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UNIVERSITY OF CALIFORNIA, SAN DIEGO
SAN DIEGO STATE UNIVERSITY

Developmental Models of Substance Abuse Relapse

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy

in

Clinical Psychology

by

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2008

DEDICATION

This doctoral dissertation is dedicated to all those who have loved and supported me throughout my life. I am truly lucky...

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ACKNOWLEDGEMENTS

Chapter 2, in full, is a reprint of the material as it appears in “Characteristic of relapse to substance use in comorbid adolescents,” by D. E. Ramo, K.G. Anderson, S.R. Tate, & S.A. Brown, 2005, *Addictive Behaviors*, 14. Copyright 2005 by Elsevier Ltd. The dissertation author was the primary investigator and author of this paper.

Chapter 3, in full, has been accepted for publication in as “Classes of relapse situations: A comparison of adolescents and adults,” by D.E. Ramo, & S.A. Brown, in press, *Psychology of Addictive Behaviors*. Copyright 2008 by the American Psychological Association. The dissertation author was the primary investigator and author of this paper.

Chapter 4, in full, has been submitted for publication of the material as it may appear in *Behavior Therapy*, by D.E. Ramo, M.G. Myers, & S.A. Brown. Copyright 2008 by Elsevier. The dissertation author was the primary investigator and author of this paper.

I would like to acknowledge Professor Sandra A. Brown for her mentorship in science and areas far beyond. I would also like to thank Mark Myers for reading draft after draft of my papers and never letting me get by without thinking things through. I would also like to thank the “NIAAA Project” and “Stats lab,” without whom graduate school would have been a whole lot more boring.

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Treatment implications of gender differences. Symposium conducted at the Joint Meeting on Adolescent Treatment Effectiveness, Washington DC

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ABSTRACT OF THE DISSERTATION

Developmental Models of Substance Abuse Relapse

by

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Most models of addiction treatment outcome and relapse have been formulated on adult populations, with only modest consideration of developmental factors which are salient issues for substance use disordered (SUD) youth. The dominant cognitive behavioral model of addiction relapse (Marlatt & Gordon, 1985) has been compelling in its description of how situational context (e.g., high risk situations) interacts with cognitive factors (e.g., self-efficacy, coping resources) to elevate risk for relapse after treatment in adults. The Youth Addiction Relapse Model (Brown & Ramo, 2005) is a developmentally specific framework from which the relapse process in adolescents can be evaluated.

The present series of studies consider developmental aspects of addiction relapse by testing the Youth Relapse Model. The first study examines the situational and personal (internal) factors associated with relapse in SUD youth with comorbid psychiatric disorders. Adolescents (N=81) with a SUD and another Axis I mental health disorder were recruited from inpatient substance abuse and psychiatric treatment, and assessed monthly for one year. Youth who relapsed within the first month were more likely to report use of drugs other than alcohol or marijuana in their first post-treatment substance use episode, and substance use among late relapsers was more often preceded by direct social pressure to use. Lower self-efficacy was associated higher likelihood of relapsing in two situations: when youth were experiencing significant conflict/life stress, and when youth reported cravings during the two weeks prior to relapsing.

The second study compares the latent class structure of relapse precursors in adolescents and adults. Adults (N=160) and adolescents (N=188) in substance abuse and psychiatric treatment were followed up to eighteen months after discharge. The best-fitting models in both age groups were able to classify all individuals into one of two classes. Adult classes were labeled Social and Urge situations (67%), and Negative Affect and Urge situations (33%), while teen classes were labeled Social and Positive situations (69%) and Complex situations (31%).

The third study examines the role of concomitant depression in substance use relapse for adults and youth. Specifically, this study compares whether self-efficacy mediates the relationship between depression symptoms and initial abstinence duration after treatment for SUD adolescents (N = 208) and adults (N = 160). In adolescents,

self-efficacy fully mediated the relationship between depression and time to initial post treatment substance use. In adults, a higher number of depression symptoms was associated with lower self-efficacy, and lower self-efficacy predicted shorter time to first substance use; however, depression was not independently associated with time to first use.

Findings for all three studies are discussed in relation to the Youth Relapse Model. Developmental and clinical considerations in treating clients with substance use disorders and comorbid psychopathology are addressed across these three studies.

CHAPTER 1

Introduction

Substance dependence has long been identified as a chronically relapsing condition (e.g., Brownell, Marlatt, Lichtenstein, & Wilson, 1986). A large body of literature has begun to identify the factors that underlie the process of relapse to drug and alcohol use after treatment (Connors, Maisto, & Donovan, 1996). A recent trend in this research is to focus on developmental differences in the process of relapse to inform treatment throughout the lifespan. Work by S.A. Brown and colleagues in particular (Brown, 2004; Chung et al., 2003) has considered ways in which the process of relapse is unique for adolescents compared to adults. The present series of studies aim to further explore how adolescence may be a unique time to experience relapse to drug and alcohol use after treatment. The first study considers the situational and temporal characteristics of relapse among youth in treatment for substance abuse and other mental health problems. The second study takes a developmental, person-centered approach to relapse by examining the latent class structure of relapse precursors in adolescents and adults. The third study tests whether self-efficacy mediates the relationship between depression symptoms and initial abstinence duration after treatment in adolescents and adults.

