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Self-efficacy mediates the relationship between depression and length of abstinence after treatment in youth but not adults

Danielle E. Ramo^{a,*}, Mark G. Myers^b, and Sandra A. Brown^c

^aDepartment of Psychiatry, University of California, San Francisco, San Francisco, CA, USA

^bVeterans Affairs San Diego Healthcare System and Department of Psychiatry, University of California, San Diego, La Jolla, CA, USA

^cVeterans Affairs San Diego Healthcare System and Departments of Psychology and Psychiatry, University of California, San Diego, La Jolla, CA, USA

Abstract

We present two studies testing whether self-efficacy mediates the relationship between depression symptoms and initial abstinence duration after substance abuse treatment in adolescents and adults. Study 1: Adolescents (N = 208) were recruited from substance abuse treatment in an urban/suburban area in the United States between 1999–2005, and followed monthly after discharge. Measures used were affective state (depression symptoms), drug-taking coping self-efficacy, and length of abstinence after treatment. Self-efficacy fully mediated the relationship between depression and time to use. Study 2: In a similar study design, adult Veterans (N = 160) in outpatient substance abuse treatment were interviewed during treatment and monthly following treatment. Depression was negatively associated with self-efficacy, and self-efficacy predicted time to first substance use, but there was no mediation. Study implications and limitations are noted.

Keywords

Relapse; comorbidity; self-efficacy; depression; developmental psychopathology

Addressing the process of relapse to addictive behaviors has been challenging for researchers, clinicians and others who seek to understand and treat these behaviors. Cognitive-behavioral models of relapse have emphasized the importance of cognitive and affective factors in predicting the rapidity and severity of return to use following substance abuse treatment among adults and adolescents. These models conceptualize the behavioral process as starting with a “lapse,” or initial use of a substance, which, based on many factors, can result in a relapse, or return to problematic use. Previous studies have characterized various factors that increase the likelihood that a lapse will result in a relapse (Brown & Ramo, 2006; Witkiewitz & Marlatt, 2004). However, all of the work leading to our understanding of the relapse process to date has been conducted on adult or adolescent samples separately, resulting in an inability to make direct comparisons between these developmental stages. In order to most effectively examine whether there are distinct differences in the relapse process for youth and adults, it is important to study this process simultaneously in both age groups. The two studies presented here addresses this issue by

*Corresponding Author. Tel: +1-415-476-7816; fax: +1-415-476-7375. danielle.ramo@ucsf.edu (D.E. Ramo)..

comparing the role of self-efficacy and depression symptoms in the posttreatment relapse process in teens and adults using an similar study design.

Coping self-efficacy and relapse

A key variable incorporated within most relapse models is coping self-efficacy, which has been found to influence the course of treatment and patterns of addictive behavior relapse. Defined by Bandura (1995) as “one's capacity to organize and execute courses of action required to manage prospective situations,” self-efficacy for drug taking situations is a key determinant of behavior in potential relapse situations (Brown & Ramo, 2006; Marlatt & Donovan, 2005; Witkiewitz & Marlatt, 2004). Within a cognitive-behavioral framework, higher confidence in one's ability to refrain from using in the face of substance use situations increases the probability of successfully resisting urges and pressures to use after a period of abstinence. Consistent with this model, coping self-efficacy is a partial mediator of behavior change and predicts adult relapse to alcohol (Solomon & Annis, 1990), drug (Burling, Reilly, Moltzen, & Ziff, 1989; Litt, Kadden, & Stephens, 2005), and cigarette use (Etter, Bergman, Humar, & Perneger, 2000) after treatment. Furthermore, increases in self-efficacy during a treatment episode have been found a more powerful predictor of decrease in marijuana use over time than changes in coping skills (Litt, et al., 2005).

Among youth, evidence as to the role of self-efficacy in outcomes from addiction treatment is mixed. Self-efficacy has been incorporated into interventions designed to treat adolescent substance abuse and dependence (Dennis, et al., 2000; Ramo, Myers, & Brown, 2007). However, some recent work has suggested that self-efficacy may not serve as strong a protective role in adolescent relapse as it does for adults (2005).

Depression and relapse

Psychiatric comorbidity is also found to play an important role in addictive relapse. In particular, comorbid depression is common among substance use disordered (SUD) adults and adolescents. Of SUD adults, more than a quarter in community samples (e.g., Merikangas & Gelernter, 1990) and up to half in clinical samples (e.g., Compton, Cottler, Jacobs, Ben-Abdallah, & Spitznagel, 2003) are diagnosed with a concomitant affective disorder. Among adolescents, mood disorders, especially unipolar depression, have particularly high rates of comorbidity with SUDs compared to other psychiatric diagnoses (e.g., Clark & Neighbors, 1996). This is an important concern, as affective distress and psychopathology are associated with poorer outcomes from treatment among adults and adolescents treated for SUDs. Major depressive disorder among SUD adults is associated with more affective disturbance from alcohol use (e.g., panic, depression, paranoia, anger, can't face the day, guilt; Hesselbrock, Meyer, & Keener, 1985), shorter time to first drink and relapse after treatment (Greenfield, et al., 1998), using a larger number of substances, and having more drug dependence symptoms one year after treatment (Compton, et al., 2003; Tate, Brown, Unrod, & Ramo, 2004). Among SUD adolescents, a comorbid diagnosis of major depressive disorder is associated with earlier relapse to alcohol and drugs after a treatment episode (Cornelius, et al., 2004). Thus, internalizing disorders pose a risk for a more rapid and persistent return to substance use following treatment.

