

Brief article

## Heroin and cocaine craving and use during treatment: Measurement validation and potential relationships

Adrienne J. Heinz, (B.A.)\*, David H. Epstein, (Ph.D.), Jennifer R. Schroeder, (Ph.D.),  
Edward G. Singleton, (Ph.D.), Stephen J. Heishman, (Ph.D.), Kenzie L. Preston, (Ph.D.)

*Clinical Pharmacology and Therapeutics Branch, Intramural Research Program, National Institute on Drug Abuse, Baltimore, MD 21224, USA*

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### Abstract

Although commonly assessed with unidimensional scales, craving has been suggested to be multifaceted and to have a complex relationship with drug use and relapse. This study assessed the consistency and predictive validity of unidimensional and multidimensional craving scales. At the beginning of a 12-week outpatient treatment trial, opiate users ( $n = 101$ ) and cocaine users ( $n = 72$ ) completed unidimensional visual analog scales (VASs) assessing “want,” “need,” and “craving” and multidimensional 14- and 45-item versions of the Cocaine Craving Questionnaire (CCQ) or Heroin Craving Questionnaire (HCQ). Spearman correlations between the VASs and the first-order factors from the 45-item CCQ/HCQ were .20–.40, suggesting that the two types of assessment were not redundant. Treatment dropout and in-treatment drug use were more frequently predicted by scores on the 14- or 45-item CCQ than by VAS ratings. Results suggest that the CCQ/HCQ and the 14-item CCQ provide information that unidimensional VASs do not. © 2006 Elsevier Inc. All rights reserved.

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### 1. Introduction

#### 1.1. Craving and relapse during treatment

Drug craving has traditionally been defined as an internal motivational state characterized by a desire to consume a substance. Craving is densely interwoven with drug use in the conceptualization of addiction: Craving is considered a hallmark of addiction and relapse (Pickens & Johanson, 1992; Tiffany, 1997) and is often used as an outcome measure in pharmacological treatment studies (Mezinskis, Honos-Webb, Kropp, & Somoza, 2001; Weiss et al., 2003). Nevertheless, its exact role as a marker or mediator remains controversial (Kozlowski & Wilkinson, 1987; Pickens & Johanson, 1992; Tiffany, 1997). Several investigations suggest that a robust correlation between craving and drug

use does not exist (Ehrman et al., 1998; Miller & Gold, 1994; Robbins, Ehrman, Childress, Cornish, & O'Brien, 2000) and that drug-addicted individuals do not report craving as a precursor to their relapse episode (Baer, Kamarck, Lichtenstein, & Ransom, 1989). However, the disconnect between conventional concepts of craving and what is documented in the literature may be attributable to inadequate measures of craving (Mezinskis et al., 2001; Tiffany & Carter, 1998), among other factors.

#### 1.2. Psychometric evaluation of craving

The effort to develop reliable craving measures has engendered discussion over whether a unidimensional or multidimensional approach is most suitable. Striking a balance between reliability and ease of administration is very important in clinical research and must be kept in mind when developing and evaluating psychometric tools.

Unidimensional assessments of craving possess several desirable characteristics such as high face validity, brevity, minimal patient burden, feasibility for multiple assessments,

\* Corresponding author. 5500 Nathan Shock Dr, Baltimore, MD 21224, USA. Tel.: +1 410 550 1570x141; fax: +1 410 550 1528.

E-mail address: heinza@intra.nida.nih.gov (A.J. Heinz).

and clinical efficiency (Lee, Brown, Perantie, & Bobadilla, 2002). However, some have argued that unidimensional measures of craving (most often consisting of only a single item), although appealing, are not sufficient (Mezinskis et al., 2001; Tiffany, Carter, & Singleton, 2000). Interitem consistency and reliability cannot be calculated for single-item scales. Tiffany et al. (2000) stated that reliability is a function of the number of items in a measure and that the addition of items tends to increase the accuracy of a measurement, suggesting that multi-item craving scales are more likely than single-item scales to differentiate between levels of craving and across individuals and environments. Heishman, Singleton, and Liguori (2001) noted that single items cannot assess the different ways in which individuals in various stages of dependence may experience craving.

