Published in final edited form as:

Am J Addict. 2011 ; 20(2): 151–160. doi:10.1111/j.1521-0391.2010.00108.x.

Selective Cocaine-Related Difficulties in Emotional Intelligence: Relationship to Stress and Impulse Control

Helen C. Fox, PhD¹, Keri L. Bergquist, PsyD^{1,2}, James Casey, BA³, K. Adam Hong, MS², and Rajita Sinha, PhD^{1,2}

¹ Department of Psychiatry, Yale University School of Medicine, The Connecticut Mental Health Center, New Haven, Connecticut

² Department of Psychiatry, Yale University School of Medicine, The Yale Stress Center, New Haven, Connecticut

³ Psychology Department (Clinical Science), University of California, Berkeley, California

Abstract

Emotional Intelligence (EI) comprises the ability to perceive, use, understand and regulate emotions and may potentially contribute to variability in risk-related factors such as stress perception and impulse control in cocaine dependent individuals. The main objective of the current study is to better define EI in cocaine dependent individuals compared with healthy controls, using the Mayer, Salovey, and Caruso Emotional Intelligence Test (MSCEIT¹). Secondary analysis investigates the association between EI, IQ factors, perceived stress and impulse control in both populations. Seventy-two abstinent treatment-seeking cocaine patients and 52 healthy controls were administered the MSCEIT as well as measures of IQ, perceived stress and impulse control. Findings showed that cocaine dependent participants demonstrated highly selective EI difficulties compared with healthy controls, specifically with regard to higher level emotional reasoning including the understanding, management and regulation of emotion. These EI problems were associated with increased perceived stress and impulse control difficulties. IQ was significantly associated with all MSCEIT measures in the cocaine dependent participants, but not controls. Findings indicate that specific aspects of EI may be of clinical importance to cocaine dependent populations, impacting relapse related factors such as stress dysregulation and impulse control.

INTRODUCTION

Emotional Intelligence (EI) is a complex, multi-dimensional construct incorporating the potential to perceive and monitor emotions in both oneself and others as well as regulate, discriminate and express these emotions in order to guide and facilitate thought and behavior.¹ As such, EI highlights the compound interactions between affective activity and intellectual function.² While EI has been studied in a wide range of healthy and clinical populations including students,³ individuals with schizophrenia,⁴ generalized social phobia,⁵ and Ecstasy polydrug users⁶ it has not been well characterized in drug-dependent populations. Moreover, compromised EI may be clinically relevant to the course of cocaine dependence.

Address correspondence to Dr. Fox, Department of Psychiatry, Yale University School of Medicine, The Yale Stress Center, 2 Church Street South, Suite 209, New Haven, CT 06519., helen.fox@yale.edu.

Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

For example, poor impulse control is a major factor underlying addictive disorders⁷ and may reflect failures of strategic efforts on the part of the individual at emotional comprehension and management.^{8,9} Such aspects of EI are particularly pertinent to cocaine dependence which is characterized by an enhanced and persistent inability to regulate negative mood following stress.^{10,11} Notably, this dysregulated emotional response is accompanied by increases in cocaine craving and other relapse-related markers.^{10–12} As an inability to effectively perceive, evaluate and modulate emotions within a distressed state may potentially reflect a conflict in regulatory goals, aspects of EI may have an important impact on the association between stress and impulse control in cocaine dependent individuals. This study therefore aims to assess the nature of EI in a group of early abstinent cocaine dependent patients compared with a group of healthy controls using the Mayer, Salovey, and Caruso Emotional Intelligence Test (MSCEIT).¹³

In the current study, secondary analysis will also be conducted focusing on the following two objectives. First, on the basis that EI may influence impulsive behaviors during periods of high distress, the extent to which EI is associated with perceived stress and impulse control during early abstinence will also be assessed. Second, as EI bridges both concepts of emotion and intelligence, clarifying the contribution of IQ to EI in a more focused manner is germane, particularly in light of the popular definition which typically views EI as a preferred way of behaving rather than ability.¹⁴ Although the conceptual premise of the MSCEIT presents EI as a standard intelligence based on performance abilities of emotional perception, appraisal, understanding and reasoning, EI also portrays a radically different aspect of general intelligence due to emphasis on ego-related components rather than basic information processing and mental performance.¹⁵ As such, assessing the association between IQ and EI within both cocaine dependent and healthy individuals will allow the construct to be better operationalized within drug-using populations.

