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Coping Strategies as a Mediator of Internet-delivered Psychosocial Treatment: Secondary Analysis from a NIDA CTN Multisite Effectiveness Trial

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Abstract

Objective—Coping strategies are a predictor of abstinence among patients with substance use disorders. However, little is known regarding the role of coping strategies in the effectiveness of the Community Reinforcement Approach (CRA). Using data from a 12 week randomized control trial assessing the effectiveness of the Therapeutic Education System (TES), an internet-delivered version of the CRA combined with contingency management, we tested the role of coping strategies as a mediator of treatment effectiveness.

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Contributors

Drs. Levesque, Campbell, and Nunes conceptualized the aims of the study. Drs. Levesque, Campbell, Pavlicova, Hu, and Nunes conceptualized the data analytic methods. Drs. Pavlicova and Hu conducted the data analysis. Dr. Levesque developed the initial draft of the manuscript. All authors contributed to manuscript editing.

Conflict of interest

The authors have no conflict of interest to declare.

Methods—507 participants entering 10 outpatient addiction treatment programs received either treatment-as-usual (TAU), a counselor-delivered treatment (Arm 1), or reduced TAU plus TES wherein 2 hours of TAU per week were replaced by TES (Arm 2). Abstinence from drugs and alcohol was evaluated using urine toxicology and self-report. Coping strategies were measured using the Coping Strategies Scale-Brief Version. Mediation analyses were done following Baron and Kenny's and path analysis approaches.

Results—The average baseline coping strategies scores were not significantly different between the two treatment arms. Overall, TES intervention was significantly associated with higher coping strategies scores when accounting for baseline scores ($F_{1,1342} = 8.3, p = .004$). Additionally, higher coping strategies scores at week 12 were associated with an increased likelihood of abstinence during the last 4 weeks of the treatment, while accounting for treatment assignment and baseline abstinence. The effect of TES intervention on abstinence was no longer significant after controlling for coping strategies scores at week 12.

Conclusion—Our results support the importance of coping skills as a partial mediator of the effectiveness of an internet-version of the CRA combined with contingency management.

Keywords

Coping strategies; computer-assisted treatment; behavioral therapies; community reinforcement approach; substance use disorders

1. Introduction

The Community Reinforcement Approach (CRA) is an efficacious treatment for alcohol and drug use disorders (Abbott, 2009; Bickel et al., 2008; Meyers et al., 2011; Roozen et al., 2004). This form of behavioral therapy aims to decrease the reinforcement value associated with substance use by developing alternative positively reinforcing social experiences (Budney et al., 1998). Acquisition of drug-specific coping strategies (i.e. learning of adapted cognitive and behavioral strategies aimed at achieving and maintaining abstinence) represents a plausible factor contributing to the effectiveness of the CRA. Indeed, teaching of different problem-focused and emotion-focused coping strategies aimed at preventing substance use is a fundamental component of the CRA (Miller et al., 1999). Furthermore, the performance of adaptive coping strategies has been identified as an important predictor of abstinence among patients with substance use disorders (Forys et al., 2007; Gossop et al., 2002; Litt et al., 2003; Maisto et al., 2000; McKay et al., 2013; Moser and Annis, 1996). Several studies conducted among alcohol users show a correlation between the number of coping strategies used and better drinking outcomes (Litt et al., 2003; Maisto et al., 2000; Moser and Annis, 1996). A large survey conducted among 2,376 substance users in community residential treatments found that higher levels of general and alcohol-oriented coping skills were associated with decreased drug and alcohol use (Forys et al., 2007).

Although many forms of behavioral therapy focus primarily on coping skills training, evidence supporting the role of coping strategies in the effectiveness of such therapies are mixed (Kadden, 2001; Kiluk et al., 2010; Litt et al., 2003; Morgenstern and Longabaugh, 2000). A review of ten clinical studies conducted among patients receiving Cognitive-

Behavioral Therapy (CBT) for treatment of substance use disorder found little support for the role of coping skills in treatment efficacy (Morgenstern and Longabaugh, 2000). Those previous studies tested the role of coping skills in CBT effectiveness, but to our knowledge, no study has yet examined the role of coping skills in the CRA effectiveness specifically. Although both therapeutic approaches share common features such as an emphasis on relapse prevention skills learning, CRA differs from CBT by also targeting individualized social, vocational, and recreational skills building (NIDA, 1998). Given the specificities of each approach, coping strategies possibly contribute to the CRA effectiveness despite its less than consistent role in CBT.

