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Brief Report: Emotion regulation strategies in individuals with cocaine use disorder maintained on methadone

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Abstract

Background and Objectives—Cognitive reappraisal (CR) and emotional suppression (ES), two emotion regulation strategies, are disrupted in other substance use disorders but have not been studied in cocaine dependence.

Methods—Methadone-maintained individuals with cocaine dependence (N = 72) completed assessment of CR, ES, cocaine use, and psychiatric symptoms.

Results—Pre-treatment CR scores were associated with lower depression scores ($r = -.29$, $p = .01$), but not with cocaine abstinence during 8 weeks of treatment ($r = .12$, $p = .29$).

Conclusions and Scientific Significance—CR appeared relevant to cocaine-dependent individuals' depression, but was not associated with abstinence or treatment outcome.

Emotion regulation is the process of modulating emotional responses to situations. One model for emotion regulation¹ involves two specific strategies¹: cognitive reappraisal (CR), or changing an emotional state by changing the way one thinks about a situation, and emotional suppression (ES), or changing the emotional state by inhibiting one's responses to a situation¹. In a large university sample, CR was associated with lower depression and ES was associated with higher depression; similarly, CR had positive correlations with well-being and satisfaction and ES had negative correlations¹. Other studies in clinical and general populations have showed similar patterns, indicating ES was associated with poorer coping abilities; structural and functional neuroimaging indicated CR and ES use were associated with brain regions associated with emotion regulation². Evidence suggests that emotion regulation is disrupted in substance use disorders (SUD): lower CR use was reported among abstinent men with heroin dependence³ as compared to those without

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¹There are other conceptualizations of emotion regulation and several other emotion regulation measures. This Brief Report is focused on the Gross and John (2003) conceptualization of cognitive reappraisal and emotional suppression.

lifetime heroin dependence. Among individuals with prescription drug misuse, those with low CR and high ES were more likely to have recent heroin use⁴. Increased ES was associated with greater anxiety, depression, and alexithymia in individuals with alcohol use disorder⁵. However, no study has expressly examined CR or ES in individuals with cocaine dependence.

To provide preliminary data on CR and ES in adults with cocaine dependence for hypothesis generation, we examined pre-treatment CR and ES, and the clinical and demographic correlates of CR and ES scores, in treatment-seeking adults with cocaine dependence who were maintained on methadone. We examined the relationship of CR and ES scores to cocaine abstinence, problems related to addiction, and depression symptoms, hypothesizing that pre-treatment CR would be associated with greater cocaine abstinence.

METHODS

Participants were drawn from an eight-week randomized controlled trial of computerized cognitive behavioral therapy (CBT) or treatment as usual (TAU) for cocaine-dependent individuals on methadone maintenance⁶. Inclusion criteria were: meeting DSM-IV criteria for cocaine dependence in the past 30 days, having a stable methadone dose for over two months, and being an English speaker with the ability to read and understand study procedures. One hundred one (101) adults participated in informed consent process and baseline assessment. The ERQ was added after the study's launch. Of the 101 individuals randomized, 72 (72.3%) completed the ERQ at pre-treatment and are included in the current report. Procedures were reviewed and approved by the institutional review board.

Participants

Individuals who completed the ERQ ($N = 72$) did not differ from those who did not complete the measure ($N = 29$) on most variables including race, age, and cocaine use frequency (results available on request). There was a smaller proportion of women in the group that completed the ERQ (52.8% vs. 79.3%, $F(1) = 6.08$, $p = .01$), and greater ASI Psychological composite scores ($M = 0.19$, $SD = 0.21$ vs. $M = .08$, $SD = 0.14$, $F(1) = 7.69$, $p = .01$).

Of those who completed the ERQ, 38 (52.8%) were women. Most participants identified as Caucasian (44 or 61.1%) with fewer identifying as African-American (21 or 29.2%), Hispanic (5 or 6.9%), Native American (1 or 1.4%), or multiracial (1 or 1.4%). Participants had a mean age of 41.15 ($SD = 9.89$) and used cocaine a mean of 14.1 days ($SD = 9.00$) of the month before the study.