METHOD

Participants

Inclusion/Exclusion criteria—All participants had to be between the ages of 18 and 50 years and able to read and write in English to at least a 6th grade level. Current cocaine dependence was determined using the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders IV (SCID IV).¹⁶ Furthermore, all potential cocaine dependent individuals tested positive for cocaine in urine toxicology screens on entry into 3–4 weeks of inpatient treatment and study participation. Cocaine dependent participants were excluded if they met criteria for any current psychiatric disorder or met current and/or lifetime dependence criteria for any illicit drug use other than cocaine, alcohol and nicotine. However, any cocaine dependent participant requiring a detoxification program for alcohol abuse was excluded. Healthy control participants were excluded if they met current criteria for any current psychiatric disorder or dependence criteria for any drug, with the exception of nicotine. In addition, women were excluded from the study, if they were using any form of birth control or were either peri/postmenopausal. All participants requiring any prescribed medications for other psychiatric disorders or medical condition and were not in good health were also ineligible.

Procedures—Seventy-two recently abstinent treatment-seeking cocaine dependent (35M/37F) and fifty-two healthy control individuals (26M/26F) were recruited via local advertisements. Following admission, all participants underwent stringent medical assessments that included electrocardiography and laboratory tests of renal, hepatic, pancreatic, hematopoietic, and thyroid function to ensure good physical health. Verbal and

written consent was obtained and the Human Investigation Committee of the Yale University School of Medicine approved the study.

Cocaine participants were admitted to the CNRU, a locked inpatient treatment research facility with no access to alcohol or drugs and limited access to visitors. Urine and breathalyzer testing was also conducted regularly to ensure continued abstinence. The CNRU is a smoke-free unit and patients are allowed four smoke breaks per day. All cocaine dependent participants took part in specialized substance abuse treatment for 4 weeks as well as a larger three day laboratory study assessing the effects of early cocaine abstinence on stress response.^{11,12} All demographic and diagnostic assessments used in the current study were administered during the second week of inpatient admission, in order to account for the potential influence of acute withdrawal symptomatology on dependent measures. Assessments were also conducted on separate days from the larger three day laboratory study.

Healthy controls completed demographic and diagnostic assessments in two to three appointments subsequent to study admission. During these appointments, control participants underwent breath alcohol testing and urine toxicology screens in order to confirm self-report of alcohol and drug information as well as a thorough physical examination with a research nurse specialist in order to ensure good health. Controls were then admitted for a three day four night hospital stay to the Yale Center for Clinical Investigation (YCCI) as part of the same larger laboratory study as the cocaine dependent individuals. This provided a similar controlled environment, with monitored cigarette breaks.

Assessments

Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT).¹—An on-line version of the MSCEIT distributed by Multi-Health System's (MHS) online assessment site and Scoring Organizer was administered to all participants 14.4 ± 5.9 days following admission to inpatient treatment. EI is measured across two main dimensions; Experiential Emotional Intelligence (*EEIQ*) defined as the ability to perceive emotions (*Branch 1*) and the ability to utilize emotions in order to facilitate thought (*Branch 2*) as well as Strategic Emotional Intelligence (*SEIQ*) or the ability to understand emotions (*Branch 3*) and the ability to manage emotions (*Branch 4*). Each “branch” or conceptual component of EI consist of 2 sub-tests. Examples of each test are provided below (see Figure 1):

Perceiving Emotions (Branch 1): Faces Task: Participants rate the severity of *happiness, fear, surprise, disgust, excitement* in relation to the face presented on a 1 (*no happiness*) to 5 (*extreme happiness*) rating scale. **Pictures Task:** Participants rate the extent to which various images and landscapes express *happiness, sadness, fear, anger, disgust* on a 1 to 5 rating scale. The task involves determining the respondents ability to perceive emotions expressed through art and the surrounding environment.

Using Emotions (Branch 2): Facilitation Task “*What mood(s) might be helpful to feel when creating new, exciting decorations for a birthday party?*” Options include: *annoyance, boredom, joy* on a 1–5 rating scale. The task assesses an individuals understanding of how specific moods may underlie and facilitate thinking and reasoning. **Sensations Task** “*Imagine feeling guilty that you forgot to visit a close friend who has a serious illness. In the middle of the day, you realize you completely forgot to visit your friend at the hospital. How much is the feeling of guilt like each of the following?*” Options include: *anger, blue, sweet* on a scale of 1 to 5. The task assesses an individuals ability to compare and contrast

certain emotions with sensations generated within other sensory modalities such as color and/or temperature.