### 1.3. Development of the Cocaine Craving Questionnaire and the Heroin Craving Questionnaire

The Cocaine Craving Questionnaire (CCQ; Tiffany, Singleton, Haertzen, & Henningfield, 1993b) and the Heroin Craving Questionnaire (HCQ; Tiffany, Fields, Singleton, Haertzen, & Henningfield, 1993a) were developed as alternatives to the single-item strategy for craving assessment to evaluate current urges and craving for cocaine and heroin among users of the drugs.

The CCQ was developed according to five theoretically distinct conceptualizations of drug craving: desire to use cocaine, intention to use cocaine, anticipation of positive outcome, and anticipation of relief from withdrawal or dysphoria (adapted from the Questionnaire of Smoking Urges, Tiffany and Drobes, 1991), and lack of control over use (Tiffany et al., 1993b). Tiffany et al. (1993b) used a sample of 225 cocaine users who were not seeking treatment, to whom the 45-item questionnaire was administered. Exploratory factor analyses identified four first-order factors, which were not named. Analysis of the interfactor score correlation matrix revealed the presence of one higher order factor that could be approximated by averaging the 41 items contributing to the four first-order factor scores; Factors 1, 2, 3, and 4 contribute 11, 12, 9, and 9 items, respectively. In that sample, reliability of this score was excellent ( $\alpha = .93$ ). The 14-item CCQ (Singleton, 1998b) contains 14 items chosen from those that loaded onto each of four first-order factors in the 45-item CCQ. Factor analysis of the interfactor score correlation matrix of the 14-item CCQ revealed the presence of one higher order factor that could be approximated by averaging the 12 items contributing to the four first-order factor scores. Items in the 14- and 45-item CCQs and the factors onto which they load are listed in Appendix A.

The 45-item HCQ was developed similarly, with items initially grouped into the same five theoretical categories. Tiffany et al. (1993a) administered the HCQ to a sample of 230 heroin users who were not attempting to quit. Exploratory factor analyses identified four first-order

factors, which were not named. Factor analysis of the interfactor score correlation matrix revealed the presence of one higher order factor that could be approximated by averaging the 34 items contributing to the four first-order factor scores; Factors 1, 2, 3, and 4 contribute 14, 9, 7, and 4 items, respectively. In that sample, reliability of the higher order factor score was excellent ( $\alpha = .94$ ). The 14-item HCQ (Singleton, 1998a) contains items chosen from those that loaded onto each of the four first-order factors from the 45-item HCQ. Factor analysis of the interfactor score correlation matrix of the 14-item HCQ revealed the presence of one higher order factor that could be approximated by averaging the 13 items contributing to the four first-order factor scores. Items in the 14- and 45-item HCQs and the factors onto which they load are listed in Appendix B.

The utility of the HCQ has been documented in several studies. Schuster, Greenwald, Johanson, and Heishman (1995) and Kanof et al. (1992) found that responses to a single-item craving question did not change when opiate-dependent volunteers were given doses of naloxone (which produce large changes in autonomic measures and aversive mood), whereas responses from the multidimensional HCQ showed significant increases. In a study examining the reinforcing effects of hydromorphone in heroin-dependent outpatients maintained on buprenorphine, Greenwald et al. (2002) determined that although some HCQ 9-item subscales were sensitive to changes in opioid agonist dose (e.g., Anticipation of Positive Outcome, Intent to Use), a total score, or rather, a 34-item higher order single factor, was consistently sensitive to pharmacological manipulations of craving. Reliability and sensitivity of the 34-item factor score to opioid agonist dose have been replicated in several studies (Greenwald, 2002, 2005; Greenwald, Johanson, & Schuster, 1999; Greenwald & Roehrs, 2005), which speaks of the potential value of using a comprehensive assessment in substance abuse treatment research. In a study by Sussner et al. (2005), the CCQ-brief was found to be a valid and reliable measure of current cocaine craving; however, its relationship to in-treatment drug use and treatment retention was not within the scope of the study.

### 1.4. The present study

The purpose of this study was to characterize pretreatment craving as measured by a unidimensional craving measure (visual analog scale [VAS]) versus a multidimensional craving measure (CCQ/HCQ) and to compare the capacity of these craving measures to detect a potential relationship with illicit drug use in the clinical setting and retention time in treatment. As shorter questionnaires are more practical for clinical research, an additional objective involved assessing whether the not-yet-validated 14-item CCQ and HCQ (Singleton, 1998a, 1998b) captured the same components of craving and predicted in-treatment

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