The role of childhood maltreatment in the altered trait and global expression of personality in cocaine addiction

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ABSTRACT

Background and aims: Drug addictions are debilitating disorders that are highly associated with personality abnormalities. Early life stress (ELS) is a common risk factor for addiction and personality disturbances, but the relationships between ELS, addiction, and personality are poorly understood.

Methods: Ninety-five research participants were assessed for and grouped by ELS history and cocaine dependence. NEO-FFI personality measures were compared between the groups to define ELS+ and addiction-related differences in personality traits. ELS and cocaine dependence were then examined as predictors of personality trait scores. Finally, k-means clustering was used to uncover clusters of personality trait configurations within the sample. Odds of cluster membership across subject groups was then determined.

Results: Trait expression differed significantly across subject groups. Cocaine-dependent subjects with a history of ELS (cocaine+/ELS+) displayed the greatest deviations in normative personality. Cocaine dependence significantly predicted four traits, while ELS predicted neuroticism and agreeableness; there was no interaction effect between ELS and cocaine dependence. The cluster analysis identified four distinct personality profiles: Open, Gregarious, Dysphoric, and Closed. Distribution of these profiles across subject groups differed significantly. Inclusion in cocaine+/ELS+, cocaine-/ELS+, and cocaine-/ELS− groups significantly increased the odds of expressing the Dysphoric, Open and Gregarious profiles, respectively.

Conclusions: Cocaine dependence and early life stress were significantly and differentially associated with altered expression of individual personality traits and their aggregation as personality profiles, suggesting that individuals who are at-risk for developing addictions due to ELS exposure may benefit from personality centered approaches as an early intervention and prevention.

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1. Introduction

Drug addiction remains a major socioeconomic problem associated with marked morbidity and mortality. Genetic and environmental factors are thought to represent the major determinants of drug addiction (Agrawal and Lynskey, 2008; Enoch, 2012), though their impacts are often indirect and intertwined with intermediate factors such as personality variables (Davis and Loxton, 2013; Gorwood et al., 2012). Personality is defined as an individual’s set of enduring, largely predictable traits, behaviors, and thought processes and is represented by both individual traits, such as neuroticism and impulsiveness, as well as clusters or profiles that represent global trait organization. Although most personality studies of drug use disorders (DUDs) focus on categorical DSM-defined Axis-II personality disorders (PDs), individuals who have or are at high risk for having a DUD also deviate significantly from general population scores for dimensional, non-pathological personality traits (Allen and Lauterbach, 2007; Drerup Stokes et al., 2013; Franken et al., 2006; Kotov et al., 2010; Sher et al., 2000).

Every stage of the addiction process, from drug use initiation to relapse, is closely associated with altered normative personality trait expression (Elkins et al., 2006; Grekin et al., 2006; Prisciandaro et al., 2011). Certain personality traits predict DUDs (Łukasiewicz et al., 2008; Turiano et al., 2012) and are associated with an early onset of drug use (Anderson et al., 2007; Malmberg et al., 2012; Nees et al., 2012), the transition from impulsive to compulsive
drug abuse (Ersche et al., 2013), and an increased risk of drug use relapse (Fisher et al., 1998).

Childhood adversity, which represents a major risk for drug addiction (Dube et al., 2003), is highly associated with personality alterations. Although personality variation is approximately 50% heritable (Turkheimer et al., 2014), personality development is significantly influenced by early-life experience, especially adversity and maltreatment (Congdon et al., 2012). Particular subtypes of childhood maltreatment (e.g., physical abuse, sexual abuse, emotional neglect) are each associated with increased risk for specific PDs (Nederlof et al., 2010; Zhang et al., 2012), and experiencing multiple subtypes of maltreatment increases risk of having one or more PDs (Zhang et al., 2012). PDs are frequently comorbid with other psychiatric disorders such as DUDs with a reported 46% prevalence of one or more PDs in a DUD inpatient population (Langas et al., 2012). As the number of adverse childhood experiences increases, graded increases occur in the prevalence of PDs and the risk of DUDs (Dube et al., 2003; Johnson et al., 2006). Evidence suggests that personality development that has been negatively impacted by early life adversity may act to strengthen the association between susceptibility for DUDs and early life stress (ELS) (Kim et al., 2009) (Oshri et al., 2013). The drug addiction process, therefore, has well-established relationships to both personality development and childhood maltreatment, but—to our knowledge—the distinct personality outcomes associated with ELS, drug addiction and their interaction have not been previously reported. Such new knowledge could support the development of personality-targeted interventions that promote resilience and prevent addictions in at-risk individuals who have a significant history of ELS. Similarly, Conrod and colleagues successfully reduced drug and alcohol use behaviors in adolescents by assessing problematic trait expression (e.g., sensation seeking, impulsivity, anxiety sensitivity, hopelessness) to identify at-risk individuals, who then received cognitive behavioral therapy (Conrod et al., 2010, 2013). The present study expands these findings by identifying divergences in personality expression between resilient and susceptible subjects who each carry a major risk factor for addiction (i.e., ELS).

