single continuum of severity using a nationally representative survey of 12-to-17 year-olds. Examining further the psychometric properties of these two most infrequently studied drugs is important since the Workgroup plans to apply the new definition of substance use disorder to all drug classes described in the DSM-IV.

Another major change proposed by the DSM-V Substance and Related Disorders Workgroup is the elimination of the legal problems abuse criterion from the new combined substance use disorder diagnoses. The impetus for this change generally rests with the observation that the prevalence of this abuse criterion is extremely low in the general population and its removal results in little loss of informational value of the substance use disorder diagnoses. However, studies using IRT and related analyses to demonstrate the superiority of the abuse and dependence criteria models with and without the legal problems abuse criterion have been sparse, and indeed only empirically documented for alcohol use disorder criteria (Saha, et al., 2006).

To fill this gap in the literature, currently justifying these major changes to DSM-V substance use disorder diagnoses, this study aims to examine the psychometric properties (unidimensionality, severity, discrimination) of hallucinogen and inhalant/solvent use disorder criteria using a large representative survey of the adult general population, the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC: Grant et al., 2003; 2004). Importantly, IRT models with and without the legal problem criterion will be compared in terms of model fit and information value. The sample size of NESARC also provides for the evaluation of bias in the diagnoses due to the differential reporting or interpretation of criteria, or differential criterion functioning (DCF) across major subgroups of the general population defined in terms of sex, age and race-ethnicity. Evaluating DCF is fundamental to evaluating differential interpretation and reporting of abuse and dependence criteria and to developing less biased estimates of for hallucinogen and inhalant/solvent use disorders across important subgroups of the general population.

2. Methods

2.1 Sample

The NESARC is a representative sample of the U.S. conducted by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and described in detail elsewhere (Grant et al., 2003). The NESARC target population was the civilian noninstitutionalized population residing in households and group quarters, 18 years and older. Face-to-face interviews were conducted with 43,093, with a response rate of 81%. Blacks, Hispanics, and young adults ages 18–24 were oversampled in the NESARC. The NESARC sample was weighted to adjust for the probabilities of selection of a sample housing unit or housing unit equivalent from the group quarters' sampling frame, nonresponse at the household and person levels, the selection of 1 person per household, and oversampling. Once weighted, the data were adjusted to be representative of the U.S. population for various sociodemographic variables, including region, age, sex, race, and ethnicity, based on the 2000 Decennial Census. All analyses in the study were conducted using weighted data so that the results would be representative of all hallucinogen or inhalant/solvent users in the U.S. population. In this study, analysis were conducted among lifetime users of hallucinogens (N=2,176) and lifetime users of inhalants/solvents (N=664).

2.2 DSM-IV Hallucinogen and inhalant/solvent abuse and dependence criteria

The Alcohol Use Disorder and Associated Disabilities Interview Schedule – DSM IV Version (AUDADIS-IV: Grant et al., 2000) was designed to assess use and abuse and dependence criteria for hallucinogens and inhalants/solvents. Specific drugs in the hallucinogen class included LSD, mescaline, angel dust and psilocybin. Substances classified as inhalants/solvents included amyl nitrate, gasoline, lacquer thinner, lighter fluid, finger nail polish remover, and nitrous oxide. DSM-IV hallucinogen and inhalant/solvent abuse criteria included: (1) use in hazardous situations (hazardous use); (2) failure to fulfill major role obligations at work/school/home (neglect roles); (3) legal problems related to use (legal problems); and (4) social / interpersonal problems. DSM-IV dependence criteria included: (1) tolerance; (2) using larger amounts of for longer periods than intended (larger/longer); (3) persistent desire or unsuccessful efforts to cut down or control use (quit/control); (4) a great deal of time spent in activities to obtain use, or to recover from use (time spent); (5) giving up or reducing important social, occupational or recreational activities in favor of use (activities given up); and (6) continued use despite knowledge of a physical or psychological problem caused or exacerbated by use (physical/psychological problems).