Despite CRA effectiveness, its implementation remains limited given certain logistic obstacles relative to required resources (Kadden, 2001). Internet-delivered treatment represents an interesting alternative in CRA implementation as it effectively addresses traditional barriers to implementing standardized evidence-based behavioral treatments. Indeed, there is an emerging literature regarding the effectiveness of internet-delivered versions of evidence-based behavioral treatment (Bickel et al., 2008; Campbell et al., 2014; Carroll et al., 2008; Sugarman et al., 2010). However, less is known about the mechanism of effectiveness of computer-delivered interventions, or the extent to which such interventions engender coping skills. The use of internet-delivered evidence-based treatments, which can ensure standardized and controlled delivery of treatment content, provides a unique platform for evaluating the role of coping skills more generally.

Using data from a randomized controlled trial assessing the effectiveness of an internet-based version of the CRA combined with contingency management for treatment of substance use disorders, we: 1) examined the effect of the computer-delivered treatment on the use of coping skills longitudinally (end of treatment and 3- and 6-months post-treatment follow-up) and; 1) tested the role of coping strategies as a potential mediator of treatment effectiveness.

2. Methods

This is a secondary analysis of data from a study conducted by the National Institute on Drug Abuse's (NIDA's) National Drug Abuse Treatment Clinical Trials Network (CTN). The aim of the original study was to assess the effectiveness of an internet-delivered version of the Community Reinforcement Approach (CRA) combined with contingency management. Details regarding the study's methods and primary results were previously published (Campbell et al., 2014; Campbell et al., 2012).

2.1 Study design

Patients seeking treatment for substance use disorder were recruited from 10 outpatient community-based substance abuse treatment programs in the USA between June 2010 and August 2011 to participate in a 12 week randomized controlled study. Eligible participants: 1) were 18 years of age or older; 2) self-reported illicit drug use within the 30 days prior to study entry, or within 60 days if exiting a controlled environment; 3) were enrolled in the current treatment episode for 30 days or less; 4) were not being prescribed opioid replacement pharmacotherapy (e.g., buprenorphine, methadone); and 5) planned to remain in

the area and in the treatment program for at least 3 months. Patients were excluded if they were unable to provide informed consent. All participants provided written informed consent in compliance with institutional review board (IRB) regulations of the respective IRBs at each recruitment site.

Patients were randomized to receive either (1) treatment-as-usual (TAU), which consisted of 4 to 12 hours per week of standard counselor-delivered individual and group outpatient addiction treatment or (2) reduced TAU plus internet-delivered Therapeutic Education System (TES), wherein two hours of TAU per week was replaced with TES. Randomization was stratified by treatment site, primary substance of abuse (stimulant vs. non-stimulant), and abstinence at baseline assessed via urine toxicology and breath alcohol screens.

2.2 Therapeutic Education System (TES)

The TES is a combination of internet-delivered therapeutic modules and contingency management (Campbell et al., 2014; Campbell et al., 2012). TES contains 62 interactive multimedia modules (32 of which are considered “core” content) that are completed in about 20–30 minutes on any computer with internet access. Participants could complete modules at computers provided onsite at the treatment program or offsite at a computer of their choosing. Module content was based on the Community Reinforcement Approach (CRA) (Budney et al., 1998). Most of the core modules targeted learning of adaptive coping strategies aimed at directly or indirectly preventing substance use, including skills for drug refusal, problem solving, decision-making, interpersonal communication, assertiveness and management of negative thoughts and emotions. Other core modules focused on hepatitis, human immunodeficiency virus (HIV) and other sexually transmitted infections prevention. Optional modules addressed more specific topics such as relational and social skills learning, employment, recreation, and more advanced education regarding sexually transmitted infections.

