Drug and Alcohol Dependence 145 (2014) 121–126

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Assessing craving and its relationship to subsequent prescription opioid use among treatment-seeking prescription opioid dependent patients

R. Kathryn McHugh[a,b,*], Garrett M. Fitzmaurice[b,c], Kathleen M. Carroll[d], Margaret L. Griffin[a,b], Kevin P. Hill[a,b], Ajay D. Wasan[e], Roger D. Weiss[a,b]

[a] Division of Alcohol and Drug Abuse, McLean Hospital, 115 Mill Street, Belmont, MA 02478, USA
[b] Department of Psychiatry, Harvard Medical School, 25 Shattuck Street, Boston, MA 02115, USA
[c] Laboratory for Psychiatric Biostatistics, McLean Hospital, 115 Mill Street, Belmont, MA 02478, USA
[d] Department of Psychiatry, Yale University School of Medicine, 950 Campbell Ave, MIRECC 151D, West Haven, CT 06516, USA
[e] Departments of Anesthesiology and Psychiatry, University of Pittsburgh School of Medicine, 5750 Centre Avenue, Suite 400, Pittsburgh, PA 15206, USA

ARTICLE INFO

Article history:
Received 21 April 2014
Received in revised form
10 September 2014
Accepted 1 October 2014
Available online 16 October 2014

Keywords:
Prescription opioids
Craving
Cue-induced craving
Buprenorphine

ABSTRACT

Background: Craving is viewed as a core feature of substance use disorders and has been shown to predict future drug use, particularly over the short term. Accordingly, craving is often assessed in treatment settings as a marker of risk for subsequent drug use. The identification of the briefest measure that maintains predictive validity is of particular value for both clinical and research settings to minimize assessment burden while maintaining utility for the prediction of use.
Methods: Data from a multi-site clinical trial of treatment for prescription opioid dependence were examined to evaluate whether a brief, 3-item craving scale administered each week predicted urine-confirmed self report of prescription opioid use in the subsequent week. Logistic regression models examining the association between craving and presence or absence of opioid use in the following week were conducted, controlling for opioid use in the previous week, treatment condition, and lifetime history of heroin use.
Results: Greater craving was associated with a higher odds of prescription opioid use in the following week. For each one-unit increase on this 10-point scale, the odds of using opioids in the subsequent week was 17% higher. In addition to an item assessing urges, items assessing cue-induced craving and perceived likelihood of relapse in an environment where drugs were previously used contributed uniquely to this association.
Conclusions: A brief measure of prescription opioid craving predicted prescription opioid use among individuals in treatment. This measure offers an efficient strategy to inform the assessment of risk for use in this population.

1. Introduction

Craving is a core feature of substance use disorders, as evidenced by its recent addition to the diagnostic criteria for these disorders in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013). Much of the research on craving has focused on whether it may precipitate substance use and thus serve as a risk marker during treatment. A number of studies have examined whether craving at treatment entry predicts outcomes following treatment, with some studies supporting this association (Anton et al., 1996; Sinha et al., 2011), some finding no association (Ahmadi et al., 2009; Dreifuss et al., 2013), and others finding associations only for particular types of craving (e.g., stress-induced craving; Sinha et al., 2006).

Although self-reported craving may have inconsistent predictive validity for long-term substance use disorder treatment outcomes, several studies have demonstrated that drug craving is associated with proximal (e.g., within the next week) substance use (Hartz et al., 2001; Moore et al., 2013; Weiss et al., 2003). Because craving is influenced by contextual factors such as substance-related cues, stress, and withdrawal symptoms, it may serve as a marker for immediate use, and associations with

* Corresponding author at: Kathryn McHugh, McLean Hospital, Proctor House 3 MS 222, 115 Mill Street, Belmont, MA 02478, United States. Tel.: +1 617 855 3169; fax: +1 617 855 2699.
E-mail address: kmchugh@mclean.harvard.edu (R.K. McHugh).

http://dx.doi.org/10.1016/j.drugalcdep.2014.10.002
0376-8716/

substance use may weaken over longer periods of time (Shiffman et al., 1997).

The evidence supporting the predictive validity of craving for proximal substance use highlights the value of regular assessment of craving during treatment. Once heightened risk has been identified, providers may choose to implement specific strategies to attempt to mitigate the risk of use in the near future. However, demands on time and resources in clinical settings necessitate that assessments be as brief as possible while still yielding meaningful information. In research settings, efficient assessment strategies have the dual benefit of minimizing participant burden and providing additional time for the assessment of other pertinent constructs. Self-report craving measures vary dramatically in length, ranging from a single item (Connor et al., 2005; West and Ussher, 2010) to more than 40 items (Heishman et al., 2001; Tiffany et al., 1993). Although lengthy, multi-dimensional assessments may be of particular value in certain research settings, the briefest possible measure that still indicates level of risk is preferable clinically and in research settings in which assessment burden is a concern, or in which repeated measures are collected. A previous multi-site study of treatment for cocaine dependence demonstrated that a brief, 3-item craving measure developed by our group predicted cocaine use in the following week, when controlling for current cocaine use (Weiss et al., 2003). It is unclear whether the predictive validity of this measure extends to other substances of abuse.