Cognitive Behavioral Model of Relapse to Substance Use: Adults and Adolescents

Cognitive and behavioral models of relapse have dominated the conceptual landscape for many decades (see Witkiewitz & Marlatt, 2004). The cognitive behavioral model of addiction relapse proposed by Marlatt and colleagues (see top layer of Figure 1; Marlatt & Gordon, 1980, 1985) has been compelling in its

description of how cognitive factors (e.g., self-efficacy, coping resources) interact with contextual factors (e.g., high risk situations) to predict the progression from first use to more severe use (“relapse”) in abstinent adults. The basic premise is that individuals self-select or unexpectedly find themselves in situations with elevated risk for relapse (“high risk” situations). When they adequately cope with these situations without using addictive substances (i.e., employ a coping response), they experience more confidence in their ability to abstain (increased self-efficacy) and are more likely to do so in the future when facing similar situations thereby reducing the likelihood of experiencing a relapse to problem use. By contrast, if individuals fail to employ an effective coping strategy, coupled with powerlessness (low self-efficacy) and strong positive expectations of substance use, then the likelihood of substance use in these situations will be high. If drinking or drug use is initiated, negative cognitive states ensue (e.g. guilt, self-blame), and combine with the effects associated with the consumption of alcohol to increase the likelihood of future or sustained substance involvement.

Studies of adolescent substance abuse relapse suggest that while components of the model are relevant to adolescent relapse (e.g., coping predicts posttreatment substance use), there are significant differences in both content and process of youth relapse compared to adults. In their Youth Addiction Relapse Model, Brown and colleagues (see Figure 1; Brown, 2004; Brown & Ramo, 2006) have incorporated developmental and interpersonal factors shown to be important for youth relapse (represented by the bottom layer of the figure). Among these factors are contextual features of high-risk situations (Anderson, Frissell, & Brown, 2007; Brown, Stetson,

& Beatty, 1989), reduced vigilance and heightened cue reactivity as compared to adults (Myers & Brown, 1990a), the importance of motivation (Brown, 1999, 2004; Kelly, Myers, & Brown, 2000), social information processing (Brown, Stetson et al., 1989), the context of relapse episodes (Myers & Brown, 1990b), types of coping skills employed (Myers & Brown, 1990a), and substances used during relapse (Brown, Tapert, Tate & Abrantes, 2000). The series of studies presented here each test a portion of the Youth Addiction Relapse Model; the first with comorbid adolescents and the second and third with both adolescents and adults.

High risk relapse situations

Several research groups (Longabaugh, Rubin, Stout, Zywiak, & Lowman, 1996; Marlatt, 1996; Marlatt & Gordon, 1985; Miller, Westerberg, Harris, & Tonigan, 1996) have identified situations that most frequently precipitate relapse to substance use and the frequency of their occurrence in adults. A major distinction is between intrapersonal or environmentally-determined (58%) and interpersonal (42%) relapse situations. Intrapersonal situations included negative emotional states (37%), negative physiological states (4%), positive emotional states (6%), testing personal control (4%) and urges and temptations (7%), while interpersonal situations included interpersonal conflict (15%), social pressure (24%) and positive emotional states (3%). This classification system has been shown to hold for both males and females in substance abuse treatment (Rubin, Stout, & Longabaugh, 1996). Studies with youth in treatment indicate that youth tend to relapse in situations that are similar to adults; however, situations involving social pressure are more common in youth (66%) compared to adults (20%; Myers & Brown, 1990a). Another developmental difference

seems to be that youth hold less differentiated cognitions associated with substance use (e.g., outcome and cessation expectancies, self-efficacy; Brown, Christiansen, & Goldman, 1987; Metrik, McCarthy, Frissell, MacPherson, & Brown, 2004). For example, Ramo, Myers and Brown (Ramo, Myers, & Brown, in press), developed a developmentally appropriate measure of situational coping self-efficacy and found that 5 factors fit the adolescent data better than the 8-factors consistently found in adults. This revised measure can be used to study the effects of self-efficacy on the characteristics of youth relapse.

Depression comorbidity and relapse

The Youth Addiction Relapse Model suggests that affective disturbance would influence the situations in which youth and adults find themselves, their confidence that they can resist urges to use in those situations (coping self-efficacy), and thus their likelihood of using in those situations. Depression comorbidity is high among adults with SUDs, with more than a quarter of those diagnosed with SUD having a concomitant affective disorder in community samples (Merikangas & Gelernter, 1990; Regier et al., 1990). Rates are higher in clinical samples, with one study reporting 32% of women and 52% of men in inpatient SUD treatment met criteria for major depressive disorder (Hesselbrock, Meyer, & Keener, 1985), and another reporting higher rates of major depression diagnoses among women in SUD treatment (Compton et al., 2000). 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 et al., 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, Cottler, Jacobs, Ben-Abdallah, & Spitznagel, 2003). Depression comorbidity also has an impact on contexts of substance use. Tate, Brown Unrod and Ramo (2004) studied the differences in substance use episode characteristics between adults diagnosed with SUD alone or SUD and co-occurring mood disorder or PTSD (SUD/PSY). We found that SUD/PSY individuals were more likely to use in negative affective states than SUD-only peers (77.6% vs. 54.3%), and used most often with intrapersonal or environmental antecedents rather than interpersonal ones. SUD/PSY individuals were also more likely to use when alone, and exhibit patterns associated with more use during and after the use episode. In a study of the effects of depression on treatment outcomes in cocaine-abusing patients in treatments, R. Brown and colleagues (Brown, Monti et al., 1998) found that depression symptoms while in treatment were associated with urges to use cocaine and alcohol in high-risk situations.