Measures

Research assistants administered interview and self-report measures. CR and ES were measured with the Emotion Regulation Questionnaire (ERQ)¹, a self-report Likert-type scale with a two-factor structure with adequate internal consistency for each subscale (CR: $\alpha = .75 - .82$; ES: $\alpha = .68 - .76$). ERQ subscales range 1–7, and a higher score indicates greater use of CR or ES. The Structured Clinical Interview for DSM-IV⁷ was used to establish psychiatric diagnoses. The widely used Addiction Severity Index (ASI)⁸ interview was

administered to assess problems in areas commonly affected by addiction (family, medical, etc). The Substance Use Calendar⁹, a calendar-based self-report of substance use frequency, was used to assess cocaine use for the 28 days prior to the study and during the study. Depression symptoms were assessed with the Beck Depression Inventory-II (BDI-II¹⁰).

Analyses

We used Pearson's correlations and one-way ANOVA to examine relationships between baseline CR and ES scores and demographic and clinical characteristics, as well as indicators of treatment outcome (self-reported cocaine abstinence, days enrolled in the study, and percent of cocaine-negative urine toxicology screens during treatment). To control familywise error within conceptually related domains, Bonferroni correction for multiple comparisons was applied within conceptually related domains: history of cocaine use (age at first cocaine use, years of cocaine use, months of lifetime abstinence, days of use before trial: corrected $\alpha = .013$); ASI problems in living (ASI medical, employment, legal, family; corrected $\alpha = .013$); ASI substance use (cocaine, alcohol, other drugs; corrected $\alpha = .017$); psychological outcomes (ASI Psychological, BDI-II score: corrected $\alpha = .025$); treatment outcomes (days enrolled, percent days abstinent; percent cocaine-negative urine toxicology screens: corrected $\alpha = .017$).

RESULTS

Relationship of CR and ES to Demographic Variables

At pre-treatment the mean CR score was 4.70 ($SD = 1.04$) and ES was 3.71 ($SD = 1.34$). Men had greater ES scores ($M = 4.09$, $SD = 1.38$) than women ($M = 3.38$, $SD = 1.23$, $F = 5.27$, $p = .03$). There were no mean differences in CR or ES on the basis of marital status, employment, enrollment in public assistance, or being on probation. ES was positively correlated with age ($r = .25$, $p = .04$).

Relationship of CR and ES to Clinical Variables

The presence of current or lifetime alcohol, sedative, or marijuana use disorder was not associated with CR or ES score (all p values $> .3$; available on request). CR was negatively correlated with current depressive symptoms, cocaine problems, and ASI psychological composite scores, and positively correlated with lifetime months of cocaine abstinence (Table 1); when Bonferroni corrections for multiple comparisons were applied, only the correlation with current depressive symptoms remained significant.

Neither CR nor ES showed a relationship with cocaine use frequency at pre-treatment. The six individuals with a current DSM-IV diagnosis of major depressive disorder had lower CR scores ($M = 3.83$, $SD = 1.47$) than those without a current depression diagnosis ($M = 4.78$, $SD = 0.97$, $F = 4.79$, $p = .03$).

Neither CR nor ES was associated with self-reported cocaine abstinence during the study, the percentage of cocaine-negative urine toxicology screens, or the number of days enrolled in the study (all p values $> .2$; Table 1).

DISCUSSION

This study examined use of CR and ES in adults with cocaine dependence maintained on methadone. While CR showed bivariate correlations with greater lifetime cocaine abstinence and lower current depression symptoms, only the correlation with depression symptoms remained significant after correction for multiple comparison. Neither CR nor ES were related to cocaine abstinence during treatment as measured by self-report or urine toxicology screen.