Understanding Emotions (Branch 3): Changes Task: “Marjorie felt more and more ashamed, and began to feel worthless. She then felt _____” Options include: Overwhelmed, depressed, ashamed, self-conscious, jittery. The task assesses the respondents understanding of how emotions can transition from one to another (eg how frustration can change into anger). **Blends Task:** “A feeling of concern most closely combines the emotions of _____” Options include a) love, anxiety, surprise, anger; b) surprise, pride, anger, fear. The task assesses how well respondents are able to comprehend the complexity of emotions.

Managing Emotions (Branch 4): Emotion Management Task: “Mara woke up feeling pretty well. She had slept well, felt well rested, and had no particular cares or concerns. How well would each action help her preserve her mood?” Participants are then presented with two alternative “Actions” that this individual may take in order to do this, and are subsequently asked to rate the effectiveness of each action on a scale of 1 to 5. The task assesses the ability of the respondent to incorporate their own emotions into a decision making scenario involving emotion regulation. **Emotional Relations Task:** “John developed a close friend at work over the last year. Today, that friend completely surprised him by saying he had taken a job at another company and would be moving out of the area. He had not mentioned he was looking for other jobs. How effective would John be in maintaining a good relationship, if he chose to respond in each of the following ways”. Two subsequent “Actions” are presented. The respondent rates the effectiveness of each one on a scale of 1 to 5. The task measures participants’ ability to incorporate emotions into decision making that involves other individuals.

The MSCEIT is scored using a general consensus procedure based on the agreement of a large normative sample of more than 5000 people drawn from 50 research institutions in the US and comprising heterogeneous respondents varying in sex, ethnicity and age. Good sample sizes have been included for individuals from four ethnic classifications: Caucasian, African American, Asian and Hispanic. Furthermore, all age ranges from 17 to 50+ are adequately sampled for with regard to both age and gender. A large percentage of the sample has received some college or university education.¹

A score is awarded to each potential response option based on the proportion of a prior screening sample who selected that item. For example, if 20% of individuals choose a particular response option, a score of 0.2 is awarded to that option.¹⁷ The MSCEIT determines an individual’s EI from several scores generated from responses to the eight tasks described above: A Total score, two Area scores (SEIQ and EEIQ), four Branch scores (Perceiving, Using, Understanding and Managing emotions) and eight individual task scores (see Figure 1).

IQ measures

Shipley Institute of Living Scale (Shipley).¹⁸ The Shipley is a global measure of cognitive functioning and IQ consisting of two parts (vocabulary and abstraction). The Vocabulary and Block Design sub-tests from the Wechsler Adult Intelligence Scale-Revised (WAIS-R¹⁹) are also standard measures of crystallized and fluid intelligence, respectively. Both measures were administered to all participants on admission to the study.

Perceived Stress Scale – PSS:²⁰ is a highly reliable and widely used 14-item self-report questionnaire that assesses the extent to which recent situations are appraised as stressful. Items include questions such as: *In the last week, how often have you felt confident about*

your ability to handle your personal problems? and, In the last week, how often have you felt difficulties were piling up so high that you could not overcome them? Responses are rated on a 5-point scale ranging from 0 (never) to 4 (very often), then summed. This was administered to the cocaine dependent participants following two weeks of inpatient treatment and on admission to healthy controls.

Difficulties in Emotion Regulation (DERS):²¹ *Impulse Control* sub-scale. The DERS is a 41-item self-report developed to examine clinical difficulties in ability to regulate emotion. Participants are requested to rate how often statements such as “*when I’m upset I lose control over my behaviors*” applies to them, where 1 is “*almost never*” (0–10%), 2 is “*sometimes*” (11–35%), 3 is “*about half the time*” (36–65%), 4 is “*most of the time*” (66–90%), 5 is “*almost always*” (91–100%). The scale was administered to all participants on study admission.

Statistical Analyses

All statistical analyses were performed using SAS software (version 9.1; SAS Institute, Cary, NC, USA). T-tests and chi-squares were used to assess all demographic and drug use variables. Group differences on all MSCEIT tests were assessed using Analyses of Covariance (ANCOVAs), with factors that correlated highly with the outcome variables used as covariates. This included IQ (Shipley) and years in education. As both were highly correlated, IQ only was included as a covariate. T-tests were also used to assess any potential group differences between a) Participants who were cocaine dependent only and those who also met current criteria for alcohol dependence and b) cocaine dependent patients who met criteria for lifetime anxiety compared with those who did not meet anxiety criteria. Pearson’s Product Moment correlations assessed the relationship between the MSCEIT, IQ, stress and impulse control. As drug use data was positively skewed, Spearman’s Rho was used for correlations. All correlations were Bonferroni corrected.