Contingency management, in the form of a prize-based voucher system using an intermittent schedule of reinforcement, was also implemented and administered within the TES system (Petry et al., 2005; Stitzer et al., 2010). Negative urine toxicology or alcohol breathalyzer screens (based on participant identified primary substance of abuse) and module completion (up to 4 per week) earned participants draws from a virtual fishbowl that either yielded vouchers with written encouragement (“good job”) or prizes (small, medium or jumbo) which could be redeemed for tangible goods on display at the treatment program.

2.3 Data collection

Demographic information was collected at a baseline assessment and included age, sex, race, ethnicity, education level, marital status, and most frequent employment status over the previous 3 years. Primary substance of abuse was self-reported by participants and was defined as the substance for which they were seeking treatment. Coping strategies were measured at baseline, at the end of treatment (week 12), and at 3 and 6 months post-treatment using the brief version of the Coping Strategies Scale (CSS). The CSS is a self-report tool (adapted from the Process of Change Questionnaire (Prochaska et al., 1988)) that was originally developed by Litt and colleagues to assess change processes and skills used in

modifying alcohol use behaviour, such as problem solving and dealing with urges to use alcohol (Litt et al., 2003). A shortened version of the tool was developed to evaluate the utilization of coping skills among marijuana users (Litt et al., 2012). In this study, the wording was adapted to include drug and alcohol use. The brief version of the CSS consists of 23 questions (internal reliability from multiple samples $\alpha = .83$ to $.87$) evaluating the frequency of using different emotion-focused and problem-focused coping strategies over the last 3 months (including different strategies employed for refusing drugs, solving problems, avoiding high risk situations, coping with craving, managing negative emotions and developing assertiveness), for which a score of 1 to 4 is obtained (1 = never used, 2 = seldomly used, 3 = occasionally used, 4 = frequently used). The coping skills were operationalized as the average across 23 items scores observed.

Abstinence from drugs and alcohol was evaluated twice per week during the 12 weeks of treatment. Abstinence was based on a negative urine toxicology test and self-reported abstinence from illicit drugs and alcohol based on the Timeline Follow Back method (Sobell, 1992). Abstinence data were considered missing if the urine screen was missing or if the urine screen was negative and the self-report was missing. The outcome was a binary measure of abstinence (yes or no) for each of the last eight half-weeks of treatment (i.e., weeks 9–12). Abstinence from drugs and alcohol use in the last eight half-weeks of treatment was the pre-specified primary outcome in the original protocol; this is a time when the treatment effect was expected and shown to be constant (Campbell et al., 2014; Campbell et al., 2012). At the 3- and 6-month post-treatment visits, abstinence was scored similarly based on a urine drug screen and breath alcohol screen and the last 4 days of self-report data.

2.4 Statistical Methods

First, the longitudinal relationship between coping scores (measured at week 12, and at 3- and 6-months post treatment) and treatment assignment was assessed using linear models. Temporal dependencies of coping scores within each subject was modeled via generalized estimating equations with autoregressive structure. The hypothetical differential trends in coping scores over time for different treatment assignment were modeled using a 2-way interaction between time and treatment assignment and adjusted for baseline coping scores.

Second, Baron and Kenny analysis (in SAS®) and path analyses (in Mplus®) were conducted to evaluate the role of the average coping skills used by participants as a potential mediator of treatment effectiveness for increasing abstinence from drugs and alcohol during the last four weeks of treatment. In the Baron and Kenny framework, the relationship between treatment assignment (dichotomous predictor [coded as TES = 1 vs TAU = 0]) and abstinence from drugs and alcohol (dichotomous longitudinal outcome measured for each of the last 8 half-weeks of treatment) was established using repeated measures multiple logistic regression adjusted for abstinence status at baseline. Subsequently, the mediation effect of the coping strategies score measured at end of treatment (week 12; assessed coping strategies used in the previous 3 months) was examined. In the path analyses framework, growth mixture models were used to accommodate the temporal outcome abstinence and the indirect effect was modeled as $a*b$.