Among youth, extant research demonstrates that those with alcohol use disorders (AUDs) and SUDs entering treatment commonly present with pronounced psychiatric symptomatology (e.g., Brown, Gleghorn, Schuckit, Myers, & Mott, 1996; Bukstein, 2001; Crowley, Mikulich, MacDonald, Young, & Zerbe, 1998; Greenbaum, Foster-Johnson, & Petril, 1996; Kaminer, Burleson, & Goldberger, 2002). Major depressive disorder ranks high among comorbid disorders with SUDs (Abrantes, et al., 2004; Clark & Neighbors, 1996; Rounds-Bryant, Kristiansen, Fairbank, & Hubbard, 1998; Stowell & Estroff, 1992) and is associated with poorer outcomes from treatment. Recently Tomlinson, Brown & Abrantes (2004) compared treatment outcomes of 126 adolescents (13-18 years old) with comorbid SUD's and Axis I

psychiatric disorders (mood, anxiety, conduct, and attention deficit hyperactivity disorders) to 81 SUD adolescents with no additional Axis I disorder. Results indicated that comorbid youth received more treatment during the posttreatment period; despite this, more comorbid SUD/Axis I disordered adolescents used substances following treatment than SUD-only youth. In another study, Cornelius and colleagues (2004) found that a comorbid diagnosis of major depressive disorder was associated with earlier relapse to alcohol after treatment among AUD youth (19 days vs. 45 days). Thus, psychiatric disorders in general and internalizing disorders particular pose a risk for using more quickly and persistently after treatment.

Depression also influences the situations in which youth relapse. Youth with Axis I disorders in addition to a SUD tend to share characteristics of noncomorbid youth and adults with comorbid psychopathology. Relapse for comorbid youth frequently occurs in situations involving social pressure (69%), dealing with temptations/urges (85%) and negative affective states (68%; Anderson et al., 2007). In a recent study conducted in Dr. Sandra Brown's lab (McCarthy, Tomlinson, Anderson, Marlatt, & Brown, 2005) depression symptoms were reported more frequently than other types of psychiatric symptoms preceding relapse, while psychiatric diagnosis at intake was not predictive of context of relapse. Moreover, depression symptoms experienced closer in time to first use after treatment were associated with relapse in negative intrapersonal contexts (Anderson et al., 2007). This suggests that affective disturbance represented by symptoms immediately before relapse rather than diagnosis is associated with use in specific contexts.

Self-efficacy and Relapse

A commonality among Marlatt's cognitive behavioral model for adults and Brown's developmental adjustments is the importance of coping self-efficacy, which has been found to influence the course of treatment and patterns of relapse in the addictive behaviors for adults and adolescents. 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 has been incorporated in cognitive-behavioral models of relapse to drug and alcohol use as a key determinant of behavior in potential relapse situations (see Figure 1.1; Marlatt & Gordon, 1985; Brown & Ramo, 2006; Witkiewitz & Marlatt, 2004). Within this theoretical framework, higher self-efficacy for drug taking situations increases the probability that one will resist urges and pressures to relapse after a period of abstinence. Indeed, coping self-efficacy has been found to predict adult relapse to alcohol (e.g., Solomon & Annis, 1990), drug (e.g., Burling, Reilly, Moltzen & Ziff, 1989), and cigarette (e.g., Etter, Bergman, Humar, & Perneger, 2000) use after treatment.

Among youth, there is less evidence on the relationship between self-efficacy and relapse. Some recent work has suggested that self-efficacy may not serve as strong a protective role in relapse as it does for adults (Burlison & Kaminer, 2005; Ramo & Brown, 2003, November). Youth may generally underestimate the riskiness of certain situations after treatment (Myers & Brown, 1990a) and inadvertently or purposefully find themselves in these situations in which using becomes an attractive option.

Aims and Hypotheses

The present work extends the developmental exploration of relapse and tests the Youth Relapse Models by exploring three specific aspects of the model in three

independent research studies. The first study seeks to further clarify the relapse process of SUD youth with concomitant Axis I mental health disorders. The aims are to: 1) characterize the ways in which youth who relapse immediately following treatment (first 3 days) differ from those who relapse early (in the first month) or later (between 1 month and 6 months); and 2) elucidate the role of psychiatric symptom severity and situational self-efficacy in comorbid youth addiction relapse. Hypotheses were that severity of pretreatment substance use would be associated with immediate and early relapse rather than later relapse and that delayed relapse would reflect social pressure for use. In addition, it was hypothesized that self-efficacy for adolescents would be associated with lower relapse likelihood in developmentally matched contexts. Finally, it was hypothesized that psychiatric symptom severity would elevate relapse risk across all developmentally salient contexts.

The second study uses a person-centered approach to examine the characteristics of relapse to substance abuse in adolescents and adults after a treatment episode. It uses latent class analysis to examine the patterns of interpersonal and intrapersonal situations that pose a high risk for relapse in adolescents and adults. The general a priori hypothesis was that the patterns of relapse situations (latent class structure) would differ between youth and adults. More specifically, we expected that social pressure situations would play a strong role as a precipitant in adolescent relapse situations, accompanied by negative precipitants such as interpersonal conflict and negative emotional states for some youth, and accompanied by more positive emotional states for other youth. Further, we hypothesized that since adolescents tend not to endorse relapsing in negative physiological states or to think about them as high

risk situations in the same way that adults do (Ramo, Myers, & Brown in press), negative physiological states would not appear in any of the adolescent latent classes. Based on literature demonstrating that adults are more likely than youth to relapse when alone (e.g., Tate et al., 2004), we suggested that adult latent classes would be more dominated by negative affective states, with social pressure only accompanying negative affect for some adults.

