



## Coping strategies as a mediator of internet-delivered psychosocial treatment: Secondary analysis from a NIDA CTN multisite effectiveness trial



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### HIGHLIGHTS

- We tested the role of coping skills as a mediator of the Therapeutic Education System (TES) effectiveness.
- TES was associated with higher coping skills scores compared to treatment as usual.
- Higher coping skills scores were associated with increased abstinence.
- The effect of TES on abstinence was no longer significant after controlling for coping skills.
- Our results support the role of coping skills as a mediator of the TES effectiveness.

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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.

**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 h 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 ( $F_{1,1342} = 8.3, p = 0.004$ ). 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.

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## 1. Introduction

The Community Reinforcement Approach (CRA) is an efficacious treatment for alcohol and drug use disorders (Abbott, 2009; Bickel, Marsch, Buchhalter, & Badger, 2008; Meyers, Roizen, & Smith, 2011; Roizen 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, Higgins, Mercer, & Carpenter, 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, Meyers, & Hiller-Sturmhofel, 1999). Furthermore, the performance of adaptive coping strategies has been identified as an important predictor of abstinence among patients with substance use disorders (Fors, McKellar, & Moos, 2007; Gossop, Stewart, Browne, & Marsden, 2002; Litt, Kadden, Cooney, & Kabela, 2003; Maisto, Connors, & Zywiak, 2000; McKay et al., 2013; Moser & 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 & Annis, 1996). A large survey conducted among 2376 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 (Fors 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, Nich, Babuscio, & Carroll, 2010; Litt et al., 2003; Morgenstern & 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 & 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, Nich, & Carroll, 2010). However, less is known about the mechanism of effectiveness of internet-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 internet-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., 2012; Campbell et al., 2014).

### 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 h per week of standard counselor-delivered individual and group outpatient addiction treatment or (2) reduced TAU plus internet-delivered Therapeutic Education System (TES), wherein 2 h 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., 2012; Campbell et al., 2014). TES contains 62 interactive multimedia modules (32 of which are considered "core" content) that are completed in about 20–30 min 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 (Petty et al., 2005; Stitzer, Petty, & Peirce, 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.

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