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The Reliability and Validity of Drug Users' Self Reports of Amphetamine Use Among Primarily Heroin and Cocaine Users

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Abstract

Relatively few studies have addressed the psychometric properties of self-report measures of amphetamine use. This study examines the reliability and validity of the Risk Behavior Assessment's (RBA) lifetime and recent amphetamine-use questions. To evaluate validity, 4027 out-of-treatment primarily cocaine and heroin users provided urine samples that were compared to self-report data; to evaluate reliability, 218 completed the RBA at two time points, 48 hours apart. In the overall sample, self-reports demonstrated moderately high validity, with a 95% accuracy rate (kappa =.54). When analysis was restricted to recent amphetamine users validity was slightly lower (71.5% accuracy; kappa = .41). Test-retest data indicated good reliability for self-reports of ever having used amphetamine (kappa =.79), and amphetamine use in the past 30 days ($.75 < r < .91$). Out-of-treatment drug users provided accurate self-reports of amphetamine use. Reliable and valid measures are essential for describing and predicting trends in amphetamine use, evaluating the effectiveness of interventions, and developing policies and programs.

Keywords

Amphetamine; reliability; validity; self-report

1. Introduction

In recent years there has been increasing concern about the risks of amphetamine use, particularly methamphetamine use (Hirshfield, Remien, Humberstone, Walavalkar, & Chiasson, 2004; Schwartz, Andsager, & LaVail, 2007). Amphetamine use is associated with, for example, increases in cases of HIV and other sexually transmitted diseases (Fisher, Reynolds, Ware, & Napper, 2009; Hirshfield, Remien, Walavalkar, & Chaisson, 2004; Menza, Hughes, Celum, & Golden, 2009; Shoptaw et al., 2006). Attempts to track the use of amphetamines often rely exclusively on self-reports, including efforts to assess the effectiveness of interventions, describe trends in drug use, develop prevention and treatment

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programs and advocate for financial support for treatment services and law enforcement. In comparison to biological markers, self-report data are usually cheaper to obtain, more practical, and allow researchers to gather more detailed information about longer-term drug-use behaviors, routes of use, and context of drug-use behaviors (Rosay, Skroban Najaka, & Herz, 2007).

Although collection of self-report data is often the only viable approach to assessing amphetamine use, responses may be influenced by factors such as presentation biases, social desirability, or a participant's ability to recall information. Social stigma associated with amphetamine use or fear of legal repercussions may lead participants to be unwilling to report having used this illicit drug. Alternatively, people may exaggerate their amphetamine use to meet eligibility requirements for a program, be seen as rebellious, or impress an interviewer (Harrell, 1997; Macleod, Hickman, & Smith, 2005). Other reasons for inaccurate self-report data include: misunderstanding questionnaire items, memory failure, embarrassment about the topic, and not recognizing the drug terminology used on the questionnaire (Cottler et al., 1994; Harris, Griffin, McCaffrey, & Morral, 2008; Hser, Anglin, & Chou, 1992; Oullett, Cagle, & Fisher, 1997). The myriad reasons why respondents may unintentionally or intentionally provide inaccurate information about their drug use result in bias, through systematic under- and over-reporting, and to increased variability, through increased random error.

While there is no gold standard in measuring drug use, biological measures have been argued to be the most accurate approach (M. E. Johnson, Pratt, Neal, & Fisher, in press). A variety of such tests are available for different types of specimens, including urine, hair, blood, sweat and saliva, one of the most common of which is urine (Crome, Bloor, & Thom, 2006). In response to concerns about the potential inaccuracies of self-report data, the use of other measures, such as biological markers provides a useful approach to examine the criterion-related validity of self-report data (P. B. Johnson & Richter, 2004).