Finally, the third study examines key components of the relapse process for youth and adults. Specifically, it investigates whether coping self-efficacy mediates the relationship between depression and length of abstinence following treatment for substance abuse in adolescents and adults. 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. We hypothesize that among youth, depression would be associated with shorter length of abstinence and lower coping self-efficacy, based on similarities in existing literature across age-groups. However, since the relationship between self-efficacy and length of time to relapse is weaker in adolescents, 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. Among adults, 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).

A better understanding of the role that situational, affective and cognitive factors 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. Additionally, the last two studies are the first that directly compare predictors of relapse in youth and adult samples. This longitudinal body of research will contribute to the knowledge of various potential pathways into substance relapse and will help to improve models of and treatments for adolescent and adult substance abuse relapse.

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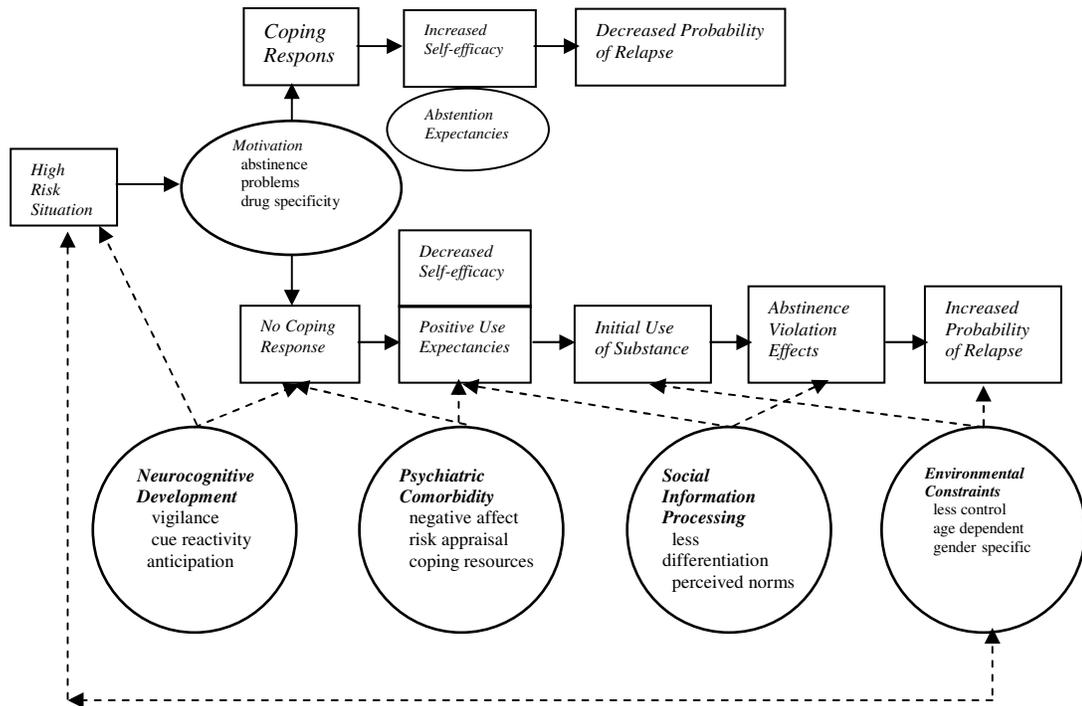
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Chapter 1, Figure 1. *Youth Addiction Relapse Model.*

CHAPTER 2

Characteristics of Relapse to Substance Use in Comorbid Adolescents

Abstract

This study examined the factors associated with the relapse process for substance use disorder (SUD) youth with comorbid psychiatric disorders. Temporal and situational characteristics as well as psychiatric symptoms, self-efficacy, and developmentally relevant experiences preceding first relapse after treatment were evaluated as part of a youth focused addiction relapse model. *Method:* Adolescents (N=81) with a *DSM-III-R* substance use disorder (SUD) and another Axis I psychiatric disorder were recruited from inpatient substance abuse and psychiatric treatment. Face-to-face interviews were conducted while youth were in treatment and monthly telephone interviews were conducted in the six months following treatment to ascertain length of time to first substance use episode and characteristics of the episode. *Results:* Youth who relapsed within the first month were more likely to report use of drugs other than alcohol or marijuana in their first use, while use among late relapsers was more often preceded by direct social pressure to use. Those relapsing in the first 3 days after treatment were less likely to view substance use as a problem and less likely to report passive emotional states (e.g., boredom) prior to use. Psychiatric symptoms were associated with relapse in conflict/life stress, negative emotional states and active emotional states. Self-efficacy was related to relapse among youth with conflict/life stress, and when youth were experiencing a desire to use in the two weeks prior to relapsing. *Conclusions:* Findings highlight some of the

factors that are most important in understanding the process of relapse in comorbid adolescents. Research and treatment implications are discussed.