Independent of diagnostic status, symptoms of depression in the period before relapse are associated with risk for relapse in both adults and teens. For example, depression symptoms, rather than a diagnosis of depression, have been associated with urges to use cocaine and alcohol in high-risk situations in cocaine-abusing patients in treatment (Brown, et al., 1998). Negative emotional states comprise the most common precursor to relapse among adults (Marlatt, 1996), suggesting that those who are prone to negative affect are more vulnerable to relapse following treatment. Among youth in treatment for substance abuse and

psychiatric problems, depressive symptoms are reported to precede relapse more frequently than other types of psychiatric symptoms (McCarthy, Tomlinson, Anderson, Marlatt, & Brown, 2005). Thus, in youth, as for adults, the presence of affective distress indicates a risk for addiction relapse.

Present study

One proposed mechanism by which affective disturbance may increase vulnerability to relapse is by lowering confidence to resist urges for substance use (coping self-efficacy) in high-risk situations. Cognitive behavioral models suggest that lowered confidence should increase the likelihood of using in those situations for both youth and adults. Depression has consistently been associated with negative cognitions such as selective attention to negative events and overly-critical self-statements (see Clark & Beck, 1999 for a review). In addition, among teens and adults who are diagnosed with SUDs, substance use and relapse often occur as a direct result of affective distress (Anderson, Frisell, & Brown, 2007; Marlatt, 1996). Depressed mood is associated with lower alcohol abstinence confidence among DUI offenders (Dill, et al., 2007) and a diagnosis of depression is negatively associated with self-efficacy to refrain from smoking among nicotine dependent individuals (Haukkala, Uutela, Vartiainen, Mcalister, & Knekt, 2000; John, Meyer, Rumpf, & Hapke, 2004). Thus, similar pathways by which these two constructs influence substance use following a period of abstinence are posited across age groups.

The present two studies investigate whether coping self-efficacy mediates the relationship between depression and length of abstinence following treatment for substance abuse. A better understanding of the role that depression and self-efficacy play in the relapse process for youth and adults can provide important information for evaluating risk and protective factors in relapse to substance use and associated problems. Study 1 examines whether self-efficacy mediates the relationship between depression and time to first use in adolescents. We hypothesized that among youth, depression would be associated with shorter length of abstinence following treatment and lower coping self-efficacy. However, since the relationship between self-efficacy and length of time to lapse has been weaker in adolescents than in adults, we hypothesized that there would be direct relationships between depression and self-efficacy and also depression and initial abstinence duration, but that self-efficacy would not mediate the relationship between depression and initial abstinence duration. Study 2 examines a similar set of relationships in an adult Veteran sample. We hypothesized that the relationship between depression and length of abstinence would be explained, at least in part, by coping self-efficacy (i.e., partial mediation).

Study 1: Depression and Self-efficacy in Adolescent Relapse

Overview

In the first study, path analysis was used to test whether drug-taking coping self-efficacy mediated the relationship between depression symptoms and length of time to first use after treatment in a sample of adolescents in substance abuse treatment.

Method

Participants—Participants were drawn from 244 adolescents participating in a longitudinal study evaluating the clinical course following treatment for SUDs (Abrantes, Brown, & Tomlinson, 2004). All teens met criteria for a DSM-IV substance use disorder (alcohol or drug) and at least one other DSM-IV Axis I psychiatric disorder. The current study focused on the 208 youth (85%) who used any substances (alcohol or drugs) in the 24 months after completion of the initial treatment episode. All adolescents were treated in adolescent inpatient treatment programs, which were abstinence-focused, offered individual

and group cognitive-behavioral treatment and used a 12-step model of substance abuse treatment. Length of time in treatment varied from 5 days to 3 weeks. Every participant also had a resource person (RP) participate in the project with him/her. For adolescents, this RP was almost always a parent (96%); however, legal guardians (1%) and other family members (e.g., grandparents, aunts) with whom the adolescent resided and had ongoing (daily) contact over extended periods of time were also included. Teens were excluded from the studies if they met criteria for current opiate dependence through intravenous administration, lived more than 50 miles from the research facility, had no resource person to corroborate information, were unable to read English, or had cognitive difficulties preventing accurate recall and neuropsychological evaluation (e.g., acute psychosis, severe cognitive impairment).

Demographic, functioning, family history and diagnostic characteristics of the youth sample are presented in Table 1. Adolescents were age 13–17 and mainly Caucasian (74%) which is typical of treatment programs in Southern California.

Procedure—Parents/guardians authorized chart screening for teen eligibility as part of the admission process at each treatment facility. For those appropriate, youth and parents were separately invited to participate in this clinical research study and given IRB-approved consent to review. Care was taken to approach teens before contacting parents by phone or in-person to describe the study so that there would be independence in the consent process.