Although past studies have examined the reliability and validity of self-report measures of other types of drugs used (Dowling-Guyer et al., 1994; Falck, Siegal, Forney, & Wang, 1992; Hamid, Deren, Beardsley, & Tortu, 1999; M. E. Johnson et al., 2000; Needle et al., 1995; Weatherby, Needle, Cesari, & Booth, 1994) surprisingly few studies specifically examined the reliability and validity of self-reports of amphetamine use. Most focused on opiate or cocaine use, and looked only at amphetamine use in combination with other drugs or found low numbers of amphetamine users (Calhoun et al., 2000; Marsden et al., 2008). Solbergsdottir, Bjornsson, Gudmundsson, Tyrfingsson and Kristinsson (2004) examined the validity of self reports of young adults entering drug treatment. They found high consistency between urinalyses and self-report for amphetamine use; however, they did not report the number of participants who either tested positive for amphetamine or self-reported using amphetamine in the past two days. Chen, Fang, Shyu, and Lin (2006) conducted a careful examination of the validity of drug-use self reports by including both urine test data and confirmatory analysis using gas chromatography/mass spectrometry; however, relatively few participants reported, or tested positive for, amphetamine use. With low numbers of participants using or reporting amphetamine use, it is difficult to draw reliable conclusions about the accuracy of self-report data. Differences between illicit drugs in terms of social stigma and patterns of use, make it important to address the reliability of self-report of different drugs separately. Given the increasing concern about amphetamine use and lack of previous research addressing the accuracy of amphetamine self-report data, more research is needed to address both the reliability and validity of individual self-reports of use of this drug in particular.

This paper outlines two separate analyses, the first looking at the criterion-related validity of individuals' self-report of amphetamine use, and the second addressing the test-retest reliability of such self-reports. Research addressing the psychometric properties of self-report of

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amphetamine use is important for those intending to use these measures to either describe or predict amphetamine use, as well as to assess the impact of interventions targeting amphetamine-use behaviors.

2. Methods

Data were collected between 1992 and 1998 as part of the National Institute on Drug Abuse (NIDA) Cooperative Agreement (CA) on HIV/AIDS Community-Based Outreach/ Intervention Research. Data from 13 of the NIDA CA sites that performed drug tests for amphetamine use and/or collected test-retest data were included in the analyses.

2.1. Measures

2.1.1. Risk Behavior Assessment (RBA; National Institute on Drug Abuse, 1993)—The RBA is a structured interview that includes measures of participants' lifetime and recent drug use. Relevant to the current study, participants were asked: “Have you ever used amphetamine?”; “How old were you the first time you used amphetamine?”; “How many days have you used amphetamine in the last 30 days?”; “How many days have you injected amphetamine in the last 30 days?”; “How many times have you injected amphetamine in the last 30 days?”; and “How many days have you used amphetamine without injecting (smoked, snorted, swallowed) in the last 30 days?”. Participants also were asked whether they had used amphetamine in the last 48 hours/two days.

In addition, participants responded to the same series of questions concerning their use of other classes of drugs, including any “other drugs.” Some participants reported that they had not used amphetamines, but in response to the “other drugs” question indicated that they had used “crank”, “crystal”, “crystal meth”, “ice”, “meth”, “methadrine” or “speed.” In these cases, participants' responses were recoded to indicate that they did report having used amphetamine.

2.1.2. Urine Test—Participants in the validity study were asked to provide a urine sample for drug testing before completing the Risk Behavior Assessment (RBA). Urine samples were analyzed for amphetamine using the Abuscreen ONTRACK urine test (Roche Diagnostic Systems). The ONTRACK test is highly accurate having a 98% agreement with gas chromatography/mass spectrometry (M. E. Johnson et al., 2000).

2.2. Participants

Eligibility requirements for participation included being at least 18 years of age, understanding English, reporting cocaine and/or heroin use in the past 30 days, and not currently being in substance abuse treatment.

2.2.1. Validity Sample—In total, 4027 participants provided urine samples and self-report amphetamine data. Participants ranged in age from 18 to 80 years old (M = 35.3, SD = 8.2), and were primarily male (68.9%). Over a third of the participants were African American (39.2%), or White (35.9%), 13.1% were Hispanic/Latino, 9.6 % were Native American, 0.4% were Asian, and 1.9% were other. Most of the participants reported having used crack (87.2%), cocaine (88.7%), heroin (59.0%), and having injected drugs in the past 30 days (57.7%). Nearly a third of the participants (31.9%) reported that they were currently homeless.

