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The impact of impulsivity on cocaine use and retention in treatment

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Abstract

To determine whether impulsivity was related to severity of drug use and treatment outcome, 50 cocaine dependent subjects underwent baseline measures of severity of current cocaine use and the Barratt Impulsiveness Scale (BIS-11). The hypothesis of the study was that there would be a significant correlation between impulsivity and cocaine use severity. As predicted, there was a significant correlation between BIS-11 total scores and self-reported average daily cocaine use as well as cocaine withdrawal symptoms. A subset of 35 patients underwent a 12-week double-blind placebo controlled trial of buspirone and group therapy. Subjects with high baseline impulsivity remained in the study a significantly shorter period than did subjects with lower baseline impulsivity. This study shows that impulsivity is a significant predictor of cocaine use and treatment retention, and suggests the need for targeting impulsivity in cocaine dependence treatment.

Keywords: Cocaine; Impulsivity; Treatment; Substance abuse

1. Introduction

The treatment of substance abuse has traditionally focused on the compulsive aspects of the disorder in which craving plays a central role (Mathew, Claghorn, & Largen, 1979). Recently, there has been an increased interest in the role of impulsivity in substance abuse. In this model of substance abuse, at least some drug use does not occur in response to chronic craving, but in a rapid, unplanned fashion. As reviewed in Brady, Myrick, and McElroy (1998), there is evidence for an association between impulsivity and substance abuse. Impulsive populations including individuals with intermittent explosive disorder (McElroy, Soutullo, Beckman, Taylor, & Keck, 1998), impulsive arsonists (Virkkunen, De Jong, Bartko, & Linnoila, 1989), and impulsively violent offenders (Linnoila, 1983) all have higher rates of substance abuse or dependence than the general population.

Studies that have examined children at risk for substance abuse have also found higher rates of impulsivity. Using a model of behavioral self-regulation involving inattention, impulsivity/hyperactivity, and aggression, Dawes, Tarter, and Kirisci (1997) compared children with a family history of substance abuse to those without this history, and found that children with a family history of substance abuse scored higher on the behavioral self-regulation measures (which equated to higher impulsivity). Self-regulation of goal directed behavior was more impaired in another study comparing high-risk children to low risk children, and this measure predicted impulsive aggression in the high-risk group (Giancola, Moss, Martin, Kirisci, & Tarter, 1996).

Most studies objectively measuring impulsivity find higher impulsivity scale scores in substance dependent individuals.

Using the Barratt Impulsiveness Scale (BIS-11), two studies found that substance dependent individuals have higher total scores than controls (Allen, Moeller, Rhoades, & Cherek, 1998, Patton, Stanford, & Barratt, 1995).

However, one study of alcoholic subjects with impulse control disorders did not find increased total BIS scores compared to controls (Lejoyeux, Feuche, Loi, Solomon, & Ades, 1998). In a study using the Eysenck Personality Inventory, drug-abusing patients were less sociable and more impulsive than controls (King, Jones, Scheuer, Curtis,

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& Zarcone, 1990). Another study using the Psychopathic States Inventory showed higher impulsivity in antisocial substance dependent subjects than controls (Moss, Yao, & Panzak, 1990).

A few studies have attempted to determine the impact of impulsivity on severity or mechanisms of substance abuse. Impulsivity as measured by the BIS-11 was positively correlated with the history of frequency of alcohol consumption in incarcerated individuals in one study (Fishbein & Reuland, 1994). In a second study, impulsivity as measured by the Impulsivity-Venturesomeness-Empathy scale was significantly correlated with self reported euphoria after intravenous cocaine administration (Cascella et al., 1994), implying that more impulsive cocaine-dependent individuals may be biologically at a greater risk for relapse.

Thus, there is evidence of an association between impulsivity and substance abuse from a number of studies examining the issue from several perspectives. In order to determine the relationship between impulsivity and severity of cocaine dependence, a group of 50 cocaine dependent subjects completed the Barratt Impulsiveness Scale (BIS-11), along with measures of quantity of cocaine use, craving and withdrawal. The hypothesis was that there would be a positive correlation between severity of cocaine use and impulsivity.