Youth and their parents were separately interviewed by research staff during treatment (intake), and followed-up monthly for 6 months, and again at 9, 12 and 24 months after treatment. Youth were not compensated while in treatment, but were paid between \$10 and \$40 for each monthly interview. A random sample of 15% of youth were administered a urine toxicology screen immediately following assessment. At each follow-up interview period, we used a structured method of compositing adolescent and RP reported information, counting adolescent reports of use or problems even when not identified in parent reports, and more heavy use/heavier consequences were included if objective information (e.g., toxicology screens, public information) verified this. Follow-up rates for the study were good, with rates ranging from 74% to 87% at each timepoint.

Measures—For background information, adolescent participants and their parents were administered a Structured Clinical Interview (SCI; Brown, Vik, & Creamer, 1989) which assesses demographics, living arrangements, medical history, family history of substance use disorders, medication review, school and work functioning, social functioning, and motivation for abstinence from alcohol and drugs. For diagnostic information, youth and their parents were separately administered the Diagnostic Interview Schedule for Children-Computerized Version (DISC-2; Shafer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000), which diagnoses DSM-III-R Axis I disorders in youth. Data from these interviews were subsequently composited using a standard protocol which has been shown to maximize reliability of diagnoses (Breton, Bergeron, Valla, Berthiaume, & St-Georges, 1998). Teen participants were only diagnosed with an independent psychiatric disorder if they met criteria for that disorder outside of the context of a substance use disorder (i.e., during periods of abstinence or limited use).

The Hamilton Depression Rating Scale (HDRS; Hamilton, 1967) was used to assess depression symptoms prior to first substance use. The 21-item version of the HDRS was modified slightly to include items that correspond to the DSM-IV criteria for depression including hypersomnia and weight increase. All items were scored on a 5-point scale from 0 (absent) to 4 (severe). The HDRS was administered during treatment, and then monthly for the first 6 months, and again at 9 months and 1 year after treatment in the adolescent sample.

For the present study, we used the total HDRS score for the completed assessment most closely preceding their first use of a substance after treatment completion, as long as it was before or concurrent with the assessment of self-efficacy (e.g., if someone used in the third month after treatment, we used the 2-month HDRS score).

The Drug Taking Confidence Questionnaire (DTCQ; Sklar, Annis, & Turner, 1997) was used to measure situational coping self-efficacy for drug of choice in the youth sample. This measure assesses coping self-efficacy in 50 different situations that correspond to Marlatt and Gordon's (1980) eight domains of situations posing the highest risk for relapse: Unpleasant Emotions, Physical Discomfort, Pleasant Emotions, Testing Personal Control, Urges and Temptations to Use, Conflict with Others, Social Pressure to Use, and Pleasant Times with Others. Total scores across all areas on the DTCQ predict the probability that an individual will relapse. All scales (alphas ranging from .79 to .93) and the full measure (alpha = .98) demonstrate high reliability in adults. The total self-efficacy score for the completed assessment most closely preceding first use of a substance after treatment completion was used, as long as it was concurrent with or after the assessment of depression. Scores on the DTCQ were summed and z-transformed to reflect self-efficacy for drug of choice.

To assess length of time to first use after treatment, adolescents were administered the Relapse Review, a version of the Contextual Cue Assessment (Marlatt & Gordon, 1980) that has been modified based on validity research demonstrating multiple precursors to relapse (Heather, Stallard, & Tebbutt, 1991). This interview allows participants to provide verbatim descriptions of initial post-treatment use with semi-structured follow-up questions about substance use and interpersonal, intrapersonal, and contextual information. It has been widely used in our work measuring adolescent relapse processes (e.g., Anderson, et al., 2007; Brown, et al., 1989). For the present study, we used the first completed relapse review to determine the length of time to first use following treatment discharge up to 24 months (range: 0–730 days).

Analyses—The present study tested whether coping self-efficacy (DTCQ total score) mediated the relationship between depression symptoms (HDRS total score) and length of posttreatment abstinence. To determine which data points were used for the final analyses, we examined length of time to relapse (i.e., initial abstinence duration) and chose the measures for depression symptoms and self-efficacy that most closely preceded the use episode for each individual participant. Thus, in order to maintain the proximity between measures of depression, self-efficacy, and time to relapse, time points from which data were drawn varied by participant.

Mediation was tested using the guidelines described by Baron and Kenny (1986). For a variable (self-efficacy) to act as a mediator of an independent variable (depression symptoms) and an outcome variable (initial abstinence duration), three conditions must be met: 1) the independent variable and the outcome variable must be related; 2) the independent variable and mediating variables must be related; and 3) when regressing the outcome variable simultaneously on the independent variable and mediators, the mediators must remain related to the outcome variable while the independent variable must no longer be related. A relationship is partially mediated when a mediating variable significantly reduces the strength of the relationship. We used path analysis with Amos 7.0 software (Arbuckle, 2006) to test all three steps. In all models, parameter estimates were considered clinically significant if they were greater than or equal to .30, which is the suggested value for a medium effect size (Cohen, 1988). In addition, to evaluate model fit when possible (i.e., when models were not just-identified), the following measures were employed: a) the Comparative Fit Index (CFI; Bentler, 1990), with values greater than .90 indicating a good

model fit; Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993), with values less than .08 indicating reasonable model fit; and model chi-square.