2.2.2. Test-retest Reliability Sample—In 1992, a subset of NIDA CA participants took part in a test-retest study examining the reliability of the RBA. In total, 218 current drug users completed the RBA at two time points, 48 hours apart. As with the larger validity sample, the majority of the test-retest participants were male (73.9%), and African American (49.1%),

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White (28.4%) or Hispanic (17.9%). The test-retest sample has been described in detail in Dowling-Guyer et al. (1994).

3. Results

3.1. Validity results

Table 1 presents the results of the validity analysis. Amphetamine use in the past 48 hours was reported by 254 participants. Of these individuals, 136 were found to have amphetamines present in their urine. In comparison, 3,773 reported they had not used amphetamines in the past 48 hours. Of these, 87 tested positive for amphetamines on the urine test. Overall, there was 95% agreement between participants' self-reports of amphetamine use and urine test data. The Kappa coefficient for agreement between self-report and urine test data was .54 (*CI* = .49, .60) suggesting moderate agreement. The imbalances in p_{neg} (.97) and p_{pos} (.57) values suggest the Kappa value may underestimate the correspondence of self-report and the biological marker data (Weatherby et al., 1994).

When drug use is infrequent, the congruence of self report and urine test data can be inflated (Harrison, 1997). Therefore, we repeated the validity analysis using subsets of participants who report having ever used amphetamine (n = 2259) or having used amphetamine in the past 30 days (n=547). Restricting the analysis only to those who self-reported ever having used amphetamine resulted in the exclusion of 30 participants who reported never having used amphetamine, but had positive urine tests. In this subgroup, there was 92% agreement between participants' self-reports of amphetamine use and urine test data, and the Kappa coefficient for agreement of .57 (*CI* = .51, .63) suggested moderate agreement. Restricting the analysis only to the subset of those who reported amphetamine use in the past 30 days resulted in an additional 19 participants who were excluded because they reported no use in the past 30 days, but had a positive urine test. Agreement between self-report and urine test data was 71.5% (Kappa = .41, *CI* = .34, .49).

Further analysis was conducted in the overall sample to examine whether there were any significant differences between those who were inconsistent (false positive or false negative) and consistent (true positive and true negative) in their self reports. Participants whose self-reports were inconsistent with their urine test results did not significantly differ in terms of gender from participants whose response was consistent ($\chi^2(1, N = 4027) = 1.09$, *ns*). Self-reports by injection drug users were more likely to be inconsistent than those of non-injecting drug users ($\chi^2(1, N = 4027) = 23.84$, $p < .001$). Ethnic groups also differed in terms of inconsistent responding ($\chi^2(3, N = 4027) = 41.70$, $p < .001$). African American participants' self reports were less likely than expected to be inconsistent, and White and Hispanic participants' self-reports were more likely to be inconsistent.

3.2. Reliability results

Individuals' self-reports of ever having used amphetamines showed good reliability (kappa = .79, *CI* = .71, .87), with 89.45% of participants providing the same response at both time points. Table 2 presents the number of participants reporting using amphetamines ever in their lifetime and in the last 30 days at Time 1 and Time 2. In total, 97.65% of participants provided consistent reports of having used amphetamine in the last 30 days.

Table 3 presents the means, standard deviations and test-retest reliability coefficients for the continuous self-report variables. Based on use within the prior 30 days, self reports of the number of days used amphetamine ($r(213) = .88$, $p < .001$), days injected amphetamine ($r(212) = .91$, $p < .001$), days used amphetamine without injecting ($r(213) = .75$, $p < .001$), and number of times injected amphetamine ($r(213) = .90$, $p <. 001$), all had good-to-excellent test-retest

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reliability. The item assessing age of first use of amphetamine had slightly lower test-retest reliability ($r(89) = .64$, $p < .001$).