Introduction

Characteristics of Relapse to Substance Use in Comorbid Adolescents

A large body of research has identified important factors that underlie the process of relapse to drug and alcohol use after treatment. Dominant cognitive-behavioral models of relapse (Abrams, Niaura, Carey, & Monti, 1986; Marlatt & Gordon, 1985; Witkiewitz & Marlatt, 2004) focus on the interaction of situational factors and individual characteristics that elevate the risk for alcohol or drug use after treatment. In our youth relapse model (e.g., Brown, 2004; Brown & Ramo, in press) we argue that while the personal and environmental factors that influence treatment outcomes may be similar between adults and adolescents, developmental dynamics will determine the extent to which each of these factors influences the outcome process and clinical course for youth.

Of particular concern among substance use disordered (SUD) teens are those with concomitant psychiatric disorders, as their treatment outcomes appear to be poorer. Adolescents with SUDs and comorbid Axis I disorders are more likely to relapse following treatment (Grella, Hser, Joshi, & Rounds-Bryant, 2001) and progress to relapse more rapidly than their SUD-only peers (Tomlinson, Brown, & Abrantes, 2004). While a number of studies have examined factors that predict severity of use and outcomes of adolescents after treatment (e.g., Brown, Myers, Mott & Vik, 1994; Tomlinson et al., 2004), less is known about the relapse process for SUD youth with psychiatric disorders. No work to date has examined whether the personal

and environmental factors that characterize the more rapid relapse of dually-diagnosed youth are distinct from delayed relapse episodes of these youth. For example, SUD adolescents with concomitant mental health disorders have been found to relapse most often in contexts involving temptation, enhancement of positive emotional states, social pressure, and negative emotional states (Anderson, Frissell, & Brown, 2007). However, the extent to which contexts of early relapse vary from later relapse is unknown for these dually-diagnosed teens.

Contextual features of potential relapse situations place specific demands on the coping skills of mental health disordered/SUD youth. Thus, these comorbid youth may be disadvantaged by the situations to which they are exposed by their coping self-efficacy (Bandura, 1995; Brown & Ramo, in press) or fluctuations in psychiatric symptoms. For example, psychiatric symptoms appear to influence adolescent relapse in several ways (McCarthy, Tomlinson, Anderson, Marlatt, & Brown, 2005). Higher levels of overall symptoms or particular symptoms (e.g., depression) prior to relapse may influence types of substances used and situations sought to alleviate symptoms. Psychiatric symptoms have been found to predict stimulant and other drug use in the relapse episodes of comorbid teens (McCarthy et al., 2005). Thus, the relationship between psychiatric symptoms and relapse may be context-dependent with psychiatric symptoms differentially influencing use across circumstances which vary with adolescent development (e.g., stress in the family, extent to which teens are motivated for abstinence). In one sample of comorbid youth, disruptive behavior diagnoses determined during treatment predicted SUD youth relapse when coping with frustration, anger, and tension, whereas anxiety symptoms preceding use were

associated with relapse to cope with negative physiological states or negative interpersonal situations (Anderson et al., 2007). Thus, psychiatric symptoms may alter situation selection, place unique demands on adolescents in certain relapse risk situations, and compromise coping abilities or situational self-efficacy.

The present study seeks to further clarify the relapse process of SUD youth with concomitant Axis I mental health disorders. The aims are to: 1) characterize the ways in which youth who relapse immediately following treatment (first 3 days) differ from those who relapse early (in the first month) or later (between 1 month and 6 months); 2) elucidate the role of psychiatric symptom severity and situational self-efficacy in comorbid youth addiction relapse. Hypotheses were that severity of pretreatment substance use would be associated with immediate and early relapse rather than later relapse and that delayed relapse would reflect social pressure for use. Since situational coping self-efficacy serves as a protective factor for potential relapse situations, it was hypothesized that self-efficacy for adolescents would be associated with lower relapse likelihood in developmentally matched contexts. Since psychiatric symptoms (both internalizing and externalizing) represent affective disturbance that comorbid youth may try to alleviate through substance use (i.e., self-medication) or may reduce the availability of adaptive coping mechanisms to stressful situations, it was hypothesized that psychiatric symptom severity would elevate relapse risk across all developmentally salient contexts. This study is the first to examine the differences between early and later relapsers and also the relationships between self-efficacy, psychiatric symptom severity and relapse context in a clinical sample of comorbid SUD and mental health disordered adolescents. While we made uniform hypotheses

for all relapse contexts tested, we expected that there may be variability in the specific relationships tested, and see this study as a unique chance to explore and elucidate these differences.

Method

Participants

Participants were selected from adolescents receiving inpatient treatment for alcohol and other SUDs and at least one Axis I *DSM-III-R* disorder described in detail elsewhere (see, for example, Tomlinson et al., 2004). Exclusion criteria for the study were as follows: 1) history of head trauma with loss of consciousness for two or more minutes, 2) current psychotic symptoms, 3) unavailability of a resource person (e.g., a biological relative at intake or follow-up) to provide corroborative information, and 4) permanent residence more than 50 miles from the research facility.

The present study included 81 adolescents ($M = 15.9$ years; range: 13-18 years) from the original sample who reported alcohol or other drug use within the first six months following treatment. Youth were excluded from this report if they did not relapse (12%), or were unable to be followed (e.g., hospitalized or incarcerated), completed forms late, or were not located in the initial time frame (33%). Among relapsing youth, the mean length of abstinence post-treatment was 52 days (range: 0-175 days). Table 1 provides demographic characteristics, diagnoses and pretreatment use patterns for the sample at study intake. Adolescents who used alcohol or drugs within this time frame were not significantly different from the abstainers in terms of sex, age, grade, ethnicity, socioeconomic status or pretreatment alcohol or other pretreatment substance use levels ($p > .05$). Attrition analyses demonstrated that the

youth who had data for all the assessments were not systematically different from those who did not have data in age, gender, ethnicity or pretreatment quantity/frequency of substance use. Subjects included in the analyses had more substances related problems before treatment than non-included cases (1.74 vs. .75; $t(129) = 2.17, p < .05$).