Missing Data Imputation—Of the 208 teens who used at least once after treatment, there were 41 adolescents (19.7%) who were not available to provide information on depression symptoms in any interviews before they relapsed. Further, there were 63 adolescents (30.3%) who did not provide information on drug-taking self-efficacy in any interviews before they relapsed. There were no significant differences between those who had depression data and those that did not on sex ($\chi^2 = .33$, n.s.), age ($F = 1.10$, n.s.), or ethnicity ($\chi^2 = 5.54$, n.s.). There were also no significant differences between those who had self-efficacy data and those who did not on sex ($\chi^2 = .29$, n.s.), age ($F = .42$, n.s.), or ethnicity ($\chi^2 = 9.71$, n.s.).

Missing data was handled using full information maximum likelihood estimation (FIML), which has been found to provide unbiased estimates if data are missing at random (Kline, 2005). Some authors have suggested that maximum likelihood estimates will tend to show less bias than estimates based on pairwise deletion or listwise deletion even when the data deviate from “missing at random” criteria (e.g., Muthén, Kaplan, & Hollis, 1987). AMOS v. 7 (Arbuckle, 2006) was used to run FIML to impute missing data on all of the variables for path analyses.

Results

Mean length of abstinence was almost 2 months ($M = 59.87$, $SD = 68.0$). In the month before relapse, adolescents reported experiencing moderate symptoms of depression on average ($M = 18.35$, $SD = 11.9$), and high coping self-efficacy ($M = 161.96$, $SD = 66.9$). All variables were examined for normality (skewness and kurtosis). The initial abstinence duration variable was significantly skewed and kurtotic and thus was log-transformed. DTCQ scores were transformed into z-scores. Since there were differences in the amount of time between depression, self-efficacy, and initial abstinence duration measurements for each participant, lengths of time between each of these measurements were examined as potential model covariates. None of the length of time variables were significantly related to IVs (depression, self-efficacy) or DV (initial abstinence duration), and thus were not included in the mediation models.

In order to test mediation, three different path models were used, all of which are presented in Figure 1. The first necessary condition for establishing mediation is a relationship between the independent variable and the outcome variable. The first path model specified one path between depression and length of abstinence. The standardized path coefficient from depression to length of abstinence was significant and at the cutoff of .30 ($B = -.30$, $p < .0001$). This model fit poorly using the CFI and RMSEA criteria ($CFI = .20$; $RMSEA = .33$), and also did not fit well statistically ($X^2_{(2)} = 47.9$, $p < .0001$).

The second path model (Figure 1) tested only the indirect effect from depression to length of abstinence through self-efficacy. Standardized path coefficients were both statistically significant and paths from depression to self-efficacy ($B = -.48$) and from self-efficacy to length of abstinence ($B = .39$) exceeded .30. This model fit well using the CFI criterion ($CFI = .95$), but not as well using the RMSEA criterion ($RMSEA = .12$), and the model fit well statistically ($X^2_{(1)} = 3.7$, $p < .01$). Thus, there was a significant indirect effect between depression and initial abstinence duration, through self-efficacy.

The third and final model (Figure 1) added the effect of depression on initial abstinence duration. The paths between depression and self-efficacy ($B = -.48$) and self-efficacy and length of abstinence ($B = .30$) were statistically significant and at or above .30, while the

path from depression to initial abstinence duration was not significant ($B = -.16$). Thus, when the indirect effect between depression and initial abstinence duration (through self-efficacy) was included in the model, the path between depression and abstinence became non-significant, indicating full mediation by self-efficacy.

Study 2: Depression and Self-efficacy in Adult Relapse

Overview

In study 2, path analysis was used to test whether drug-taking coping self-efficacy mediated the relationship between depression symptoms and length of time to first use after treatment in a sample of adult Veteran's in substance abuse treatment.

Method

Participants—Participants for the current study were drawn from 229 adults participating in two substance use treatment outcome studies: one evaluating clinical course following addiction treatment (Tate, et al., 2004) and a randomized trial of addiction treatment (Brown, et al., 2006). All adults were diagnosed with at least one SUD, and a portion were also diagnosed with nonsubstance Axis I disorders or antisocial personality disorder (ASPD). The current study focused on the 160 adults (70% of total) who used in the 24 months (long-term follow-up study; $N = 141$) and 12 months (clinical trial; $N = 19$) after treatment. In both adult studies, participants were veterans receiving treatment from the Alcohol and Drug Treatment Program (ADTP) and Substance Abuse Mental Illness (SAMI) Program in the San Diego Veteran's Administration Healthcare System. Most of the sample was treated in the 28-day residential treatment program (75%). Other participants were drawn from mental health inpatient settings (13%), with variable time frames based on psychiatric need ($M = 24.4$ days, $SD = 15.2$), or were recruited from outpatient settings following inpatient substance abuse treatment (12%). All inpatients were assigned to aftercare groups after treatment. All programs were based on 12-Step or cognitive behavioral treatment models and had abstinence as a treatment goal. Interventions included psychoeducation, therapy, and family support groups. The 19 participants in the randomized trials were diagnosed with a substance use disorder and either Major Depressive Disorder or Dysthymia. They were randomized to 12 weeks of either Integrated Cognitive-Behavioral Therapy or 12-Step facilitation therapy, after which time they were able to obtain treatment as usual in the ADTP or SAMI programs. These participants were no different than those in the main treatment outcome study on demographic or substance use characteristics.