2.3 Statistical analyses

2.3.1 Factor analyses—Factor analyses with binary criterion data were conducted to examine the IRT assumption of unidimensionality of the hallucinogen and inhalant/solvent abuse and dependence criteria with and without the legal problems criterion. Factor analyses were conducted using Mplus software (Muthén and Muthén, 2010) within a confirmatory factor analytic context. In factor analysis, unidimensionality is demonstrated by showing that a one-factor model provides a good fit to the underlying data.

To asses fit of the factor analytic models, Hu and Bentler's (1999) two-index strategy was used. They suggest a cutoff of 0.95 or above on either the Tucker Lewis Index (TLI; Tucker and Lewis, 1973) or the Comparative Fit Index (CFI; Bentler, 1990). A root mean squared error of approximation (RMSEA) "close to 0.06" also indicates good fit of a factor model.

2.3.2 IRT Modeling—Two-parametric IRT models (Lord and Novick, 1968) were used to define the relationship between the observed responses to the criteria and the IRT-defined underlying latent trait or construct of hallucinogen and inhalant/solvent use disorder severity. The IRT models were generated with BILOG-MG statistical software (Scientific Software International, 2004) to yield maximum likelihood estimates (Bock and Aitkin, 1981) of two parameters; the *a* or discrimination parameter and the *b* or severity parameter. The discrimination parameter measures the level of precision with which a criterion distinguishes among hallucinogen or inhalant /solvent users who are higher versus lower on the severity continuum. The greater the discrimination, the more strongly *a* criterion is related to the underlying trait or construct. The large the *a* parameter the greater the discrimination of a criterion. The *b* parameter measures severity of a criterion; criterion with high thresholds are endorsed less frequently and are more severe. Criterion with high levels of severity are endorsed less frequently.

IRT parameters are depicted on criterion characteristic curves (CRCs) (Embretson and Reise, 2000). In these plots, the *b* parameter represents the criterion's location along the latent continuum (located on the horizontal axis). The *b* parameter (severity) is the point on the latent continuum where there is a 50% chance of the criterion being present. The *b* parameter shifts the CRC from left to right as the criterion becomes more severe. The *a* or discrimination parameter indicates how steep the slope of the CRC is at its steepest point.

The Bayesian Information Function (BIC) was used as a fit index to compare hallucinogen and inhalant/solvent IRT modes with and without the legal problems criterion. The BIC is a commonly used statistical criterion for model selection. When comparing estimated models using this strategy, the model with lower BIC is considered the best model.

2.3.3. Aggregate criteria information function—For hallucinogens and inhalants/solvents, IRT models with and without the legal problems criterion were additionally compared with respect to information value. The aggregate criterion information function (ACIF), that reflects the information value of each model, was estimated using BILOG-MG (Scientific Software International, 2003) for each model. The ACIF graphically depicts the information value of the criteria as a collective or in the aggregate. The ACIF is the reciprocal error variance in an efficient estimate of the latent trait and measures the contribution of each criterion to the reduction of error of measurement. Total area under the curve (AUC) associated with each ACIF curve for each model was generated using the trapezoidal rule of integration. The trapezoidal rule is a numerical integration method used to approximate the area under any curve, including ACIFs Statistical differences in the informational value of IRT models with and without the legal problems criterion were conducted by statistically comparing AUCs for each of the models.

2.3.4. Differential criterion functioning—Differential criterion functioning (DCF) reflects bias and invariance of interpreting and reporting abuse and dependence criteria across sex, age and race ethnic subgroups of the population. Evidence of DCF reflects differences in the degree to which criteria are related to the underlying constructs of hallucinogen and inhalant/solvent use disorder severity and suggests that unequal levels of a trait are necessary to endorse a criterion. However, when DCF occurs in opposing directions (e.g., some criteria demonstrate greater severity among men while other criteria show greater severity among women) this does not always indicate bias in response to criteria across subgroups of the population (Cooke et al., 2001; Bolt et al., 2004). In these situations, differential criteria functioning can be best assessed by determining whether the observed DCF cancels out at the total test (scale) score level. This is accomplished by plotting the expected raw scores by the severity of the hallucinogen and inhalant/solvent use disorder severity continuum by sex, age and race-ethnic, plots referred to as test response curves (TRCs). If the TRCs between subgroups (e.g., men vs. women) do not visually differ and overlap, we can conclude that any significant criterion-level differential functioning cancels out when considered at the total scale level. That is, for any latent trait value, men and women have identical raw scores. If TRCs between subgroups substantially differ, DCF is demonstrated.

