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Substance abuse treatment patients with early onset cocaine use respond as well to contingency management interventions as those with later onset cocaine use

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ABSTRACT

Early onset drug use is associated with increased risk of developing substance use disorders, but relatively little is known about the correlates of early drug use among adults receiving treatment. A retrospective analysis of a randomized study of contingency management treatment compared cocaine-dependent patients who reported initial cocaine use at age 14 or younger ($n = 41$) to those who began using after age 14 ($n = 387$). Patients with early onset cocaine use had more legal and psychiatric problems than those who initiated cocaine use later. Patients with early-onset cocaine use also dropped out of treatment sooner and achieved less sustained abstinence than those who began using at older ages, but the interaction between age of first use and treatment condition was not significant. Early-onset cocaine use is associated with persistent psychosocial problems and an overall poor response to treatment. However, contingency management is efficacious in improving outcomes in early onset cocaine users.

1. Introduction

Contingency management (CM) is the psychosocial intervention with the greatest effect size for reducing substance use (Dutra et al., 2008). This treatment is efficacious in treating a range of drug use disorders, including cocaine (Lussier, Heil, Mongeon, Badger, & Higgins, 2006; Prendergast, Podus, Finney, Greenwell, & Roll, 2006). However, one individual factor that appears to impact effectiveness of CM is continued cocaine use at time of initiating treatment (Preston et al., 1998; Stitzer et al., 2007); submission of positive samples at treatment initiation are related to overall poor response to treatment, including CM, especially when the reinforcers provided are of relatively low magnitudes (Silverman, Chutuape, Bigelow, & Stitzer, 1999). Another individual factor that may impact response to treatment generally, and CM specifically, relates to age of initiation of cocaine use.

Early onset substance use is a well-established risk factor for development of substance use disorders (Behrendt, Wittchen, Höfler, Lieb, & Beesdo, 2009; Chen, Storr, & Anthony, 2009; Hingson, Heeren, & Winter, 2006; Sartor, Lynskey, Heath, Jacob, & True, 2007). Children who begin using substances in early adolescence have a two- to three-fold increased risk of developing alcohol or drug use disorders (Anthony & Petronis, 1995; King & Chassin, 2007; Odgers et al., 2008). Most children who begin using substances start with alcohol or marijuana before moving to "harder" drugs such as cocaine (Windle & Windle, 2012). Although initiating any substance use in early adolescence carries a poor prognosis, moving to "harder" drugs such as cocaine at a young age may be indicative of particularly poor outcomes, given that use of these drugs may further marginalize youth and lead to greater psychosocial difficulties.

In treatment-seeking youth, early onset drug use is associated with conduct disorder (Gordon, Kinlock, & Battjes, 2004; Hser, Grella, Collins, & Teruya, 2003) and progression to antisocial personality disorder (Myers, Stewart, & Brown, 1998), as well as school problems and risky sexual behaviors (Gordon et al., 2004). Further, treatment-seeking adolescents with early onset substance use are more likely to have had multiple previous treatment episodes (Gordon et al., 2004), more severe drug use, shorter treatment stays, and more family, social, and legal problems than their counterparts who initiate drug use later (Hser et al., 2003).

Although early onset substance use appears to be relatively common in samples of treated youth and associated with increased psychosocial problems, study of early substance initiation in adult treatment-seeking samples is relatively limited, and has been studied primarily in the context of alcohol use disorders. Although not synonymous with early onset, a popular conceptualization of alcoholics relates to a type A/B distinction (Babor et al., 1992). Type B alcoholics are characterized by earlier onset and more severe symptoms of dependence and comorbid psychopathology; these patients also have poorer response to treatment than their later onset, type A, counterparts (e.g., Babor et al., 1992). This classification

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system has also been evaluated, but much less extensively, in cocaine-dependent patients. For example, Ball, Carroll, Babor, and Rounsaville (1995) reported that type B cocaine-dependent individuals had more severe cocaine dependence symptoms and greater legal and family-social problems than their type A counterparts.

The type A/B distinction relies on a somewhat complex classification system integrating 17 domains and therefore may not be useful in the context of clinical practice (Schuckit et al., 1995). Simply evaluating age of onset of cocaine use may represent a meaningful way to assess severity of problems and possibly poor prognosis, as well as need for more intensive treatment.

The purpose of this study was to evaluate the association between early onset cocaine use and psychosocial problems and treatment response in cocaine-dependent patients. We hypothesized that early onset cocaine use would be related to more significant psychopathology and legal difficulties, as well as poorer response to treatment. We also examined, for the first time, whether CM would improve outcomes in patients with early onset cocaine use. Identification of subgroups who are more or less responsive to CM is needed to target this intervention toward those most likely to benefit from it.