Approximately fifty percent of participants in the original sample of adults were prescribed a psychotropic medication in the follow-up year, mostly for depression or sleep difficulties. As in the adolescent study, adults also had a resource person participate in the study (e.g., partner, sibling) who could corroborate substance use and psychosocial information. Individuals were excluded if they lived more than 50 miles from the research site, met criteria for opiate dependence, did not speak or read English, or had cognitive impairments preventing them from completing study assessments.

Demographic and diagnostic characteristics of the adult samples are presented in Table 2. Participants were age 22–68, which is representative of the population treated at the Veteran's Administration treatment programs.

Of the adults who used at least once after treatment, there were seven (4.4%) who were not available to provide information on depression symptoms in any interviews before they relapsed. There were 3 adults (1.9%) who did not provide information on drug-taking self-efficacy in any interviews before they relapsed. The participants with missing depression data were not significantly different on any of the demographic characteristics compared to

those with all data. Path analyses were conducted using available data for the 160 adults who used in the 24 months after treatment.

Procedure—The sample for the present study was generated from two studies of adult Veterans in outpatient substance abuse treatment. In the first study (N=141), eligible and consenting adults completed structured and diagnostic interviews with research staff and self-report questionnaires following administration of treatment (1 to 2 weeks after last alcohol or drug use. Participants were contacted by phone at 1, 2, 4, and 5 months posttreatment. In-person follow-up interviews were conducted at 3, 6, 9, 12, and 24 months posttreatment to assess alcohol and drug use, the date and context of initial posttreatment use episode, ongoing participation in outpatient sessions and 12-step meetings. Participants received \$30 for each quarterly follow-up interview and 20% were randomly selected for urine toxicology screens. A separate interviewer independently interviewed a collateral contact near the same time as the participant's interview and collected data regarding the participant's recent use of alcohol and other substances.

In the second study (N=19), adults diagnosed with major depressive disorder and an SUD were recruited from the same VA programs into a randomized efficacy trial of Integrated Cognitive Behavioral Therapy and 12-Step Facilitation therapy. Both conditions comprised two consecutive 12-week phases of intervention. Phase I consisted of twice weekly 1 hour group sessions plus monthly medication management, and subsequently, Phase II consisted of once weekly 1 hour group sessions plus monthly medication management. Follow-up assessments were conducted at 3, 6, 9, and 12 months following treatment entry.

Measures—For background and diagnostic information, participants in the treatment outcome study were administered the Semistructured Assessment for the Genetics of Alcoholism (SSAGA; Bucholz, et al., 1996), a comprehensive standardized structured psychiatric interview that was developed by the Collaborative Study on the Genetics of Alcoholism consortium. The 19 participants in the depression treatment outcome study were administered the Composite International Diagnostic Interview (CIDI; Robins, et al., 1988), a structured diagnostic interview developed for international cross-cultural use. Both the SSAGA and the CIDI yielded diagnoses of alcohol and drug abuse/dependence and other psychiatric disorders. Participants were only diagnosed with an independent psychiatric disorder if they met criteria for that disorder outside of the context of a substance use disorder (i.e., during periods of abstinence or limited use).

The 21-item Hamilton Depression Rating Scale (HDRS; Hamilton, 1967) was used to assess depression symptoms prior to first substance use. As in the adolescent study, the 21-item version of the HDRS was modified slightly to include items that correspond to the DSM-IV criteria for depression, with a possible maximum score of 84. The HDRS was administered when adults came into the study (intake), and every three months thereafter up to 1 year. In the present study, we used the total HDRS score for the completed assessment most closely preceding an individual's first use of a substance after treatment completion.

For participants whose drug of choice was a drug other than alcohol, The Drug Taking Confidence Questionnaire (DTCQ; Sklar, et al., 1997) was used to measure situational coping self-efficacy for drug of choice. Adults whose drug of choice was alcohol were administered the Situational Confidence Questionnaire (SCQ; Annis & Graham, 1988). The SCQ assesses coping self-efficacy in 42 different situations that parallel those measured by the DTCQ. Total scores across all areas on the DTCQ (range: 0–250) and SCQ (range: 0–210) predict the probability that an individual will relapse. For the present study, we used the total self-efficacy score for the completed assessment most closely preceding an individual's first use of a substance after treatment completion, as long as it was concurrent

with or after the assessment of depression. Scores on the DTCQ and SCQ were z-transformed for uniformity.