Of the 218 participants, at Time One, 104 reported having used amphetamines and at Time Two, 97 reported using amphetamine. The test-retest reliability was reexamined only for those individuals who reported ever having used of amphetamines at both Times One and Two (n=89), the results of this analysis were similar to that for the overall sample. Self reports of the number of days used amphetamine ($r(84) = .91$, $p < .001$), days injected amphetamine ($r(83) = .95$, $p < .001$), days used amphetamine without injecting ($r(84) = .76$, $p < .001$), and number of times injected amphetamine ($r(84)= .92$, $p <. 001$), all had good-to-excellent test-retest reliability.

Additional analyses were conducted to examine whether those who reported ever having used amphetamine differed from those who did not. Amphetamine users tended to be younger (M = 37.7 years, SD = 7.9) then non-amphetamine users (M = 40.2 years, SD = 7.8; $t = -2.27$, $p< .05$), and were more likely to be White than Black or Hispanic ($\chi^2 = 43.16$, $p< .001$).

4. Discussion

Psychometrically sound self-report measures of amphetamine use are essential for understanding, describing, and predicting drug use. The current study provides evidence for the criterion-related validity and test-retest reliability of items assessing amphetamine use on the RBA in a sample of primarily heroin and cocaine users.

In the overall sample, self-reports of amphetamine use in the past 48 hours were largely consistent with urine test data. For example, only 2.2% of participants said they had not used any amphetamines in the past 48 hours, when, in fact, amphetamine was detected in the urine sample. Slightly more participants self reported using amphetamine when it was not detected in their urine sample (2.9%).

The congruence of self report and urine test data can be inflated if drug use is not highly prevalent in a sample (Harrison, 1997). Therefore, the validity analysis was repeated including only participants who reported having used amphetamine in the past 30 days. In this subset of participants, validity was slightly lower. In total, 6.9% of these participants reported no amphetamine use, but received a positive urine test result. This number is higher (14.6%) if the sample includes those who did not identify as an amphetamine user, but received a positive urine test result. These inconsistencies may have been due to a variety of unintentional or intentional factors, including embarrassment at answering the question, not being able to recall the information, or misunderstanding the question. The percentage of those who reported having used amphetamine in the past 30 days, but who received a negative test result, was much higher (21.6%). There are a variety of reasons why this may be the case. For example, the participant may have used amphetamine, but the concentration of the drug was not high enough to exceed the cut point on the test. This could have been due to the purity of the drug used, the amount of drug used, or fluid intake. There also may have been some clients who said they had used amphetamine when they had not, for example because they misunderstood the question, they had exaggerated their drug use, or because they were mistaken about what the substance they had used really was (Falck et al., 1992).

The present study also provided evidence for the test-retest reliability of the self-report items. Participants in the overall sample, and the subset who reported ever having used amphetamines were generally consistent in their reports of having ever used amphetamines across the two time periods. The items assessing amphetamine use in the past 30 days demonstrated good-to-excellent test-retest reliability. The item measuring age of first use of amphetamine had slightly lower test-retest reliability. This lower reliability may reflect that participants were less

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accurate at recalling events that happened longer ago, than they were at recalling events in the past 30 days.

In the test-retest sample, amphetamine use in the past 30 days was reported by 17 participants at Time 1 and 16 participants at Time 2. Reliability analyses for the subset of recent amphetamine users were not performed due to the limited sample size. The findings of the current study need to be replicated using a sample that includes a greater number of current amphetamine users. The data from the current study does suggest that when current heroin and cocaine users are asked about their amphetamine use, they are fairly reliable in recalling their behavior. Future research should focus specifically on the reliability of amphetamine users' self-reports.