RESULTS

Participants: (Table 1)

Cocaine dependent participants and controls differed significantly by racial status, years of education and IQ. The cocaine patients were higher proportion minority had lower IQ and were less educated. More cocaine dependent participants also met lifetime criteria for anxiety disorders and alcohol dependence. They also reported significantly higher levels of perceived stress compared with controls.

MSCEIT scores: (Figure 2a & b)

Cocaine dependent participants reported significant performance deficits on the total EI score compared with Healthy controls [without covariates: $F(1, 123) = 14.20$; $p < .0001$]. However, after co-varying for IQ, group differences were no longer significant.

The cocaine dependent sample also demonstrated worse performance on the overall SEIQ sub-branch of the MSCEIT, [without covariates: $F(1, 123) = 28.21$, $p < 0.0001$; with covariates: $F(1, 120) = 8.63$, $p = 0.004$]. No group differences were observed in the EEIQ sub-branch or any of the componential branches and/or tasks.

Poor performance on the SEIQ branch was related to the fact that cocaine dependent participants scored worse on the *Understanding Emotions* branch of the SEIQ [without covariates: $F(1, 123) = 30.1$, $p < 0.0001$; with covariates: $F(1, 120) = 8.52$, $p = 0.004$] as well as the two componential tasks, *Changes* [without covariates: $F(1, 123) = 20.22$, $p <$

0.0001; with covariates: $F(1, 120) = 4.23, p = 0.04$], and *Blends* [without covariates: $F(1, 123) = 32.96, p < 0.0001$; with covariates: $F(1, 120) = 7.89, p = 0.006$].

Differences between the cocaine dependent group and the controls only approached statistical significance for the second SEIQ branch *Managing Emotions* [without covariates: $F(1, 123) = 3.09, p = .08$] and was insignificant following the inclusion of covariates into the model. While cocaine dependent participants performed poorly compared with controls on the *Emotional Management* task [without covariates: $F(1, 123) = 13.71, p < 0.0001$; with covariates: $F(1, 120) = 3.87, p = 0.05$], performance on the second *Emotional Relations* task was only statistically different between groups prior to the inclusion of covariates, [without covariates: $F(1, 123) = 9.64, p = .002$].

Secondary analyses indicated that no group differences were observed on any measure of the MSCEIT between cocaine dependent only patients and those who were co-morbid for both cocaine and alcohol dependence. In addition, lifetime anxiety was shown to have no effect on any of the statistical models and was removed as a covariate.

Correlational analyses (Table 2 for all correlations in cocaine dependent participants)

IQ and MSCEIT scores—In *cocaine dependent participants*, scores from the Shipley and the Vocabulary sub-scales of the WAIS were positively associated with all MSCEIT sub-scales. These findings remained significant following correction. Scores from the Block Design subscale of the WAIS were positively associated with the total EI and SEIQ branch of the MSCEIT, including the componential tasks, Managing and Understanding emotions. The association between both individual tasks and the block design were insignificant following correction. In all cases, increases in IQ were associated with significant increases in MSCEIT scores. In *healthy control participants*, a moderate association between IQ and MSCEIT scores were observed on the Perceiving Emotions (Branch 1) sub-scale of the MSCEIT only (WAIS Vocabulary: $r = .30, p = .03$; Shipley: $r = .45, p = .0009$). Only the latter remained significant following correction.

Perceived stress, impulse control and MSCEIT scores—In *cocaine dependent participants*, increases in perceived stress were associated with a decrease in all MSCEIT summary scores. Following correction significant negative correlations were observed for the total score, Experiential subscale, and Managing Emotions test only. Increases in self-reported impulse control difficulties were also associated with poorer scores on the total MSCEIT score, the SEIQ area measure and all branches and sub-tests of the SEIQ measures. No significant associations were observed between self-reported perceived stress or impulse control difficulties and MSCEIT scores in healthy control participants (Figure 3). All scores in the cocaine dependent sample were insignificant following correction.

Cocaine use and MSCEIT scores—Performance on both the Emotional Relations test ($r = -.23, p = .05$) and the Emotional Management test ($r = -.23, p = .05$) were weakly but significantly associated with greater number of years of cocaine use. As such, an increase in the number of years of cocaine use was also weakly but significantly associated with a worse score on the Managing Emotions branch of the MSCEIT ($r = -.22, p = .05$), and a worse total EI score ($r = -.23, p = .05$). A greater number of years of cocaine use was also associated with poorer performance on the Perceiving Emotions test ($r = -.23, p = .05$) and the Experiential Emotion Area score ($r = -.22, p = .05$). No significant correlations were observed in relation to frequency and quantity of cocaine use and MSCEIT performance. All scores in the cocaine dependent sample were insignificant following correction.