Measures

Structured clinical interview. A trained interviewer at study intake conducted a 90-minute confidential structured interview (Brown, Vik & Creamer, 1989) with each adolescent, and a second interviewer independently assessed the parent. This procedure was used to gather demographic and background information as well as information regarding participant experiences with substance use, mental health symptoms and services, and related variables. All demographic information obtained from the teen and parent was subsequently reviewed to clarify inconsistencies.

Psychopathology. Axis I mental health disorders at study intake were assessed using the Diagnostic Interview Schedule for Children-Computerized Version (DISC-III-R. Piancentini et al., 1993) with supplementary age of symptom onset questions (Aarons, Brown, Hough, Garland, & Wood, 2001). The DISC-III-R was separately administered to each adolescent and collateral reporter (e.g., parent); results from the two interviews were composited in a standard procedure to determine diagnoses. Specifically, if the adolescent or parent reported the youth met a criterion, this was counted toward the diagnosis. This standardized procedure maximizes validity of youth diagnoses (Breton, Bergeron, Valla, Berthiaume, & St. George, 1998).

Posttreatment substance use. A modified version of the Contextual Cue Assessment for Relapse interview was administered monthly to youth who engaged in any alcohol or drug use within the first six months following treatment to assess interpersonal, intrapersonal, and other contextual information related to the substance use episode. Modifications were made to this measure based on research examining multiple antecedents to alcohol/drug use episodes (Marlatt & Gordon, 1980) in samples of adolescents with AUDs and/or SUDs (e.g., Brown et al., 1989; Tomlinson et al., 2004) and youth with both an AUD/SUD and concomitant Axis I psychopathology (e.g., Abrantes, Brown & Tomlinson, 2004; McCarthy et al., 2005). Relapse review data included information concerning the length of initial abstinence, context of youth initial posttreatment substance use and psychiatric symptoms preceding the first alcohol or drug use episode following treatment.

At all assessments, a Timeline Follow-Back interview (Sobell & Sobell, 1992) was used to determine the length of abstinence since last interview. A composite of the total days abstinent between treatment and the date of the first relapse was computed (range = 0 - 175). Relapses occurring between 1 and 3 days after discharge from treatment were classified as “immediate,” between 4 and 30 days classified as “early,” and relapses after 30 days (31-180 days) were considered “late.”

Youth were also queried regarding six domains of developmentally relevant situational features (e.g., life stress, family conflict, association with substance using friends, perceived need to abstain) during the two weeks prior to first use, ascertained from previous focus groups of youth. Domains assessed included external factors (Social Pressure: e.g., friends using and afraid of missing out; Conflict/Life Stress:

e.g., family conflict, etc.), internal states (Negative Emotion: e.g., depressed, anxious, angry, etc.; Active Emotion: e.g., “feeling good”, hyper, need for more stimulation etc.) and substance-related factors (Desire for Drug: e.g., cravings; Non-Problematic Perception: e.g., trivialize use; “can use responsibly”, etc.). These six features of personal experience were individually evaluated to characterize salient features present during the two weeks preceding their initial post-treatment use episode. As an index of psychiatric distress, the presence or absence of psychiatric symptoms within the same 2 week period prior to relapse were summed across 12 symptoms covering domains associated with depression, anxiety and psychotic cognitions (McCarthy et al., 2005).

Self-efficacy. A 39-item adolescent version (Ramo & Brown, 2004) of the Drug-Taking Confidence Questionnaire (DTCQ; Sklar, Annis & Turner, 1997) was used as part of the intake assessment to assess coping self-efficacy in relation to adolescent high-risk for relapse situations. Youths are asked to indicate their drug of choice and rate their confidence that they can resist using this drug in 39 situations, on a 6-point scale (20% increments) from 0% (“not at all confident”) to 100% (“very confident”). Five factor analytically derived scales have been identified for adolescents (Negative Situations, Social/Urges, Pleasant Emotions, Testing Personal Control, and Physical/Sexual). These factors have been shown to demonstrate adequate convergent, discriminant and predictive validity among youth with concurrent substance use and psychiatric disorders (Ramo & Brown, 2004).

Procedure

Youth were screened for comorbid alcohol or other substance use disorder and psychiatric disorder through medical chart review of new admissions to three psychiatric/drug treatment facilities in San Diego County, California. Parental consent approved by the University of California, San Diego Institutional Review Board was obtained for medical chart screening. Additional parental consent procedures and youth assent procedures for study participation were used with those meeting criteria for participation. Approximately 20-30% of youth admitted to the treatment centers were appropriate for entrance into the study (e.g., no active psychotic symptoms, parent to corroborate data, lived within 50 miles), and 90% of eligible youth agreed to participate. While youth were in treatment, separate interviewers evaluated each adolescent and parent. Follow-up teen and parent interviews were conducted over the phone (1, 2, 4, 5, month teen interviews; 3, 6 month parent interviews) or in person (3, 6 month teen interviews). Monthly assessments (1, 2, 4 and 5 months) were approximately 30 minutes and youth were paid \$10.00 per assessment. At months 3 and 6, youths and parents completed more comprehensive assessments for a larger investigation of multiple domains of outcomes for youth with AUD/SUDs and Axis I psychopathology. For each assessment adolescents and parents were paid \$40 and \$20, respectively. All youth were informed in advance that a urine toxicology screen may be required. A random sample of youth (10%) completed screens to verify follow-up use reports. With the exception of one case (cocaine), toxicology screens did not identify substances beyond those reported by youth.