To assess relapse, adults were administered the same version of the Relapse Review as was used in the adolescent study. This measure has previously been used in our work measuring adult relapse processes (e.g., Tate, et al., 2004). For the present study, we used the first completed relapse review to determine the length of time to first use following treatment discharge up to two years (range: 0–730 days).

Analyses—The present study used the same analytical strategy as the adolescent study to test whether coping self-efficacy (z-transformed DTCQ or SCQ) mediated the relationship between depression symptoms (HDRS total score) and length of posttreatment abstinence. As in the previous study, data points for depression symptoms and self-efficacy varied by participant so as to maintain that these variables were assessed at the timepoint most close in time to length of abstinence. Mediation was again tested with three path models using Amos 7.0 software (Arbuckle, 2006). In all models, parameter estimates were evaluated using a .30 cutoff for clinical significance, and model fit was evaluated using the likelihood ratio χ^2 , CFI, and RMSEA when applicable.

Missing data—Of the 160 adults, 153 provided a HDRS measure (95.6%) and 157 provided a measure of self-efficacy (either DTCQ or SCQ; 98.2%) before their first use after treatment. As with the adolescent study, missing data was handled using full information maximum likelihood estimation (FIML).

Results

Mean length of abstinence was more than 5 months ($M = 167.08$ days, $SD = 118.9$). Before relapse, adults reported experiencing moderate symptoms of depression on average ($M = 19.57$, $SD = 10.9$), and coping self-efficacy scores were high both for those whose drug of choice was alcohol (SCQ: $n = 89$; $M = 155.22$, $SD = 51.3$) and a drug other than alcohol (DTCQ: $n = 71$; $M = 177.42$, $SD = 61.8$).

Length of time between all assessments was again examined as a possible covariate. Only duration between depression measurement and initial abstinence duration was significantly related to initial abstinence duration and thus was incorporated into all path models as a covariate.

The three models used to test mediation are presented in Figure 2. The first path model, specifying the direct effect between depression and length of abstinence controlling for length of time between measurements, showed a significant negative relationship ($B = -.22$), however the parameter estimate did not meet cutoff criteria for clinical significance. Both CFI (.57) and RMSEA (.11) indicated poor model fit and the model did not fit well statistically ($X^2_{(2)} = 12.2$, $p < .05$), suggesting that this model was not the best way to explain the data. The second path model specified the indirect effect between depression and length of abstinence (through self-efficacy), controlling for the length of time between self-efficacy measurement and initial abstinence duration (see Figure 2). It demonstrated a significant negative relationship between depression and self-efficacy ($B = -.25$), and a significant positive relationship between self-efficacy and initial abstinence duration ($B = .19$), although these values were below the cutoff of .30. This model fit well statistically ($X^2_{(1)} = 3.69$, $p = .30$) and also met CFI and RMSEA criteria for good model fit (CFI = .96, RMSEA = .04). The third path model tested the full relationship between depression, self-efficacy, and length of abstinence, controlling for both time between depression measurement and initial abstinence duration, and self-efficacy measurement and initial abstinence duration. As expected, there were significant negative associations between depression and self-efficacy

($B = -.25$) and depression and length of abstinence ($B = -.18$). However, since the relationship between self-efficacy and length of abstinence was not significant in this model, there was no evidence for full or partial mediation in the adult sample. While both Models 2 and 3 demonstrated significant paths between key variables, in the interest of parsimony, Model 2 was deemed the best-fitting model to describe the adult data.

Discussion

The two studies presented here compared an important aspect of the relapse process in adolescents and adults by examining the relationships between depression, substance use coping self-efficacy and initial abstinence duration after drug and alcohol treatment. Results indicated a role for self-efficacy and depression in both adolescent and adult relapse. Among adolescents, contrary to hypotheses, the relationship between depression symptoms and initial abstinence duration could be explained by coping self-efficacy (i.e., there was full mediation). Among adults, however, also contrary to hypotheses, coping self-efficacy did not mediate the relationship between depression and initial abstinence duration. The best fitting-model showed that higher levels of depression were significantly associated only with lower self-efficacy, which in turn predicted shorter time to substance use.

The findings for adolescents, although inconsistent with our hypothesis, were consistent with the premise of the Youth Relapse Model that affective distress makes teens vulnerable to more rapid relapse in part by influencing substance use-related cognitions (Brown & Ramo, 2006). However, these findings contrast with recent evidence that self-efficacy assessed during treatment is not related to relapse (Burleson & Kaminer, 2005). In the present study, we measured self-efficacy prospectively and closely preceding relapse (within one month), and these assessments took place both during and following treatment. Previous studies, including Burleson and Kaminer's (2005) study, and work in our own lab (Ramo, Anderson, Tate, & Brown, 2005), which have not demonstrated a relationship between self-efficacy and relapse, have only examined self-efficacy assessed while teens are in treatment, which is more distal from the first use episode. Our hypothesis that self-efficacy would not mediate the relationship between depression symptoms and initial abstinence duration was based on these previous findings. This highlights the potential temporal instability of the self-efficacy concept, and the benefit of measuring cognitive variables such as self-efficacy frequently throughout longitudinal studies.