DISCUSSION

Current findings indicate that cocaine dependent participants demonstrate highly selective deficits in EI supporting the discriminative validity of the MSCEIT within substance abusing populations. While early abstinent cocaine dependent individuals were able to fully experience, generate and perceive emotions in both people and objects as well as use their emotions to facilitate cognition (experiential EI), they demonstrated problems pertaining to emotional strategizing. Specifically, they were unable to understand emotional causes and complexities and showed difficulties regarding the regulation of emotions both within themselves and others (strategic EI). Furthermore, this reduced ability to evaluate and regulate emotions was associated with an increase in self-reported impulse control problems. In addition, all measures of the MSCEIT were shown to be associated with increases in perceived stress and decreases in IQ in the cocaine dependent individuals, but not the healthy volunteers. The implications of these findings are discussed in terms of their relevance to the maintenance of cocaine dependence and the utility of the MSCEIT as a measure of EI in cocaine dependent populations.

In cocaine dependent individuals, difficulties specifically relating to the successful comprehension (Branch 3) and regulation (Branch 4) of emotions were associated with increases in perceived stress and impulse control difficulties, both of which are integral to the maintenance of cocaine abuse.^{7,10,11} From a behavioral perspective, this is in keeping with several social psychological theories which postulate that accurate understanding or appraisal of a situation underlies emotionally intelligent responding.²² Furthermore, that a loss of impulse control may reflect the fact that the need to regulate emotional or affective distress states becomes greater than the need to adhere to volitional self-regulatory goals which are perceived as being psychologically effortful.^{8,9}

In cocaine dependent individuals therefore, periods of high perceived stress may culminate in poor emotional appraisal, a reduced ability to regulate emotion and a potential loss of impulse control. While a reduction in the ability to perceive and utilize emotions was also associated with increased stress in the cocaine dependent participants, no association was observed between these EI factors and impulse control. This may serve to highlight the emotion regulation and appraisal components of EI as being central to stress-related impulse control. However, it is important to note that this interpretation must remain tentative as statistical correction showed correlational findings to be insignificant. Moreover, without prospective data it is not possible to determine the temporal order of these associations either in terms of these emotion related processes and cocaine use, or with regard to the causal relationships between emotion regulation and appraisal, stress and impulse control.

While caution must be applied to the interpretation of these associations, several studies have documented difficulties pertaining to emotional understanding, regulation and impulse control during early abstinence from cocaine.²³ In addition, high impulsivity has also been associated with increased emotional eating following negative mood induction in healthy volunteers²⁴ and is shown to moderate antecedent negative effect (particularly anger) and binge eating in bulimics.²⁵ Future longitudinal research, however, is warranted in order to better ascertain a more causal contribution of emotional ability in relation to the associations between stress, impulse control and compulsive cocaine use.

It is also interesting to note that no significant association was observed between performance on the MSCEIT or reported impulse control difficulties in the healthy control group. As healthy controls also reported significantly lower levels of perceived stress compared with cocaine dependent participants, it may be suggested that an enhanced or dysregulated stress state may represent an important aspect of this association in cocaine

dependent individuals. This is consistent with studies which show “urgency,” or a tendency to act impulsively in response to a negative emotional state, to be a better predictor of cocaine²⁶ and alcohol abuse²⁷ than sensation-seeking, lack of perseverance and lack of premeditation, which do not necessitate the regulation of negative emotional factors.²⁸

As EI may represent a concept which serves to highlight the complex interactions between affect and intellect, a moderate association between EI and IQ may be expected.²² The complexity of this relationship is highlighted by the fact that, to date, research assessing how EI relates to various types of intelligence and other established cognitive constructs, remains ambiguous.²⁹ In a recent study verbal or crystallized intelligence was shown to be the most robustly associated with MSCEIT Emotional Understanding across seven studies.³⁰ Conversely, other research has reported minimal to low/moderate associations with IQ in healthy populations.¹ Current findings further suggest that the association between EI and IQ may vary between healthy volunteers and population samples with compromised intellectual abilities. While standard IQ measures of crystallized intelligence were moderately to highly associated with all components of EI in the cocaine dependent sample, only a moderate correlation between Perceiving Emotions (Branch 1) and crystallized IQ was observed in the controls. Similarly, in the cocaine dependent participants, fluid intelligence (WAIS Block Design) was significantly associated with all branches of the MSCEIT, with the exception of Perceiving Emotions. Again, this was not demonstrated in the healthy control group and is consistent with previous findings.^{1,31} Our findings, may however, be related to the fact that the consensus scoring comprises a high proportion of individuals who have received at least some college and university education. This was not typically the case with the current cocaine dependent sample. As such, our findings indicate that the MSCEIT may show good discriminant validity in healthy populations reflecting an emotional concept predominantly independent of IQ. However, although IQ was used as a covariate in the current study, it is important to consider that IQ may contribute to EI difficulties in subject samples with compromised intellectual functioning.