3.0 Results

3.1 Prevalences and factor analyses

The prevalence of hallucinogen abuse and dependence criterion among lifetime hallucinogen users ranged from 2.2% for the legal problems criterion to 32.3% for the quit/control criterion (Table 1). Similarly, the prevalence of inhalant/solvent criteria ranged from 1.5% to 30.3% for the legal problems and quit/control criteria, respectively (Tables 2). The one factor model for hallucinogens with (CFI=0.91; TLI=0.975; RMSEA=0.036) and without (CFI=0.999; TLI=0.972; RMSEA=0.042) the legal problems criterion showed excellent fits to the underlying data. The one-factor inhalant /solvent model also showed excellent fit; whether the legal problems criterion was included (CFI=0.971; TLI=0.962; RMSEA=0.043) or excluded (CFI=0.964; TLI=0.952; RMSEA=0.052).

3.2 IRT models

For hallucinogens (Table 1, *b*Figure 1) and inhalants/solvents (Table 2, Figure 2) IRT models that included the legal problems criterion was indeed the most severe (= 2.95, 3.53), followed by the activities given up (*b*= 2.30, 2.52) and tolerance (*b*=2.06, 2.60) criteria. The latter severity results were mirrored in the hallucinogen and inhalant/solvent models that did not include the legal problems criterion. The least severe criterion was the quit/control criterion in both IRT hallucinogen (*b*=0.65) and inhalant/solvent (*b*=0.69) models. Regardless of IRT model, discrimination for hallucinogen and inhalant/solvent abuse and dependence criteria were remarkably similar, ranging from 1.67 to 1.87.

Based on the BIC criterion, IRT models without the legal problems criterion were much better fits to the data than the corresponding models with the legal problems criterion for hallucinogens (BIC=11155.65 vs. 11541.30) and inhalants/solvents (BIC=2911.41 vs. 2967.21).

3.3 Aggregate Criterion Information Function

The ACIF curves for hallucinogens and inhalants/solvents are shown in Figures 3 and 4, respectively. Graphically, the ACIF for models with the legal problems criterion appear to have slightly higher information values; especially at the more severe end of the continua. However, there were no statistical differences in AUCs of the ACIFs for models with or

without the legal problems criteria, for hallucinogens [(AUC=15.31 (−7.40, 38.01) vs. AUC=14.39 (−8.49, 37.26)] or inhalants/solvents [(AUC=13.98 (−12.71, 40.68) vs. AUC = 13.47 (−13.33, 40.27)].

3.4 Differential Criterion Functioning

TRCs for hallucinogens and inhalants/solvents, respectively, were virtually identical and overlapping between sex, age and race-ethnic subgroups of the population, suggesting the absences of DCF of the hallucinogen and inhalant/solvent abuse and dependence criteria.