The present study investigated relationships between drug (i.e., cocaine) addiction, exposure to childhood maltreatment and personality variation (Fig. 1). We performed a secondary analysis of a case—control, cross-sectional dataset that probed the brain—behavior relationships underlying impulsivity in ninety-five individuals, including participants who were cocaine dependent at the time of recruitment (Elton et al., 2014a, 2014b); therefore, the personality trait scores measured in the present study were taken from individuals who had already developed cocaine dependence. This study does not exhaustively probe the directionality of every possible relationship between ELS, cocaine dependence and normative personality; rather, its purposes are to determine if and how ELS history or absence affects personality expression in cocaine-dependent individuals and whether resilient individuals (those with ELS history but no addiction) display unique personality features. In the present work, we tested the overall study hypothesis that ELS history and cocaine dependence are associated with distinct alterations in personality. As enumerated in Fig. 1, the following specific hypotheses were also tested: 1) that ELS and cocaine dependence each predict altered personality trait expression, 2) that ELS and cocaine dependence interact in predicting altered personality expression, 3) that clusters of distinct trait configurations, referred to as profiles, would emerge from within the sample, and 4) that ELS and cocaine dependence would be selectively associated with specific personality profiles. To test these hypotheses, we compared personality traits (trait-centered approach, Fig. 1A) and trait configurations as profiles (person-centered approach, Fig. 1B) (Crockett et al., 2006) across four groups of adults that differed with respect to the presence and absence of cocaine dependence or moderate to severe ELS. We constructed multiple linear regression models that predict trait expression for ELS and cocaine dependence status. Because clusters of multiple personality dimensions better predict psychopathology and risk profiles than do individual traits (Janson and Mathiesen, 2008; Retew et al., 2008; Wessman et al., 2012), we used a data-driven cluster analysis of trait expression to uncover the most prevalent combinations of traits (i.e., profiles) among individuals within the sample (see Supporting Information). We also determined how subject group membership affects the odds of expressing each personality profile. The identification and analysis of specific personality traits was based on the well-established five-factor model (FFM) of personality (McCrae and Costa, 1985). To our knowledge, this is the first case—control cross-sectional study design used to test the hypothesis that both cocaine addiction and exposure to childhood maltreatment are associated with significant alterations in personality and that their co-occurrence is associated with increased risk of expressing specific profiles of altered personality traits.

2. Methods

2.1. Subjects

Ninety-five participants ages 18 to 50 (37 female, mean age 38 ± 8.8 years) were enrolled in the study. Recruitment advertisements targeting individuals with childhood maltreatment, current cocaine dependence and healthy comparison subjects were posted in the community (Little Rock, AR), including city buses, and in area newspapers. A phone screening preliminarily assessed study eligibility and described the study procedures; eligible participants provided written informed consent to participate in the study. Prior to recruitment, all advertisements and study procedures were approved by the Institutional Review Board at the University of Arkansas for Medical Sciences (Little Rock, AR).

Recruitment was performed in two cohorts. For cohort 1 (n = 84), presence of current Axis 1 disorders other than cocaine dependence represented an exclusion criterion; nicotine dependence or alcohol dependence were exceptions to this, provided that cocaine was the preferred drug of abuse. Non-cocaine-dependent subjects were excluded if they had current or lifetime drug or

![Fig. 1. Hypothetical conceptual model of the relationships between childhood maltreatment (early life stress), addiction (drug use disorders) and personality. Bolded arrows represent the relationships examined in the present cross-sectional case—control factorial study. Bracketed numbers specify each hypothesis posed in the introduction.](image-url)
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