Several limitations of this study are worth noting. First, 32 % of the cocaine dependent sample met lifetime criteria for alcohol dependence and 88.9% were cigarette smokers indicating that findings may reflect the combined chronic effects of these drugs on MSCEIT performance. Although no differences on EI were observed between the cocaine dependent and co-morbid cocaine and alcohol dependent participants, control participants had consumed significantly less alcohol and nicotine in the three months prior to treatment. Second, the cocaine dependent group comprised a higher number of participants with lifetime anxiety disorder, which may again have contributed to reduced performance on the MSCEIT. Notably, however, symptoms were not current and any participants requiring psychiatric medication were excluded from the study. Conclusions to the current study are also limited by the cross-sectional nature of the design and therefore provide no details regarding the causal relationship between emotional intelligence difficulties and factors associated with cocaine use. Moreover, no correlations were observed between indices of addiction severity and MSCEIT scores, with the exception of low significant associations regarding years of cocaine use. Despite this, findings do suggest that poor emotional appraisal and regulation may contribute to cocaine dependence.

In summary, although performance on the MSCEIT in cocaine dependent individuals may be influenced by IQ, a clear selectivity in EI difficulties was observed supporting the utility of the MSCEIT in cocaine dependent populations. EI problems in cocaine dependent individuals relate specifically to higher-level reasoning about emotions and less to more basic-level processing of emotions such as experiencing and responding to feelings. This is clinically relevant, as poor emotional appraisal and regulatory processes may influence the association between stress, impulse control and ultimately cocaine maintenance.

Acknowledgments

This study was supported in part by grants K02-DA17232 (Dr. Sinha), P50-DA16556 (Dr. Sinha), and UL1 RR024139 (Yale CTSA) from the National Institutes of Health and its Office of Research on Women's Health (ORWH), Bethesda, MD.

We wish to thank the staff at the Clinical Neuroscience Research Unit and the General Clinical Research Center at Yale University School of Medicine for their assistance in completing these studies.