In order to determine the impact of impulsivity on treatment for cocaine dependence, a subset of 41 subjects entered a 12-week treatment study in which baseline impulsivity was used as a predictor of subject dropout. It was hypothesized that subjects with higher baseline impulsivity would drop out of treatment significantly sooner than would subjects with lower impulsivity.

2. Materials and methods

2.1. Subjects

Ninety-eight treatment-seeking cocaine-dependent subjects were screened for inclusion into the study after obtaining informed consent. Subjects were recruited from advertisements for research treatment of cocaine dependence, and from community referrals. Subjects were screened using the Structured Clinical Interview for DSM-IV (SCID) and (SCID-II) (First, Spitzer, Gibbon, & Williams, 1996), a physical examination, and routine blood work. Inclusion criteria included presence of current cocaine dependence by DSM-IV criteria, lack of current or past DSM-IV Axis I diagnosis other than substance dependence or substance induced mood disorder, and willingness to complete questionnaires. This study was approved by the Committee for the Protection of Human Subjects of the University of Texas Houston Health Science Center.

Fifty cocaine dependent subjects, 39 male and 11 female, met the inclusion criteria for the baseline comparison study. Of those, 1 had 6 years or less of formal education, 14 were high school dropouts, 24 had graduated from high school or received their GED, 10 had some college, and 1 was a four year college graduate.

All subjects completed a drug use questionnaire, a cocaine craving scale based on Halikas, Kuhn, Crosby, Carlson, and Crea (1991) and a 13-item cocaine withdrawal scale based on the symptoms of cocaine withdrawal listed in DSM-III-R (Moeller et al., 1997). This scale is a self-report questionnaire with levels ranging from 0 (not at all) to 5 (severely) on the following items: Depressed; Irritable; Anxious; Tired; Sleeping too much; Not sleeping enough; Restless or fidgety; Trembling or twitching; Sweating; Nausea or vomiting; Diarrhea or stomachache; Appetite increased; and Unpleasant dreams.

All subjects submitted a urine drug screen for determination of benzoylecgonine levels. Semiquantitative measurement of benzoylecgonine was accomplished using a modified EMIT which uses a 5 point standard curve (Behring Diagnostics Inc., 1996). Urine creatinine was also measured and used to compensate for differences in urine dilution (Wilkins, 1997). An Alcosensor III was used to screen for alcohol consumption.

The measure of impulsivity used in this study was the BIS-11 (Patton et al., 1995).

This is a 30-item questionnaire that has been validated in several different populations, including substance-dependent individuals (Patton et al., 1995, Allen et al., 1998), incarcerated individuals with antisocial personality disorder (Barratt, Stanford, Felthous, & Kent, 1997), and patients with Bipolar Disorder (Swann, Anderson, Dougherty, & Moeller, 2001). The BIS-11 includes three subscales labeled attentional, non-planning, and motor, based on a principal component analysis (Patton et al., 1995). These three subscales have been replicated in an Italian (Fossati, Di Ceglie, Acquarini, & Barratt, 2001) and a Japanese (Someya et al., 2001) version of the BIS. Examples of items used in the BIS-11 include: "I act on impulse" and "I plan tasks carefully."

A subset of 41 subjects agreed to participate in a 12-week double-blind placebo-controlled trial of buspirone for the treatment of cocaine dependence. Subjects who were randomized to buspirone were initially started on a dose of 5 mg twice daily, with a titration to 15 mg three times daily over the course of 2 weeks. All subjects were seen twice weekly for behavioral testing and underwent urine drug screens at each visit. Female subjects underwent urine pregnancy testing at each visit. Subjects were given take home doses of buspirone twice weekly with enough medication to last until their next visit. Subjects also underwent weekly group therapy sessions focusing on relapse prevention. All subjects received monetary compensation for attendance and completion of behavioral testing (approximately $20 per visit). Compensation was not contingent on providing a drug-free urine. As part of a separate study examining the effects of buspirone on aggression, subjects