Results

Table 1 provides demographic and substance use characteristics of youth with immediate, early, and delayed relapse. There were no significant differences between relapse groups for age, sex, ethnicity or intake levels of substance use frequency, number of substance-related problems or substance dependence symptoms. Table 2 depicts substance use characteristics, situational and contextual features of relapse in this sample. Chi-square analyses indicate that groups differed on the use of drugs other than alcohol or marijuana during relapse [$\chi^2(2, N = 80) = 9.20, p = .01$], such that more rapid relapsers (immediate and early groups) were more likely to use other drugs and late relapsing youth were less likely to use other drugs than expected. Again, chi-square analyses and F-tests indicate that there were no other differences between groups on use of drug of choice first, cigarette smoking during relapse, or number of substances used during initial episode. In addition, environmental features, such as activity and location of relapse were not significantly different across groups.

In terms of relapse contexts, significant differences did emerge between youth who relapsed immediately, early, or late. Using Marlatt and Gordon's (1985) taxonomy of relapse situations, youth in the immediate relapse group were less likely to report social pressure and youth in the late relapse group were more likely to report social pressure immediately preceding relapse ($\chi^2(2, N = 81) = 7.16, p = .03$). However, relapse group differences were found for traditional precursors of temptation, intrapersonal, or interpersonal relapse contexts, or negative physiological states. By contrast, the developmentally determined domains for experiences preceding relapse including passive emotional states [$\chi^2(2, N = 81) = 6.74, p = .03$]

and perceived non-problematic use, [$\chi^2(2, N= 81) = 12.17, p = .002$) were different across relapse groups. Youth relapsing immediately after treatment were less likely to consider all substance use as problematic and to report feeling bored immediately prior to relapse compared to other relapse groups.

Next, in order to examine the extent to which psychiatric symptom severity and situational self-efficacy affected relapse contexts, scales on the revised DTCQ for adolescents (Ramo & Brown, 2004) were matched with pre-relapse experiences based on conceptual similarity (e.g., DTCQ Testing Personal Control scale and Perceived Non-Problematic Use; see Table 3). The Desire for Drug context was tested in two models because there were two DTCQ scales (scales 2 and 5) that matched that had overlapping content. Scale 2 includes items representing a psychological desire to use (e.g., “If I began to think how good a rush or high had felt”), while scale 5 includes some items that represent physical sensations that may reflect withdrawal symptoms (e.g., “If I wanted to stay awake, be more alert, or be more energetic”). There were no use contexts measured that directly overlapped in content with the sexual items in the Physical/Sexual scale (e.g., “If I were having a good time and wanted to increase my sexual enjoyment) and thus Desire to Use was deemed the best match for this scale.

Logistic regression analyses examined the relations between proximal psychiatric symptoms, situational self-efficacy, and likelihood of relapse following each type of pre-relapse experience. In the initial analyses, gender, age, ethnicity and length of abstinence were each considered as possible covariates; however, there were no significant bivariate relationships between the demographic variables or length of abstinence and any of the six pre-relapse experiences, so none of them was not used in

the final models tested. Seven hierarchical logistic regression analyses were conducted with self-efficacy entered in step one and psychiatric symptom severity entered in step two.

All of the models with self-efficacy and psychiatric symptoms were significant and are presented in Table 4. Odds ratios are presented in standard deviation units for ease of interpretation. Self-efficacy in negative emotional states and psychiatric symptoms both significantly predicted relapse following a conflict/life stress experience. Higher self-efficacy for negative situations decreased likelihood of relapse following conflict/life stress situations (OR = .53), and more psychiatric symptoms were associated with increased likelihood of relapsing in conflict/life stress contexts (OR = 2.5). Each standard deviation increase in psychiatric symptoms also increased chances of relapse following negative emotional experiences by over three times (OR = 3.29). Neither psychiatric symptoms nor self-efficacy was associated with relapse following social pressures, although self-efficacy for social/urges and temptations approached significance ($\chi^2 = 3.38, p = .07$). Self-efficacy in social/urges and temptations situations was predictive of relapse when youth have a desire to use their drug of choice, such that lower self-efficacy increases chances of relapsing when youth report a desire to use (OR = .45, $p < .005$). Psychiatric symptoms were predictive of relapse following experiences of active emotional states, such that a standard deviation unit increase in symptoms increased relapse risk in this context two and a half times (OR = 2.41). Neither psychiatric symptoms nor self-efficacy predicted relapse when youth felt substance use was not a problem (non-problematic

use). Finally, lower self-efficacy in physical/sexual situations (DTCQ Scale 5) was associated with greater relapse risk when youth reported a desire to use (OR = .46).