The findings of the current study are largely consistent with previous research that has looked at the reliability of self-reports of other drugs (Dowling-Guyer et al., 1994; Needle et al., 1995; Weatherby et al., 1994) and with the limited prior research specific to self-reports of amphetamine use (M. E. Johnson et al., 2000). The validity of the data was also comparable with past research. Solbergsdottir et al. (2004) found slightly higher validity (kappa = .83) in a sample of young people seeking drug treatment, around half of whom reported using amphetamine in the past 16 days. Chen et al. (2006) also found slightly greater agreement between self-report and urine test data in a sample where less than 1% tested positive for amphetamines. Differences between studies are likely to reflect the characteristics of the sample, for example, whether the sample is in treatment or out of treatment, and the prevalence of amphetamine use in the sample and in the broader geographical area in which the data are collected.

In the current study participants knew that their urine sample would be tested for drugs before completing the self-report instrument, and this may have affected the validity findings (Wish, Hoffman, & Nemes, 1997). For example, Hamid, Deren, Beardsley and Tortu (1999) demonstrated that agreement between urine test results and self-report of opiate and cocaine use increased from 58% to 93% when the urine tests were performed before the self-report interview. Prior knowledge of the occurrence of the urine test in the current sample may have increased the consistency of the self-report data. Studies that examine the accuracy of self-reports of amphetamine use when participants are unaware of the urine test until after completing the self-report measure may find lower validity.

The urine test results in this study were not confirmed using gas chromatography/mass spectrometry. Although the urine test used in this study has been shown to be highly accurate (M. E. Johnson et al., 2000), this is a limitation of the current study, as confirmatory analysis could reduce the number of false positive results due to cross-reactions (Chen et al., 2006; Moeller, Lee, & Kissack, 2008). An additional limitation is that these data were collected in the 1990's. People's self-reports of amphetamine use may be influenced by their perceptions of social stigma associated with their drug use, and it is not clear what changes have occurred in perceptions of social stigma since this study took place. Recent research suggests that methamphetamine users are often stigmatized in media coverage (Schwartz et al., 2007). Semple, Grant and Patterson (2005) found that, in a sample of methamphetamine users, the majority believed people held negative stereotypes of methamphetamine users and were prejudiced against methamphetamine users. With increasing media attention on methamphetamine use and public health campaigns targeting its use, it is possible that social stigma associated with methamphetamine use has increased since these data were collected.

The current study suggests that it is possible to obtain reliable and valid self-report data on recent amphetamine use from current cocaine and heroin users using the RBA. Past research has tended to focus more on the accuracy of self reports of opiates and cocaine and has not

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reported the psychometric properties of amphetamine use items (Dowling-Guyer et al., 1994; Needle et al., 1995; Weatherby et al., 1994). As the popularity of amphetamine-type drugs grows, research addressing the reliability and validity of this drug is important for both research and clinical settings. Further research is needed addressing the accuracy of self-report data which uses different types of samples, including in treatment or those seeking treatment, and samples that are primarily amphetamine users.

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Table 1

A comparison of self-reported amphetamine use and urinalysis

	Amphetamine Urinalysis	
Self-reported amphetamine use	**Positive**	**Negative**
Use in last 48 hours	136 (3.4%) *True Positive*	118(2.9%) *False Positive*
No use in last 48 hours	87 (2.2%) *False Negative*	3686(91.5%) *True Negative*

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Table 2

Self-reports of lifetime and recent amphetamine use at Time 1 and Time 2

	Time 2			
	Lifetime		30 day	
Time 1	**No**	**Yes**	**No**	**Yes**
Lifetime: No	106	8		
Yes	15	89		
30 day: No			194	2
Yes			3	14

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Table 3

Test-retest reliability of self-report amphetamine use

Amphetamine self-report	Time 1		Time 2		
	M	SD	M	SD	r
Days used amphetamines in last 30 days[a]	0.77	3.29	0.64	2.95	.88***
Days injected amphetamines in last 30 days[b]	0.55	2.78	0.53	2.70	.91***
Days used amphetamines without injecting in last 30 days[a]	0.34	2.25	0.20	1.70	.75***
Times injected amphetamines in the last 30 days[a]	1.25	6.85	1.09	6.82	.90***
Age of first use[c]	19.46	6.86	20.06	6.96	.64***

Note.

[a] $n = 213$.

[b] $n = 212$.

[c] $n = 89$.

*** $p < .001$.

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