The mediation analyses followed the approach described by Baron and Kenny (Baron, 1986) according to which the following conditions must be met in order to establish mediation: (1) the predictor (treatment assignment) is associated with the hypothesized mediator (coping scores); (2) the hypothesized mediator is associated with the outcome (abstinence at weeks 9–12); (3) the effect of the predictor on the outcome decreases or completely diminishes after adjusting for the hypothesized mediator; and (4) temporality: the predictor precedes the hypothesized mediator which, in turn, precedes the outcome. A significant association between treatment assignment (predictor variable) and abstinence (outcome variable) was established from the prior analysis (Campbell et al., 2014). The path analyses were performed to estimate the indirect effect, its p-value and 95% confidence interval.

The following statistical techniques were used to evaluate the specific conditions: (1) given the non-normal distribution of the coping score variable, a non-parametric Wilcoxon Z test was used to compare the coping score between the two treatment groups; (2) dichotomous abstinence for each of the last 8 half-weeks of treatment was modeled using repeated measures multiple logistic regressions with treatment and abstinence at baseline; (3) dichotomous abstinence for each of the last 8 half-weeks of treatment was modeled using repeated measures multiple logistic regression with treatment, coping score and abstinence at baseline as predictors. Logistic models of abstinence during the last four weeks of treatment were adjusted for abstinence at baseline because previous analyses identified this variable as a significant predictor of abstinence at the end of treatment (Campbell et al., 2014). Participants who had CSS scores measured at week 12 and at least one abstinence observation at the 8 last half-weeks of treatment were included in the analysis (N = 437). Among the 70 participants for whom either coping skills or abstinence information was missing at the end of treatment, 37 (52.86%) were assigned to TES, and 33 (47.14%) were assigned to TAU.

All hypothesis testing was performed as 2-sided tests with pre-selected level of significance of 5%. Analyses included an intent-to-treat sample and were performed using SAS version 9.2 statistical software or Mplus (where specified).

3. Results

Data from 437 randomized participants were analyzed. Participant demographic and clinical characteristics are reported in Table 1. The mean age was 35.3 (SD = 11) and the majority of participants were males (62.4%) and white (53.3%). Over three-quarters of the sample completed high school or more education (76.7%), 59.3% were single, and 35.2% were underemployed (unemployed or irregular part-time). Reported primary substances of abuse were marijuana (22.7%), opioids (19.5%), alcohol (22.4%), cocaine (20.8%), and other stimulants (13.0%). About half (54.9%) of participants were abstinent from drugs and alcohol at baseline assessment (based on urine toxicology and breath alcohol screening).

3.1 Effect of Treatment on Coping Strategy Scores

Mean coping scores, measured at week 12 and 3- and 6-months post treatment, are presented in Figure 1. At baseline, the average coping was 3.08 (SD = 0.63), with no significant difference between treatment arms. A mean increase of 0.21 in average coping scores was

noted at the end of treatment (Mean = 3.29, SD = 0.55) with greater scores found amongst TES participants compared to TAU participants (Mean = 3.38, SD = 0.54 vs. Mean = 3.20, SD = 0.55). In the initial analyses, the 2-way interaction between treatment group and time was not significant ($p = .52$), indicating that there were no significant differences in the longitudinal coping scores between treatment groups across time, and the interaction term was omitted from the final model. After treatment completion, a decline in average coping scores was observed in both treatment arms. When average coping scores were assessed longitudinally, participants assigned to the TES treatment group were found to have greater average scores compared to participants assigned to the TAU treatment group ($p = .004$) across all time points, adjusted for baseline coping scores. In addition, average coping scores at week 12 were significantly higher than at 3-month ($p = .003$) and 6-month follow-up ($p = .005$) in both treatment groups when adjusted by baseline coping scores, as illustrated in Figure 1.