Mean CR scores in this sample were higher than in a sample of abstinent men with heroin dependence history ($N = 25$; CR: $M = 4.09$, $SD = 0.88$; ES $M = 3.97$, $SD = 0.93$)³ and surprisingly comparable to CR and ES scores in undergraduates ($N = 1483$; CR in men: $M = 4.60$, $SD = 0.94$; CR in women: $M = 4.61$, $SD = 1.02$; ES in men: $M = 3.64$, $SD = 1.11$, ES in women: $M = 3.14$, $SD = 1.18$)¹. Consistent with previous studies^{1,2}, men had greater ES scores and CR was associated with lower depressive symptoms in this sample of cocaine-dependent individuals.

Contrary to hypotheses, CR was not associated with cocaine abstinence prior to or during treatment, in contrast with previous findings indicating low CR and high ES' association with heroin use⁴. While this finding would need replication, it is possible that cocaine is less associated with emotion regulation than heroin. It is also possible that individuals in this sample were relying on methadone to regulate emotions instead of using CR or ES. Findings imply that clinicians working with cocaine dependence may view low CR as a potential indicator of the need to assess depression, but should not view low CR as an indicator of cocaine use or a predictor of poor treatment outcome.

ES was not associated with cocaine use or depressive symptoms, which was surprising as ES is considered an unhealthier regulation strategy. However, suppression may be an adaptive technique for individuals with cocaine dependence who wish to suppress cocaine cravings or suppress the urge to act on cravings. Future studies should examine relationships between ES, craving, and craving response to determine whether suppression is applied selectively (i.e., only to cravings) or to multiple targets (i.e., cravings and emotions).

Limitations of these analyses include modest sample size, absence of a craving measure, and use of a single measure of emotion regulation strategies. In sum, both CR and ES scores were comparable to undergraduates', but CR was associated with fewer depressive symptoms. Researchers should continue to examine emotion regulation strategies' relationship with cocaine use and craving.

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Table 1

Descriptive statistics and correlations for cognitive reappraisal and emotional suppression.

Correlations	M (SD)	Cognitive Reappraisal		Emotional Suppression	
		r	p	r	p
Cocaine Use History					
Age at first cocaine use	20.03 (5.00)	.13	.28	-.05	.70
Years of cocaine use	10.51 (7.67)	-.06	.60	.00	.98
Lifetime months of cocaine abstinence	28.57 (48.58)	.24	.04	-.01	.93
Days of cocaine use in 28 days before trial	14.54 (9.00)	-.17	.16	.01	.94
ASI Problems in Living					
ASI Medical	0.38 (0.38)	.12	.31	-.10	.42
ASI Employment	0.85 (0.24)	.09	.44	.28	.02
ASI Legal	0.09 (0.19)	-.14	.23	-.10	.40
ASI Family	0.12 (0.14)	-.05	.68	-.10	.39
ASI Substance Use					
ASI Cocaine	0.64 (0.26)	-.26	.03	-.18	.14
ASI Alcohol	0.05 (0.10)	-.03	.83	.05	.68
ASI Other Drugs	0.06 (0.08)	.09	.44	-.09	.45
Psychological					
ASI Psychological	0.19 (0.21)	-.25	.04	-.17	.16
BDI-II score	9.94 (6.83)	-.29	.01*	.04	.71
Treatment outcomes					
Days enrolled in trial (maximum of 56)	48.38 (17.10)	.15	.22	.11	.38
Percent days of cocaine abstinence in 8 weeks	63.69 (28.94)	.13	.29	.03	.83
Percent of cocaine-negative toxicology screens in 8 weeks	22.23 (30.68)	.07	.59	.01	.93

Note. *N* = 72 except where limited by missing data. ASI = Addiction Severity Index; higher score indicates greater problems. BDI-II = Beck Depression Inventory II; higher score indicates greater depression. To correct for familywise error in conceptually related domains, Bonferroni corrections were applied: cocaine use history (corrected $\alpha = .013$); ASI problems in living (corrected $\alpha = .013$); ASI substance use (corrected $\alpha = .017$); psychological (corrected $\alpha = .025$); treatment outcomes (corrected $\alpha = .017$). Bold text denotes results significant at $p < .05$.

* denotes results significant at Bonferroni-corrected α .