4. Discussion

Consistent with studies on the dimensionality of abuse and dependence criteria for other substances (Compton et al, 2009; Langenbucher et al., 2004; McBride et al., 2010; Teesson et al., 2002; Saha et al., 2007; 2010), this study found that hallucinogen and inhalant/solvent abuse and dependence criteria mapped well onto a single dimensional construct of substance use disorder severity. All abuse and dependence criteria for each substance showed good discrimination in distinguishing between hallucinogen and inhalant/solvent users especially at the middle to severe end of the severity continua. Model fit was substantially better for hallucinogen and inhalant/solvent models without the legal problems abuse criterion relative to the models that retained the criterion and removing the legal problems criterion did not affect the aggregate information value. Further, there was no evidence for differential criterion functioning between subgroups, indicating the absence of gender, age and race-ethnic bias in thresholds of reporting hallucinogen and inhalant/solvent abuse and dependence criteria. The absence of differential criterion functioning (DCF) strongly suggests that group comparisons of the diagnoses will not be affected by different interpretations or reporting of abuse and dependence criteria across gender, sex and race-ethnic subgroups. Further, the lack of DCF indicates that the abuse and dependence criteria examined in this study appear to work for each gender, age and race-ethnic subgroups as indicators of a common constructs, that is, hallucinogen and inhalant/solvent use disorder severity. Taken together these results suggest the combining abuse and dependence criteria and eliminating the legal problems criterion proposed for a new definitions of DSM-V substance use disorders by the DSM-V Substance and Related Disorders Workgroup are justified as they relate to hallucinogens and inhalants/solvents.

Although discrimination values for hallucinogen and inhalant/solvent abuse and dependence criteria were good to excellent, severity of the hallucinogen and inhalant/solvent abuse and dependence criteria varied. Further, the relative ranking of criteria in the terms of severity differed from results of the two prior studies conducted in this area among adolescents. Disregarding the legal problems abuse criterion, this study found that the activities given up criterion was the most severe hallucinogen and inhalant/solvent criterion while tolerance was also among the most severe inhalant/solvent criteria. In contrast, the most severe hallucinogen criteria in the Wu et al. study (2010) were the cut down and large/larger criteria, while in the Perron et al. (2010) study the most severe inhalant/solvent criteria were time spent and social/interpersonal problems. Also at variance with this study that found the quit/control hallucinogen and inhalant/solvent criterion the least severe, Wu et al. (2010) identified the hallucinogen tolerance and time spent criteria as the least severe, while Perron et al. (2010) identified the inhalant hazardous use and physical/psychological problems criteria as the least severe. Differences in the severity between this study of adults and the prior research conducted among adolescent samples suggests that the relative ranking of abuse and dependence criteria is likely to change as a function of developmental period and stage of severity of the hallucinogen and inhalant/solvent use disorders.

The results of this study have major implications for both the classification of treatment of substance use disorders. First, the results of this study empirically show that DSM-IV diagnoses of hallucinogen and inhalant/solvent abuse and dependence criteria can be combined into a single DSM-V diagnoses of hallucinogen and inhalant/solvent use disorders. Clinically, these new definitions of hallucinogen and inhalant/solvent use disorders simply diagnosis and eliminate the need to differentiate treatment modalities between abuses and those classified as dependent in the older criteria. Evidence that DSM-IV hallucinogen and inhalant/solvent abuse and dependence criteria (without the legal problems criterion) form unidimensional continua of severity similar to other drug classes also simplifies clinical diagnosis by having identical criteria for all substance use disorders to appear in the DSM-V

Limitations are noted. The data on use, abuse and dependence relied on self-report typical of large epidemiologic surveys of the general population. Moreover, the NESARC sample excluded certain segments of the population (e.g., adolescents, prisoners and individuals in substance abuse treatment) in which the prevalences of hallucinogen and inhalant/solvent use, abuse and dependence are high. Nonetheless, the fundamental finding on dimensionality of hallucinogen and inhalant/solvent criteria is most consistent with the two prior studies (Perron et al., 2010; Wu et al., 2010) conducted among adolescents, the largest segment of the population excluded from the NESARC survey.

In summary, this study found strong evidence for the dimensionality of hallucinogen and inhalant/solvent abuse and dependence criteria (excluding the legal problems abuse criterion) and the applicability of the criteria to sex, age and race-ethnic subgroups of the population. These finding provide further support for combining hallucinogen and inhalant/solvent abuse and dependence criteria in the DSM-V and eliminating the legal problems abuse criterion thus aligning the new definition of hallucinogen and inhalant/solvent use disorders with the other substances appearing in the DSM-V. Future research should focus on replicating the results of the present study with regard to hallucinogens and inhalants/solvents using other large epidemiological surveys and clinical studies of the adult and adolescent populations.