As the prevalence of prescription opioid dependence has rapidly escalated in the past 15 years (Johnston et al., 2012; Substance Abuse and Mental Health Services Administration, 2012), studies have begun to examine craving in this population. However, the association between opioid craving and proximal opioid use has yet to be examined. A study in chronic pain patients receiving opioids for pain found that self-reported craving for medication was associated with aberrant drug behaviors (e.g., positive urine toxicology) assessed 6 months later (Wasan et al., 2009). Although this study included participants both with and without prescription opioid use disorders, these results suggest that craving for prescription opioids is a risk marker for later opioid misuse, at least among those with chronic pain.

Another reason to examine craving specifically in patients dependent on prescription opioids is the possibility that craving in this population differs in some ways from craving for illicit drugs. A recent report from our group found that craving in response to opioid cues was less robust in this population than in those dependent upon heroin (McHugh et al., 2014). One potential explanation for this difference is that the associative conditioning of prescription drug cues may differ from illicit drug cues because the pairing of drug use and contextual cues is less unique for prescription drug cues, which are encountered in numerous settings (e.g., pharmacies, advertisements). Thus, research examining the role of cue-induced craving in this population is of particular interest.

The aim of the current analysis of data from a multi-site study of prescription opioid dependence treatment was to examine whether craving for prescription opioids predicted use of these drugs in the following week. A brief, 3-item craving measure was used to assess three different domains of craving: general craving, cue-induced craving, and likelihood of use if exposed to an environment in which drugs were previously used. In this study, we examined the concurrent and predictive validity of this measure in a prescription opioid dependent population. We hypothesized that greater craving would be associated with a higher likelihood of opioid use in the following week, when controlling for current use. In an exploratory analysis, the associations between the individual craving scale items and subsequent use were examined to evaluate the relative importance of these three domains of craving. This study is novel in its examination of the relationship between craving and prescription opioid use over brief time intervals, its extension of a validated measure to a new population, and its consideration of the incremental importance of various domains of craving.

2. Methods

2.1. Procedures

The Prescription Opioid Addiction Treatment Study (POATS) was a large, randomized controlled trial conducted in the National Drug Abuse Treatment Clinical Trials Network. For a full description of POATS, see Weiss et al. (2010). POATS was conducted at 10 treatment programs across the United States. The study design included two phases. In Phase 1, participants received a 4-week buprenorphine–naloxone taper and were randomly assigned to receive standard medical management (Fiellin et al., 1999) alone, or medical management and concurrent individual drug counseling (Mercer and Woody, 1999; Woody et al., 1977). Participants who relapsed during Phase 1 were eligible to participate in Phase 2, during which they received 12 weeks of buprenorphine–naloxone; they were again randomized to receive standard medical management alone or with concurrent individual drug counseling. The primary results of this study were that only a small number of participants (<7%) achieved successful outcomes (defined as abstinence or near abstinence) in Phase 1; almost half of participants in Phase 2 achieved successful outcomes. Counseling was not associated with treatment outcome in either phase (Weiss et al., 2011).

Individuals with a current Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (American Psychiatric Association, 1994) diagnosis of prescription opioid dependence were recruited for POATS. Inclusion criteria included a diagnosis of opioid dependence specifically for prescription opioids and use of prescription opioids on at least 20 days in the previous month. Participants with significant heroin use (defined as 5 or more days of heroin use in the previous 30 days, history of heroin injecting, or history of opioid dependence based on heroin use alone), a significant pain condition for which ongoing opioid therapy was indicated, or any medical or psychiatric condition contraindicated for study participation were excluded (Weiss et al., 2010).

For this secondary analysis of POATS data, we examined whether craving in a given study week was associated with opioid use (defined dichotomously as use versus no use) in the subsequent week. Data from Phase 2 (12 weeks of buprenorphine–naloxone stabilization) were utilized to maximize the available number of weeks to examine this study question, while minimizing the potential impact of other variables on both craving and use (i.e., all participants were receiving study medication during this time period). Phase 1 data were not analyzed because any participant who relapsed in Phase 1 was immediately offered Phase 2 treatment. Thus, the number of available weeks for analysis was inconsistent across Phase 1 participants, potentially introducing bias to the analysis during this phase.

2.2. Measures

The Opioid Craving Scale, a modification of the Cocaine Craving Scale (Weiss et al., 1995, 1997, 2003), was used to measure opioid craving. This scale consisted of three items rated on a visual analogue scale from 0 to 10: (1) How much do you currently crave opiates? (rated from *not at all* to *extremely*), (2) In the past week, please rate how strong your desire to use opiates has been when something in the environment has reminded you of opiates (rated from *no desire* to *extremely strong*), and (3) Please imagine yourself in the environment in which you previously used opiates. If you were in this environment today and if it were the time of day that