3.2 Mediation Analysis

As illustrated in Figure 2, coping scores measured at week 12 satisfy all conditions proposed by Baron and Kenny to establish mediation, supporting the hypothesis that coping strategies mediates the effect of TES treatment on abstinence. The relationship between treatment assignment (TES vs TAU) and abstinence during the last four weeks of treatment is estimated by the corresponding logistic regression coefficient and denoted as path c in Figure 2 (c: $\hat{\beta} = 0.8$ [95% CI: 0.18, 1.42], $p = .02$). Additional conditions establishing mediation are also shown in Figure 1 as follows: (1) Path a - treatment assignment is significantly associated with coping scores (a: Wilcoxon $Z = 3.62$, $p < .0003$); (2) Path b - coping scores are significantly associated with abstinence during the last four weeks of treatment (b: logistic regression coefficient $\hat{\beta} = 2.22$ [95% CI: 1.63, 2.81], $p < .0001$); (3) Path c' - the effect of treatment assignment on abstinence was no longer significant (c': logistic regression coefficient $\hat{\beta} = 0.42$ [95% CI: -0.19, 1.03], $p = 0.18$) when adjusted by coping scores.

Given that c' did not remain significant after adjusting for the hypothesized mediator, we conducted path analyses in Mplus to estimate the indirect effect computed as $a*b$. The indirect mediation effect was found significant ($a*b = .26$, $p = .002$, 95% CI = .10, .42).

4. Discussion

The Therapeutic Education System (TES), an internet-version of the Community Reinforcement Approach (CRA) combined with contingency management, was previously shown to be effective at increasing abstinence rates among substance users (Campbell et al., 2014). Results from our exploratory mediation analysis help clarify mechanisms involved in the treatment's effectiveness. The major finding of this study was to provide evidence that coping skills contributes to greater patient abstinence. Our results also show a positive impact of the intervention on coping strategies scores at the end of treatment. After 12 weeks of treatment, there was an overall increase in coping strategies scores, with higher scores found among participants assigned to the TES compared to those assigned to the TAU arm.

Both arms, TES and TAU, exhibit the same gradual decline in coping strategies scores assessed 3- and 6-months after treatment completion.

Our mediation results differ from previous studies that failed to identify coping skills as a mediator of behavioral treatment effectiveness for reducing substance use (Kiluk et al., 2010; Morgenstern and Longabaugh, 2000). Those results could partly be explained by smaller sample sizes, and thus the possibility for underpowering the ability to detect a mediation effect. The relatively large sample size in this study may have allowed sufficient power to detect a smaller effect size. Also, the interventions tested in previous studies were various forms of CBT, with none applying CRA specifically. Although CBT and CRA therapies share common features, including a significant emphasis on coping skills learning, CBT focus primarily on relapse prevention skills building whereas CRA places equal and broader emphasis on familial, social (e.g., communication skills), vocational, and recreational skills building (NIDA, 1998). These differences between the interventions, and the inclusion of contingency management with CRA, may have contributed to discrepancies between our results and those of previous studies.

This study suggests that coping strategies used by participants contributed to treatment effectiveness. A partial mediation model in which multiple variables contribute to treatment efficacy is likely to apply in this case. A recent study assessing the effectiveness of computer-assisted behavioral interventions for substance use treatment, for example, identified the *quality* of the adopted coping skills (i.e. the ability to effectively implement the targeted coping strategies), as a significant factor contributing to the treatment's effectiveness (Kiluk et al., 2010). Future research aiming to identify additional components involved in behavioral treatment effectiveness would be of great value in order to better understand treatment mechanisms and potentially improve such interventions.

Our results regarding the intervention's impact on coping skills are consistent with a previous study showing that computerized versions of behavioral interventions can effectively promote coping skills utilization (Sugarman et al., 2010). We found a sustained difference in coping strategies scores between treatment arms at 3- and 6-months post-treatment follow-up, however, the overall decline of coping strategies scores after treatment completion differs from other studies that demonstrated long lasting increases in coping skills utilization and in abstinence following counselor-delivered behavioral treatment (Carroll et al., 1994; Oei and Jackson, 1980). It is possible that one of the weaknesses of internet-delivered treatment is to produce less long lasting learning compared to counselor-delivered treatment. Therapist-delivered behavioural approaches typically stress homework, that is the ongoing practice of coping skills between sessions, to engender more enduring learning. However, computer-delivered intervention does not afford the opportunity for discussion with a therapist of such practice. Hence, it can be hypothesized, and should be tested in future research, that an ideal form of treatment would integrate content learned from the computer with feedback and oversight by a counselor to maximize coping strategy use.