Another difference between this study and earlier work is that abstinence duration was examined in a sample consisting entirely of teens who relapsed. In contrast, our hypothesis was derived from studies that investigated prediction of outcome status in abstinent and relapsed participants. For example, Burleson and Kaminer's (2005) study examined the relationship between self-efficacy and substance use outcomes among teens who had both positive and negative urine toxicology screens at 3 months and 9 months after a treatment episode. Our findings support the Youth Relapse Model's premise that self-efficacy plays an important role in the relapse process in that lower self-efficacy predicts more rapid relapse among youth who resume substance use following treatment. The present study does not address whether self-efficacy is a protective factor against using in high risk situations, or whether it will influence outcomes among those experiencing depressive symptoms. As such, it will be important to replicate the present analysis with teens who have and have not relapsed after treatment in order to test the full prediction of the Cognitive Behavioral Model of relapse.

In the best-fitting model for adults, depression was associated with lower self-efficacy, and self-efficacy was associated with length of time to relapse. These findings mirror others who have found that self-efficacy distinguishes those who are drinking from those who are not

drinking after treatment for alcohol use disorders in the Project MATCH study (Carbonari & DiClemente, 2000; Project MATCH Research Group, 1998). They also extend the self-efficacy research by demonstrating a relationship between self-efficacy and time to relapse specifically among those who return to use. This sheds further light on the important role of self-efficacy in the relapse process and the significance of assessing it throughout treatment in order to prevent relapse.

Contrary to our prediction, the best fitting adult model indicated no significant association between depression symptoms and length of time to relapse. This is consistent with early findings in the study of depression and alcoholism comorbidity demonstrating that alcohol dependent adults have high rates of depression comorbidity while in treatment that tend to abate during the course of treatment (Brown & Schuckit, 1988). Other studies have found that symptoms of depression are associated with heavier relapse in drug using adults. For example Levin et al. (2008) found that among cocaine dependent patients who exhibited positive urine toxicology screens at a baseline assessment of psychiatric symptoms, comorbid depression and ADHD symptoms were associated with poorer substance use outcomes than those with cocaine dependence alone. The present study attempted to account for changes in depression symptoms during treatment by assessing depressive symptoms prospectively and proximally to relapse, a methodological approach infrequently employed in previous studies. In our study, however, many of the participants were diagnosed with substance dependence and another independent psychiatric condition marked by affective distress. These high rates of psychiatric disorders may have resulted in insufficient variability in depression symptoms experienced by our sample to explain variations in relapse time after treatment. This issue may have been exacerbated by including only individuals who relapsed in the present analysis, thereby reducing the range of variables of interest.

Finally, previous work has demonstrated that negative affect is the most common precursor to relapse in adults (Marlatt & Gordon, 1980). It is likely that depressive symptoms alone do not account for all of the variance associated with negative affect (Marlatt & Gordon, 1980; Shiffman, et al., 2007). Future studies should include other aspects of negative affect such as anger, frustration, or interpersonal conflict measured prospectively and proximal to relapse in models of the relationship between negative affect and adult relapse before it is concluded that the relationships do not exist. It should be noted that the sample studies here was made up of primarily male veterans who participated in two studies through the Veteran's Affairs substance abuse treatment programs, and thus may not generalize to a female and the non-veteran population of adults in substance abuse treatment. Given recent findings regarding gender differences in relationships between depression symptoms and type of relapse episode (Zywiak, et al., 2006), the model tested in this study should be replicated with more female participants.

These findings have some important implications for cognitive and behavioral models of addiction relapse. The findings for adolescents suggest that depression symptoms are an important aspect of the relapse process because they may modify cognitions that are predictive of relapse. Thus, the Youth Relapse Model's emphasis on comorbid psychopathology as particularly important in understanding relapse for teens appears to be useful at least as it relates to symptoms of depression. While Relapse Prevention interventions do emphasize the importance of affective states, including sadness as a precursor to relapse and thus treat these states as "high risk" (Witkiewitz & Marlatt, 2004), adolescents with comorbid psychopathology still tend to relapse most often in social situations with experiencing positive emotions or in a "complex" set of internal and external precipitants, making it hard to determine how strong a factor depression may be in the immediate precursors of relapse (Ramo & Brown, 2008). In contrast, at least some portion

of adults relapse when experiencing a negative emotional state coupled with urges and temptations to use, making depression a more obvious immediate, direct precursor to relapse and more imminently “high risk” (Ramo & Brown, 2008). The findings here suggest that while depressive symptoms may not play as great a role in precipitating adolescent relapse, depression plays an important role nonetheless.

These studies have a number of strengths. First, the studies from which the samples were drawn for the present analyses provided the opportunity to examine similar factors associated with relapse in teens and adults, permitting more direct comparisons of developmental differences in the process of relapse. In addition, by using similar instruments and procedures, and measuring depression and self-efficacy prospectively and close in time to each individual's relapse, the design of these studies supported relapse as a dynamic process (Witkiewitz & Marlatt, 2004). This type of design is an important step toward continuing to elucidate the cognitive and behavioral factors associated with relapse to addictive behaviors across the lifespan.