2. Methods

2.1. Participants

Participants in this study were drawn from a randomized clinical trial evaluating CM interventions (Petry, Barry, Alessi, Rounsaville, & Carroll, 2012), which was approved by the University of Connecticut School of Medicine Institutional Review Board. For the parent trial, inclusion criteria were beginning outpatient treatment, age 18 years or older, able to speak English, and met past-year Diagnostic and Statistical Manual of Mental Disorders-IV (American Psychiatric Association, 2000) criteria for cocaine dependence. Exclusion criteria were uncontrolled psychotic symptoms, active suicidality, or in recovery for pathological gambling (but see Petry & Alessi, 2010; Petry et al., 2006). Participants were recruited into the trial from those initiating treatment at one of four community-based treatment clinics that provided standard outpatient (non-medication assisted) substance abuse treatment services (see Petry et al., 2012). Of the 442 individuals randomized in the trial, 14 (3.2%) were excluded due to missing data related to age of onset of use, leaving 428 participants for analyses.

2.2. Procedures

After obtaining written informed consent, research assistants conducted an interview, which included demographic questionnaires, drug dependence checklists derived from the Structured Clinical Interview for the DSM-IV (First, Spitzer, Williams, & Gibbon, 1995), and the Addiction Severity Index (ASI; Bovasso, Alterman, Cacciola, & Cook, 2001; Kosten, Rounsaville, & Kleber, 1983), which evaluates severity of problems across seven domains: employment, family/social, legal, drug, alcohol, medical, and psychiatric. Composite scores range from 0.00 to 1.00 on each domain, with higher scores reflecting greater problem severity. Responses to individual items on the ASI were used to characterize specific problems for indices that differed between early and late onset participants.

2.3. Treatment group assignment

Research assistants used a computerized urn randomization program to assign patients to standard care or a CM intervention that awarded chances of winning prizes ranging from $1 to $100. Treatment groups were balanced on clinic, baseline urine toxicology results, gender, and direct transfer from inpatient detoxification services or not. The details of the treatments are provided in the primary study (Petry et al., 2012). Briefly, patients in all conditions received standard care, which involved group therapy related to life skills training, relapse prevention, AIDS education, and 12-step therapy. Intensive care (up to 4 hours/day, 5 days/week) was available for up to 6 weeks, and then intensity of care decreased down to one group per week. In addition to standard care, study patients were expected to submit 21 urine and breath samples over a 12-week period according to a tapering schedule that mimicked reductions in clinical care over time. Samples were scheduled 3 days per week during weeks 1–3 (Monday, Wednesday, and Friday), 2 days per week during weeks 4–6 (e.g., Mondays and Fridays) and 1 day per week during weeks 7–12. Research assistants collected urine specimens that were tested for cocaine and opioids using OnTrak TesTstiks (Varian, Inc., Walnut Creek, CA) and breath samples that were tested for alcohol using an Intoximeter Breathalyzer (Intoximeters, St. Louis, Mo). Research assistants congratulated patients when they tested negative for all three substances: cocaine, opioids and alcohol. If results were positive, RAs encouraged patients to discuss use with clinical staff, but results were research data and not shared with clinical staff. Patients assigned to CM earned the chance to draw from a bowl and win prizes ranging from $1 to $100 in value for attending treatment or submitting drug negative specimens as described in Petry et al. (2012).

2.4. Data analyses

Independent sample t-tests, Mann–Whitney U tests, and chi-square tests evaluated differences in baseline characteristics in patients with early onset cocaine use compared to those with later onset cocaine use. Age 14 or younger was the cut point, because this age represented one standard deviation below the mean age of onset in this sample, 20.7 ± 6.6 years, and it is similar to the age of initiation reported in youth samples (e.g., Bracken, Rodolico, & Hill, 2013).

Treatment outcome data were available from all randomized patients, and an intent-to-treat approach was employed. Variables that differed between early and late onset groups were examined for relatedness to treatment outcomes, and those associated (e.g., current age and race) were used as covariates in subsequent analyses. Other variables, including ASI scores that differed between age of onset groups, were unrelated to treatment outcomes ($ps > .22$) and therefore not included in the model. In the model outlined below, treatment condition and race were entered as categorical variables, and others as continuous variables. Age of onset of cocaine use was entered as a continuous variable in analyses, and results were similar if age of onset was entered as a dichotomous variable, i.e., 14 or younger versus older.

Multivariate analysis of covariance (MANCOVA), was used to test the main effect of age of first cocaine use, treatment condition (CM or standard care), and the interaction of age of onset and treatment condition on three primary treatment outcomes: number of days on which patients attended treatment sessions, longest consecutive period of objectively determined abstinence (LDA), and proportions of negative samples submitted. Attendance data were abstracted from clinical charts. A week of consecutive abstinence was a 7-day period during which all scheduled samples tested negative. Because frequency of sample collection tapered over time, 1 week of abstinence was recorded for three consecutive negative samples during early phases, two during middle periods, and one during the last weeks. If a patient refused or missed a sample because of an unexcused absence, the LDA was broken. Proportion of negative samples was analyzed using the actual number of samples submitted in the denominator such that this variable was not impacted by duration of time in treatment. For all analyses, samples were negative if they tested negative for cocaine, opioids, and alcohol. The vast majority of positive samples tested positive for cocaine, with less than 1% alcohol positive and less than 5% opioid positive. Analyses were