The progressive decline in coping skills after treatment completion also raises questions about the ideal duration over which the TES intervention should be maintained. Emerging

literature suggests that substance use disorders may benefit from treatment that utilizes the chronic care model (CCM) first described by Bodenheimer, Wagner and colleagues (Bodenheimer et al., 2002). This model, shown to be effective in the treatment of chronic pain and diabetes, demonstrated more favorable outcomes with sustained coordinated therapeutic interventions when compared to acute treatment (Bodenheimer et al., 2002; Dobscha et al., 2009; McLellan et al., 2014; O'Connor et al., 2011). This treatment model suggests potential benefits of implementing TES over longer periods of time than that employed in the present study. Fortunately, internet-delivered treatments have the advantage of being easily delivered over extended periods of time with minimal additional cost.

The coping strategies scores required by the patient in order to produce a significant difference on treatment outcome is not known. However, our mediation analysis suggests that a significant proportion of TES effectiveness in reducing substance use could be explained by higher coping strategies scores, hence supporting the clinical relevance of what could be considered a relatively small mean difference in the average coping strategies scores found between treatment arms in this study.

This study must be evaluated in the context of several limitations. First, the temporal precedence of the mediator on the outcome variable could not be established with certainty as the CSS score at 12 weeks assessed the number of coping strategies used during the last 3 months of treatment, which partly overlapped with the period of time over which abstinence was measured (i.e. the last 4 weeks of treatment). In addition, coping strategies were assessed by self-report rather than using a more intensive assessment tool such as an observer-rated scale that would have allowed direct observation of engagement of participants in coping skills behaviors (e.g. the Drug Risk Response Test or the Coping Action Patterns Rating Scale) (Carroll et al., 1999; Kramer et al., 2011). Further, the coping measure used in this study did not allow for the assessment of the quality of the coping skills adopted, which would have provided relevant and complementary information used in previous comparable studies. In addition, the design of this study to explore CRA and contingency management as a package treatment does not allow for parsing the degree to which the adoption of coping skills was impacted by one intervention component over the other. To be sure, contingency management was not designed to teach coping skills. However, contingency management is known to improve treatment adherence and may then have increased patient's motivation to complete modules and to use the acquired coping skills.(Higgins et al., 1994) Thus, contingency management may have indirectly impacted the use of coping skills. Future studies examining separately the different treatment components may help us to understand more precisely the mechanisms involved in the TES effectiveness. Finally, although Baron and Kenny's approach was selected for this exploratory analysis to facilitate interpretation, we also included path analysis to estimate the magnitude of the mediated effect and to obtain a confidence interval for this effect. Despite these limitations, strengths of this study include the randomized controlled design, the large, diverse sample, the high follow-up rate and the broad eligibility criteria increasing this study's external validity and generalizability.

To our knowledge, this was the first study to suggest that a computer-delivered version of the CRA, with contingency management, improves abstinence by increasing coping strategies.

CRA is an efficacious behavioral approach, but implementation is limited due to the resources required for proper training and delivery. Thus, this study supports the promising role of computer-assisted therapeutic approaches to provide effective standardized interventions to treat individuals with substance use disorders. Most importantly, it provides additional evidence of the role of coping strategies as a mechanism of effective substance use disorder treatment.

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Figure 1.
Observed average Coping Strategies Scale scores by treatment groups (Therapeutic Education System [TES] vs. Treatment as Usual [TAU]).

Figure 2.