These studies also had some limitations. First, data for both studies were almost exclusively gathered using self-report measures, although there were multiple reports in the teen and adults studies and urine toxicology screens provided back-up information for substance use reports. In addition, the studies used measures of depression symptoms and self-efficacy as close in time to first use as they were available; however in many cases these two constructs were measured in the same time period. Thus, these studies are limited in the conclusions they can make related to mediation, because there was not temporal independence in measuring depression symptoms and substance-related coping self-efficacy. In addition, self-efficacy was assessed with respect to the primary substance of abuse for each participant (i.e., drug of choice), yet initial relapse episode was defined based on any substance use. Thus it is unclear to what extent self-efficacy generalizes across substances of abuse, and this should be addressed in future research testing cognitive behavioral models of relapse in teens and adults.

Given the positive impact of abstinence on longer term psychosocial functioning in treated SUD youth and adults, interventions focused on providing alternative avenues for managing negative affect (e.g., Integrated Cognitive Behavioral Therapy for substance abuse and depression) and increasing self-efficacy (e.g., relapse prevention targeted to youth; Ramo, et al., 2007) could improve general functioning in both age groups. However, it appears from this research that targeting negative affect in teens may be particularly important. Further, our findings suggest that outpatient clinicians should evaluate self-efficacy often and be attentive to changes in adolescents, as they may portend relapse. This study provided an important step to understand how the dynamic process of relapse is developmentally unique. Future investigations should incorporate other factors known to play a part in addiction relapse (e.g., neurobiological factors, environmental factors) for both teens and adults in order to fully understand the extent of developmental differences in the relapse process.

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Figure 1.
Three path models of the relationships between depression symptoms, drug-taking self-efficacy, and length of abstinence in adolescents.
Note. * indicates $p < .05$

Figure 2.
Three path models of the relationships between depression symptoms, drug-taking self-efficacy, and length of abstinence in adults.
Note. * indicates $p < .05$

Table 1

Demographic, substance abuse, and diagnostic characteristics for adolescents who relapsed after drug and alcohol treatment

Adolescents (N=208)	
Gender (% male)	46
Age (mean years)	15.9 (1.2)
Ethnicity (%)	
Caucasian	74
Hispanic	18
African-American	3
Other	5
Years of Education (SD)	8.8 (1.3)
School Status (%)	
Currently enrolled	79
Quit or suspended	21
Parents' Marital Status (%)	
Married	39
Separated	9
Divorced/Widowed	47
Single (never married)	4.3
Pretreatment Living Situation	
Both parents (incl. bio, step, adoptive)	61
One parent	25
Other relatives/Foster parents	5
Institution or group home	2
Homeless	5
Family History of Alcoholism *	76
Family History of Drug Dependence **	56
Substance use frequency *** M(SD)	
Alcohol	13.38 (15.7)
Marijuana	14.4 (12.4)
Amphetamines	6.76 (10.5)
Cocaine	.75 (2.3)
Sedatives	.80 (3.1)
Opiates	.67 (2.9)
Self-identified drug of choice (%)	
Alcohol	17.2
Cannabis	43.1
Amphetamine	27.2
Cocaine	1.6
Sedative	1.1
Opioid	.5

Adolescents (N=208)	
Other	9.8
Previous substance abuse treatment episode (%)	20.3
Comorbid Psychopathology (%)	
Conduct Disorder	84.1
Panic Disorder	4.9
OCD	23.1
GAD	15.4
Major Depression/Dysthymia	62.9
Bipolar Disorder	23.1
ADHD	34.3

* At least one first- or second-generation blood relative met criteria for alcohol or drug dependence.

** At least one first- or second-generation blood relative met criteria for dependence on a drug other than alcohol or nicotine).

*** Substance use frequency was calculated as the average days per month using each substance in the 3 months preceding the substance abuse treatment episode (range: 0–30).

Table 2

Demographic, substance abuse, and diagnostic characteristics for adults who relapsed after drug and alcohol treatment

	Adults (N=160)
Gender (% male)	90
Age (mean years)	44.8 (8.0)
Ethnicity (%)	
Caucasian	64
Hispanic	11
African-American	21
Other	5
Years of Education, M (SD)	13.0 (2.0)
Marital Status (%)	Self
Married	18
Separated	14
Divorced/Widowed	44
Single (never married)	26
Number of Children, M (SD)	1.6 (1.6)
Employment Status (%)	
Full time	5
Part time	7
Retired/Disability	46
Unemployed or Never worked	41
Physical Health Functioning*	
Excellent/Very Good	41
Good/Fair	49
Poor	11
Substance use disorder (%)	
Alcohol	92.5
Cannabis	47.5
Cocaine	37.5
Amphetamine	41.3
Sedative	13.8
Opioid	15.6
Other	4.4
Previous psychiatric or substance abuse treatment episodes, M (SD)	3.1 (5.1)
Comorbid Psychopathology (%)	
ASPD	16.9
Panic Disorder	3.8
OCD	5.0
PTSD	28.1
GAD	1.9

Adults (N=160)	
Schizophrenia	5.0
Major Depression/Dysthymia	18.1
Bipolar Disorder	6.3

* Reflects self-reported overall physical health functioning.