References

1. Mayer, JD.; Salovey, P.; Caruso, DR. Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT): USER'S Manual. Toronto, Ontario: Multi-Health Systems, Inc; 2002.
2. Salovey, P.; Pizarro, DA. The value of emotional intelligence. In: Sternberg, RJ.; Lautrey, J.; Lubart, TI., editors. Models of intelligence: International perspectives. Washington, DC: American Psychological Association; 2003. p. 263–278.
3. Geher G, Warner RM, Brown AS. Predictive validity of the emotional accuracy research scale. *Intelligence*. 2001; 29:373–388.
4. Kee KS, Horan WP, Salovey P, et al. Emotional intelligence in schizophrenia. *Schizophr Res*. 2008; 107:61–68. [PubMed: 18805674]
5. Jacobs M, Snow J, Geraci M, et al. Association between level of emotional intelligence and severity of anxiety in generalized social phobia. *J Anxiety Disord*. 2008; 22:1487–1495. [PubMed: 18439799]
6. Craig L, Fisk JE, Montgomery C, Murphy PN, Wareing M. Is emotional intelligence impaired in ecstasy-polydrug users? *J Psychopharmacol*. 2010; 24:221–231. [PubMed: 18801831]
7. Perry JL, Carroll ME. The role of impulsive behavior in drug abuse. *Psychopharmacology (Berl)*. 2008; 200:1–26. [PubMed: 18600315]
8. Kuhl, J.; Koole, SL. Workings of the will. In: Greenberg, J.; Koole, SL.; Pyszczynski, T., editors. Handbook of experimental existential psychology. New York: Guildford Press; 2004. p. 411–430.
9. Tice DM, Bratslavsky E, Baumeister RF. Emotional distress regulation takes precedence over impulse control: If you feel bad, do it! *J Pers Soc Psychol*. 2001; 80:53–67. [PubMed: 11195891]
10. Sinha R, Talih M, Malison R, Cooney N, Anderson GM, Kreek MJ. Hypothalamic-pituitary-adrenal axis and sympatho-adreno-medullary responses during stress-induced and drug cue-induced cocaine craving states. *Psychopharmacology (Berl)*. 2003; 170:62–72. [PubMed: 12845411]
11. Fox HC, Hong K-I, Siedlarz KM, Sinha R. Enhanced Sensitivity to Stress and Drug/Alcohol Craving in Abstinent Cocaine dependent Individuals Compared to Social Drinkers. *Neuropsychopharmacology*. 2008; 33:796–805. [PubMed: 17568398]
12. Sinha R, Garcia M, Paliwal P, Kreek MJ, Rounsaville BJ. Stress-induced cocaine craving and hypothalamic-pituitary-adrenal responses are predictive of cocaine relapse outcomes. *Arch Gen Psychiatry*. 2006; 63:324–331. [PubMed: 16520439]
13. Mayer JD, Salovey P, Caruso DR, Sitarenios G. Measuring emotional intelligence with the MSCEIT V2.0. *Emotion*. 2003; 3:97–105. [PubMed: 12899321]
14. Mayer JD. Emotional intelligence: Popular or scientific psychology? *APA Monitor*. 1999; 30:50.
15. Brackett MA, Mayer JD. Convergent, discriminant, and incremental validity of competing measures of emotional intelligence. *Personality and Social Psychology Bulletin*. 2003; 29:1147–1158. [PubMed: 15189610]
16. First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. Structured Clinical Interview for the DSM-IV Axis I Disorders - Patient Edition (SCID-I/P, Version 20, 4/97 Revision). New York, NY: New York State Psychiatric Institute; 1997.
17. Legree, PJ.; Psotka, J.; Tremble, T.; Bourne, DR. Using consensus based measurement to assess emotional intelligence. In: Schulze, R.; Roberts, RD., editors. Emotional intelligence. An international handbook. Gottingen, Germany: Hogrefe & Huber; 2005. p. 99–123.
18. Shipley WC. A self-administering scale for measuring intellectual impairment and deterioration. *J Psychology*. 1940; 9:371–377.

19. Wechsler, D. WAIS-R Manual: Wechsler Adult Intelligence Scale - Revised. San Antonio, TX: Psychological Corp; 1981.
20. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav.* 1983; 24:385–396. [PubMed: 6668417]
21. Gratz KL, Roemer L. Multidimensional assessment of emotion regulation and dysregulation: development, factor structure, and initial validation of the difficulties in emotion regulation scale. *J Psychopath Behav Asses.* 2004; 26:41–54.
22. Mayer JD, Roberts RD, Barsade SG. Human abilities: emotional intelligence. *Annu Rev Psychol.* 2008; 59:507–536. [PubMed: 17937602]
23. Fox HC, Axelrod SR, Paliwal P, Sleeper J, Sinha R. Difficulties in emotion regulation and impulse control during cocaine abstinence. *Drug and Alc Dep.* 2007; 89:298–301.
24. Bekker MH, van de Meerendonk C, Mollerus J. Effects of negative mood induction and impulsivity on self-perceived emotional eating. *Int J Eat Disord.* 2004; 36:461–469. [PubMed: 15558635]
25. Engel SG, Boseck JJ, Crosby RD, et al. The relationship of momentary anger and impulsivity to bulimic behavior. *Behav Res Ther.* 2007; 45:437–447. [PubMed: 16697350]
26. Verdejo-Garcia A, Bechara A, Recknor EC, Perez-Garcia M. Negative emotion-driven impulsivity predicts substance dependence problems. *Drug Alcohol Depend.* 2007; 91:213–219. [PubMed: 17629632]
27. Whiteside SP, Lynam DR. Understanding the role of impulsivity and externalizing psychopathology in alcohol abuse: application of the UPPS impulsive behavior scale. *Exp Clin Psychopharmacol.* 2003; 11:210–217. [PubMed: 12940500]
28. Whiteside SP, Lynam DR. The Five Factor Model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences.* 2001; 30:669–689.
29. Roberts RD, Schulze R, O'Brien K, MacCann C, Reid J, Maul A. Exploring the validity of the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) with established emotions measures. *Emotion.* 2006; 6:663–669. [PubMed: 17144757]
30. Roberts, RD.; Schulze, R.; MacCann, C. The measurement of emotional intelligence: A decade of progress?. In: Boyle, G.; Matthews, G.; Saklofske, D., editors. *Sage personality handbook series.* Thousand Oaks, CA: Sage; 2007. p. 461-482.
31. Salovey, P.; Pizarro, DA. The value of emotional intelligence. In: Sternberg, RJ.; Lautrey, J.; Lubart, TL, editors. *Models of intelligence: International perspectives.* Washington, DC: American Psychological Association; 2003. p. 263-278.