Coping Strategies Scale (CSS) score as a mediator of the effect of treatment assignment (Therapeutic Education System [TES = 1] vs Treatment as Usual [TAU = 0]) on abstinence from heavy drinking and drug use during the last 4 weeks of treatment (weeks 9 to 12).

a: Wilcoxon Z test of the differences between the CSS score for each treatment group. (N = 437)

b: Repeated measures multiple logistic regression of the association between CSS score and abstinence at the end of treatment, adjusted by baseline abstinence and treatment assignment. Path b is estimated via logistic regression $\hat{\beta}$ coefficient corresponding to the dichotomous predictor Treatment Assignment. (N = 437)

c: Repeated measures multiple logistic regression of the association between treatment assignment and abstinence at the end of treatment, adjusted by baseline abstinence. Path c is estimated via logistic regression $\hat{\beta}$ coefficient corresponding to the dichotomous predictor Treatment Assignment. (N = 437)

c': Repeated measures multiple logistic regression of the association between treatment assignment and abstinence at the end of treatment, adjusted by baseline abstinence and CSS score. Path c' is estimated via logistic regression $\hat{\beta}$ coefficient corresponding to the dichotomous predictor Treatment Assignment. (N = 437)

Table 1

Demographic and clinical characteristics by treatment assignment (Therapeutic Education System [TES] vs Treatment-as-Usual [TAU]) for all randomized participants (N=437^a).

	Total N=437	TES ^I n=218	TAU ^I n=219	
Participant Characteristics	n (%) or Mean (SD)			χ^2 or t-test
Age (years)	35.3 (11.0)	36.0 (10.8)	34.6 (11.2)	t=1.29, p=0.20
Male (%)²	272 (62.4)	144 (66.1)	128 (58.7)	$\chi^2(1)=2.50$, p=0.11
Race (%)³				$\chi^2(6)=9.17$, p=0.16
White	232 (53.3)	107 (49.5)	125 (57.1)	
Black/African American	106 (24.4)	64 (29.6)	42 (19.2)	
American Indian/Alaska Native	3 (0.7)	2 (0.9)	1 (0.5)	
Asian	13 (3.0)	6 (2.8)	7 (3.2)	
Native Hawaiian/Pacific Islander	11 (2.5)	7 (3.2)	4 (1.8)	
Multi-racial	50 (11.5)	20 (9.3)	30 (13.7)	
Other	20 (4.6)	10 (4.6)	10 (4.6)	
Hispanic/Latino (%)⁴	49 (11.3)	24 (11.2)	25 (11.4)	$\chi^2(1)=0.01$, p=0.93
Education (%)				$\chi^2(1)=2.93$, p=0.23
[†] High school degree	118 (23.3)	60 (23.5)	58 (23.0)	
High school degree/GED	310 (61.1)	161 (63.1)	149 (59.1)	
[‡] High school degree	79 (15.6)	34 (13.3)	45 (17.9)	
Marital Status (%)				$\chi^2(2)=1.55$, p=0.46
Single/Never married	259 (59.3)	124 (56.9)	135 (61.6)	
Married/Remarried	65 (14.9)	32 (14.7)	33 (15.1)	
Separate/Divorced/Widowed	113 (25.9)	62 (28.4)	51 (23.3)	
Underemployed (%)	154 (35.2)	86 (39.5)	68 (31.1)	$\chi^2(1)=3.38$, p=0.07
Primary substance (%)				$\chi^2(5)=11.96$, p=0.04
Alcohol	98 (22.4)	54 (24.8)	44 (20.1)	
Cocaine	91 (20.8)	48 (22.0)	43 (19.6)	
Stimulants	57 (13.0)	28 (12.8)	29 (13.2)	
Marijuana	99 (22.7)	47 (21.6)	52 (23.7)	
Opiates	85 (19.5)	34 (15.6)	51 (23.3)	
Other	7 (1.6)	7 (3.2)	0 (0.0)	
Abstinent at Baseline (%)	240 (54.9)	118 (54.1)	122 (55.7)	$\chi^2(1)=0.11$, p=0.74

^aParticipants who had at least one abstinence observation in the last 4 weeks of treatment and a CSS score measured at week 12 were included.

^IThere were no statistically significant differences on Demographic and clinical characteristics between treatment groups, except primary substance.

²One participant did not report their gender.

³Two participants did not report their race.

⁴Three participants did not report their ethnicity.