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Highlights

1. Hallucinogen and inhalant/solvent abuse and dependence criteria mapped well onto a single dimensional construct of substance use disorder severity providing support for the new DSM-V definition of substance use disorders.
2. Removal of the DSM-IV legal problems criterion did not affect the information value of the aggregate hallucinogen and inhalant/solvent abuse and dependence model, a finding supporting its elimination as a criterion for DSM-V diagnoses.
3. Dimensionality of DSM-IV hallucinogen and inhalant/solvent abuse and dependence criteria does not support the concept of two distinct disorders with abuse being prodromal to dependence.

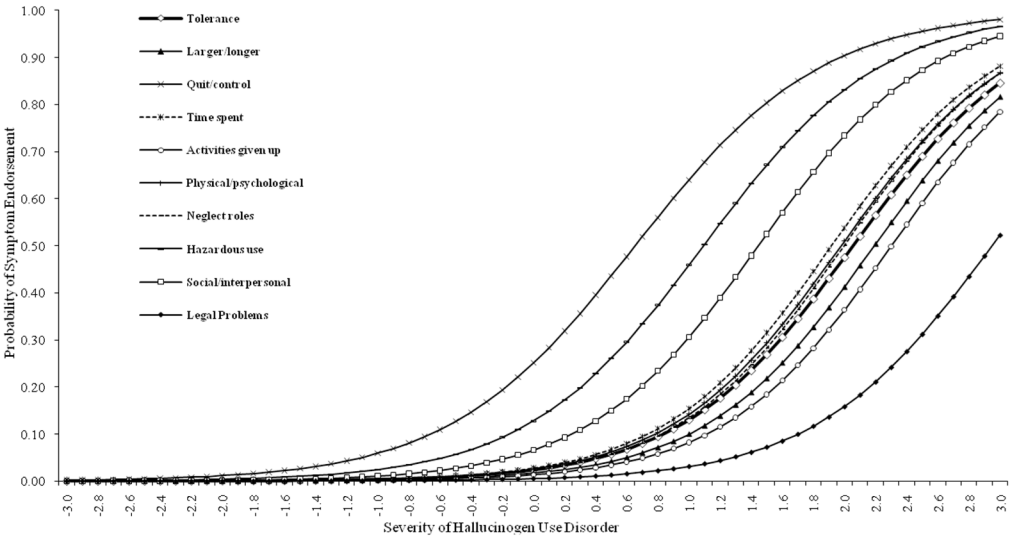

Figure 1.
Criterion Response Curves: Hallucinogens

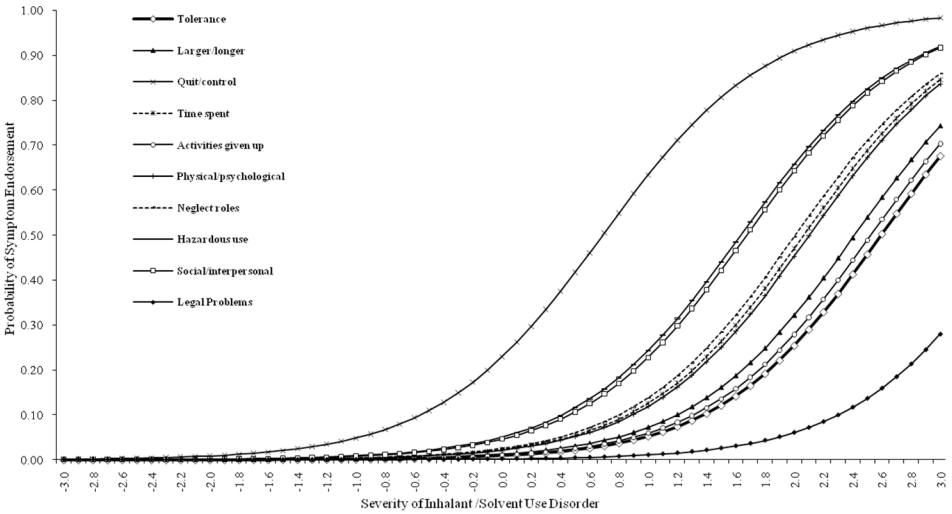

Figure 2.
Criterion Response Curves: Inhalants/Solvents

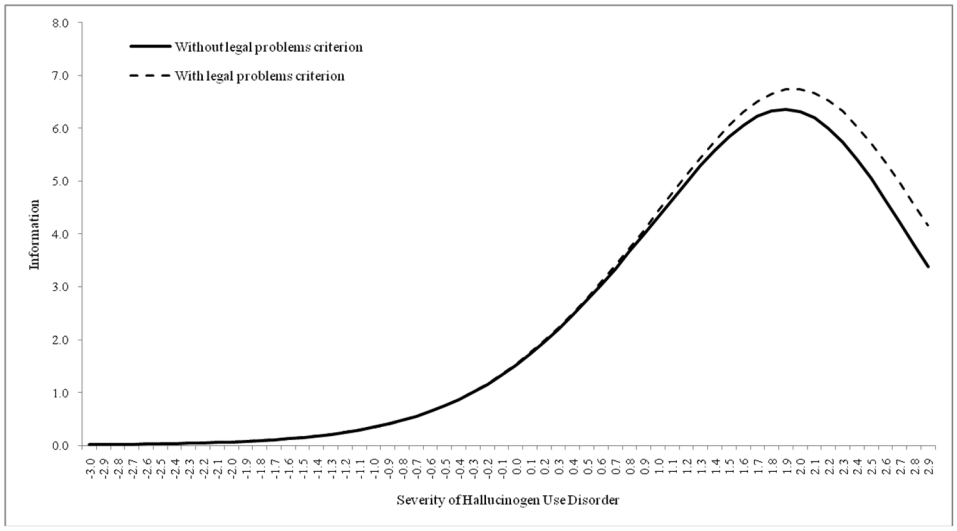

Figure 3.
Aggregate Criteria Information Function Curves: Hallucinogens

Inhalants/Solvents

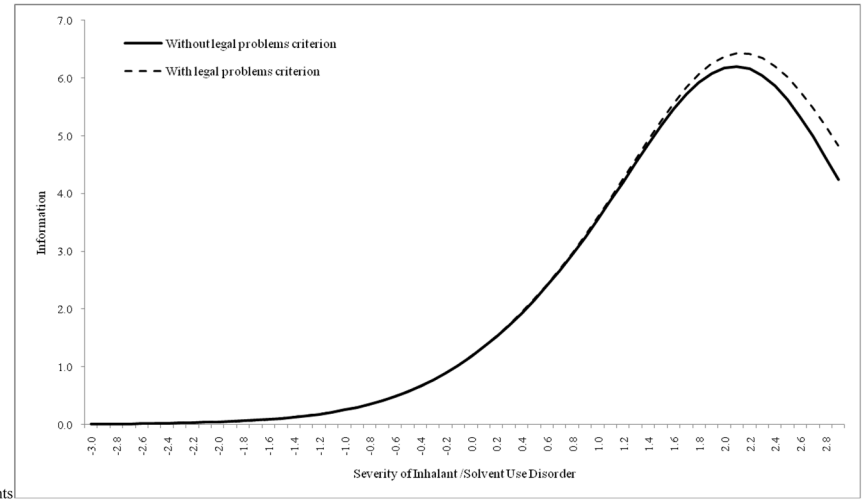

Figure 4.
Aggregate Criteria Information Function Curves:

Table 1

Prevalence, Factor Loadings, IRT Parameters and Fit Statistics: Hallucinogens

Hallucinogen Abuse (A) and Dependence (D) Criteria	Prevalence (%)	Model With Legal Problems Criterion			Model Without Legal Problems Criterion		
		Factor Loadings	Discrimination estimate *a* (SE)	Severity estimate *b* (SE)	Factor Loadings	Discrimination estimate *m* (SE)	Severity estimate *b* (SE)
Tolerance (D)	6.94	0.770	1.80 (0.05)	2.06 (0.07)	0.765	1.80 (0.05)	2.06 (0.07)
Larger/Longer (D)	6.66	0.836	1.84 (0.05)	2.19 (0.07)	0.836	1.84 (0.05)	2.19 (0.07)
Quit/Control (D)	32.26	0.603	1.67 (0.04)	0.65 (0.04)	0.604	1.67 (0.04)	0.65 (0.04)
Time spent (D)	8.41	0.846	1.85 (0.05)	1.92 (0.06)	0.851	1.86 (0.05)	1.92 (0.06)
Activities given up (D)	5.38	0.881	1.85 (0.05)	2.30 (0.08)	0.884	1.85 (0.05)	2.30 (0.08)
Physical/Psychological problems (D)	8.87	0.847	1.84 (0.05)	1.98 (0.07)	0.851	1.84 (0.05)	1.98 (0.07)
Neglect roles (A)	7.63	0.868	1.87 (0.06)	2.00 (0.07)	0.864	1.86 (0.05)	2.00 (0.06)
Hazardous use (A)	21.23	0.717	1.76 (0.05)	1.09 (0.05)	0.713	1.76 (0.05)	1.09 (0.05)
Social/Interpersonal problems (A)	14.29	0.809	1.83 (0.05)	1.45 (0.05)	0.808	1.83 (0.05)	1.44 (0.05)
Legal problems (A)	2.16	0.632	1.76 (0.05)	2.95 (0.10)			
Comparative Fit Index (CFI)		0.981			0.979		
Tucker Lewis Index (TLI)		0.975			0.972		
Root mean squared error of approximation (RMSEA)		0.036			0.042		
Bayesian Information Criterion (BIC)			11541.30			11155.65	

Table 2

Prevalence, Factor Loadings, IRT Parameters and Fit Statistics: Inhalants/solvents

Inhalant/solvent Abuse (A) and Dependence (D) Criteria	Prevalence (%)	Model With Legal Problems Criterion			Model Without Legal Problems Criterion		
		Factor Loadings	Discrimination estimate *a* (SE)	Severity estimate *b* (SE)	Factor Loadings	Discrimination estimate *a*(SE)	Severity estimate *b* (SE)
Tolerance (D)	4.37	0.842	1.81 (0.05)	2.60 (0.16)	0.841	1.81 (0.05)	2.60 (0.16)
Larger/Longer (D)	6.17	0.850	1.81 (0.05)	2.41 (0.14)	0.853	1.81 (0.05)	2.41 (0.14)
Quit/Control (D)	30.27	0.617	1.76 (0.05)	0.69 (0.07)	0.624	1.76 (0.05)	0.69 (0.07)
Time spent (D)	8.28	0.903	1.82 (0.05)	2.07 (0.12)	0.911	1.82 (0.05)	2.07 (0.12)
Activities given up (D)	4.52	0.876	1.81 (0.05)	2.52 (0.16)	0.878	1.81 (0.05)	2.52 (0.16)
Physical/Psychological problems (D)	7.68	0.844	1.82 (0.05)	2.11 (0.12)	0.856	1.82 (0.05)	2.10 (0.12)
Neglect roles (A)	7.53	0.882	1.82 (0.05)	2.01 (0.12)	0.861	1.82 (0.05)	2.01 (0.11)
Hazardous use (A)	12.95	0.748	1.79 (0.05)	1.64 (0.09)	0.755	1.79 (0.05)	1.64 (0.09)
Social/Interpersonal problems (A)	12.65	0.834	1.81 (0.05)	1.68 (0.10)	0.821	1.81 (0.05)	1.68 (0.10)
Legal problems (A)	1.51	0.780	1.79 (0.05)	3.53 (0.26)			
Comparative Fit Index (CFI)		0.971			0.964		
Tucker Lewis Index (TLI)		0.962			0.952		
Root mean squared error of approximation (RMSEA)		0.043			0.052		
Bayesian Information Criterion (BIC)			2967.21			2911.41	