Note. Shaded areas: Cocaine dependent individuals perform significantly worse than controls.

* Following the inclusion of IQ as a covariate, group differences were no longer significant at the .05 level.

Figure 1.
Showing the branches and tests comprising the MSCEIT

Figure 2.
Group differences in MSCEIT performance

Figure 3. Scatterplots showing associations between Total MSCEIT scores, perceived stress and impulse control

Table 1

Group demographics and drug use

	Cocaine n = 72	Healthy n = 52	P
Age	36.5 ± 6.2	33.9 ± 9.7	ns
Gender (% Male)	51.4	50.0	ns
Race (% Caucasian)	36.1	55.8	<.0001
(% African American)	58.3	21.2	
(%Hispanic)	4.2	15.4	
(% Other)	1.4	7.7	
Tobacco smoking (% Smokers)	88.9	34.6	<.0001
Estimated IQ (Shipley Institute of Living Scale)	104.1 ± 10.2	114.1 ± 9.4	<.0001
WAIS – Vocabulary test	8.1 ± 2.2	12.0 ± 2.9	<.0001
WAIS – Block Design	8.5 ± 2.4	11.1 ± 3.1	<.0001
Years of education	12.2 ± 1.6	14.8 ± 1.9	<.0001
MSCEIT - total score	89.89 ± 15.81	101.40 ± 18.07	<.0001
Perceived Stress Scale - total score	23.9 ± 7.5	16.02 ± 7.1	<.0001
Difficulties in Impulse Control (DERS)	13.12 ± 5.03	8.88 ± 2.85	<.0001
Cocaine use 30 days prior to treatment:			
Number of days used	20.3 ± 9.5	-	
Total amount used (<i>grams</i>)	35.3 ± 35.3	-	
Alcohol use 30 days prior to treatment:			
Number of days used	10.5 ± 10.6	4.5 ± 6.5	<.002
Total amount used (<i>no. of drinks</i>)	104.6 ± 111.0	10.5 ± 8.4	<.0001
Number of years Cocaine use	8.9 ± 5.9	-	
Number of years Alcohol use	12.5 ± 7.5	7.8 ± 8.3	<.003
Lifetime Anxiety Disorder Diagnosis (%)	31.9	11.5	.008
Lifetime Depressive Disorder Diagnosis (%)	9.7	11.5	ns
Lifetime Alcohol Dependence Diagnosis (%)	51.4	-	

Table 2

Correlations with MSCEIT summary scores in cocaine dependent participants

	Branch 1 Perceiving	Branch 2 Using	Branch 3 Understanding	Branch 4 Managing	SEIQ Strategic	EEIQ Experiential	Total EI Score
IQ							
SHIPLEY	$r = .34, p < .004$	$r = .41, p = .0005$	$r = .65, p < .0001$	$r = .49, p < .0001$	$r = .62, p < .0001$	$r = .45, p < .0001$	$r = .60, p < .0001$
WAIS: Vocabulary	$r = .43, p = .0002$	$r = .61, p < .0001$	$r = .67, p < .0001$	$r = .57, p < .0001$	$r = .69, p < .0001$	$r = .63, p < .0001$	$r = .73, p < .0001$
WAIS: Block Design	ns	$r = .28, p = .02$	$r = .32, p < .008$	$r = .35, p = .003$	$r = .37, p < .002$	ns	$r = .32, p = .007$
DETS: Impulse Control	ns	ns	$r = -.28, p = .03$	$r = -.25, p = .05$	$r = -.27, p = .03$	ns	$r = -.28, p < .03$
PSS: Perceived Stress	$r = -.35, p = .004$	$r = -.30, p = .01$	$r = -.21, p = .08$	$r = -.33, p = .006$	$r = -.29, p < .02$	$r = -.38, p = .001$	$r = -.37, p < .002$
Cocaine use							
Years of cocaine use *	ns	ns	ns	$r = -.26, p < .03$	$r = -.26, p < .03$	$r = -.26, p = .03$	$r = -.32, p = .006$

* Spearman's Rho used for correlations between MSCEIT and cocaine use data

Note. All shaded areas represent insignificant findings following Bonferroni correction.