Discussion

This study examined the differences between immediate, early and late relapsing dually-diagnosed youth after inpatient substance abuse and psychiatric treatment and also the ways in which proximal psychiatric symptoms and self-efficacy are associated with youth experiences prior to use. Immediate and early relapsing youth were more likely to use drugs other than alcohol or marijuana in their first use episode after treatment, and those relapsing later were more likely to use in situations of direct social pressure. These findings indicate that comorbid youth who are able to remain abstinent for at least a month after treatment may be most vulnerable to later relapse when they are in the company of friends who are also using and is consistent with prior research on youth (e.g., Brown, Vik & Creamer, 1989). Similarly, as has been suggested before, alcohol and marijuana may have somewhat distinct role in the process of youth relapse relative to other drugs (Brown, Tapert, Tate & Abrantes, 2000).

An important consideration in youth relapse models is the extent to which adolescents perceive alcohol, marijuana, or other substance use as a problem for them (i.e., “non-problematic use”). In the present study, comorbid youth who use immediately after treatment were more likely to view at least some types of substance involvement as nonproblematic compared to their peers who relapse at later points following treatment. Thus, consideration of substance-specific motivation to abstain is critical in understanding youth return to substance use after treatment (Brown &

Ramo, in press). Teens entering treatment programs commonly have limited motivation to abstain even though they may be motivated to resolve substance-related problems (Brown, 1999) and motivation for abstinence may vary substantially across types of substances (Brown, Tapert, Tate & Abrantes, 2000). Motivation is a prerequisite for effortful coping responses in anticipated and experienced risk situations, and as such, it is not surprising that youth who consider certain substance use as acceptable are more likely to use immediately following discharge from treatment.

Findings from the present study also highlight the importance of consideration of mental health disorder symptoms and developmentally salient experiences in models of addiction relapse. For example, in the present study, psychiatric symptoms and self-efficacy were associated with risk when comorbid youth were facing certain life experiences. Both psychiatric symptoms and self-efficacy in negative situations were related to relapse risk following periods of conflict/life stress and negative emotional states. Youth with limited self-efficacy and experiencing salient psychiatric symptoms appear most vulnerable to relapse in these types of circumstances. Similarly, the protective role of coping self-efficacy for this high risk population of SUD youth was evident when youth were experiencing desires to use alcohol or drugs (e.g., social/urges and temptations situations and physical/sexual situations). Situationally specific risk of psychiatric symptoms was evident by the association with relapse following adversity (e.g., conflict/life stress, negative affect), and prediction of relapse following more positive emotional states, or when youth feel “hyper, impulsive, or sensation-seeking”. This person-environment specificity is consistent

with cognitive-behavior formulations of youth relapse (Brown, 2005; Brown & Ramo, in press) in which self-efficacy is a protective factor against relapse and psychopathology increases vulnerability to relapse through its association with fewer or less effective coping responses and expectancies that use will alleviate psychiatric symptoms.

The results in this study must be interpreted with caution. The data collected were based on self-report interviews with corroboration from parents and random toxicology screens. There may be potential bias in self-report although only one discrepancy with toxicology screens was noted. Also, the sample consisted of 13-18 year old adolescents in inpatient treatment for AUDs/SUDs and comorbid Axis I psychopathology and therefore are not expected to generalize to youth with only AUDs/SUDs. Further, since the present study examined initial use episodes, we were not able to examine repeated relapse contexts over time, which is part of our cognitive-behavioral model of youth relapse process. Future research should examine the relationships tested in this paper for application to longer term risk for comorbid youth. Finally, given the modest sample size used in this study, the inability to detect significant interaction relationships may be indicative of a lack of power rather than an absence of such relationships (Aiken & West, 1991).

In conclusion, this study continues to clarify the dynamic process of addiction relapse in adolescents. Characteristics of relapse were found to vary with length of abstinence and youth perceptions of their problem and motivation are critical to understanding this process. Psychiatric symptoms present specific vulnerabilities to youth relapse and developmentally relevant life experiences of youth and their self-

efficacy for these situations need to be taken into consideration when seeking to prevent relapse among SUD youth with mental health disorders.

Chapter 2, in full, is a reprint of the material as it appears in “Characteristic of relapse to substance use in comorbid adolescents,” by D. E. Ramo, K.G. Anderson, S.R. Tate, & S.A. Brown, 2005, *Addictive Behaviors*, 14. Copyright 2005 by Elsevier Ltd. The dissertation author was the primary investigator and author of this paper.

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Chapter 2, Table 1.

Background, diagnostic, and substance use characteristics of comorbid youth: Comparisons by time to first pretreatment use (N = 81).

Timing of Relapse Sample	Immediate (N = 13)	Early (N = 20)	Late (N = 48)	Total (N = 81)
Age	16.5(1.2)	15.7(1.1)	15.9(1.3)	15.9(1.2)
Sex (%)				
Females	38.5	42.1	66.7	56.3
Males	61.5	57.9	33.3	43.8
Ethnicity (%)				
Caucasian	76.9	63.2	72.9	71.3
Hispanic-American	15.4	31.6	22.9	23.8
African-American	7.7	5.3	2.1	3.8
Asian-American	0	0	2.1	1.3
DSM-III-R Diagnosis (%)				
Internalizing (Int) only	0	10.5	15.6	11.7
Externalizing (Ext) only	46.2	0	8.9	13.0
Int + Ext	53.8	78.9	75.6	72.7
SUD-only	0	10.5	0	2.6
Pretreatment Substance Use				
Frequency (episodes/mo)	50.9(28.9)	31.1(28.6)	38.3(24.6)	38.6(26.5)
Number of Substances ever used	5.8(1.6)	5.3(1.8)	4.9(1.7)	5.1(1.7)
Substance-related problems (DSM-IV)	2.1(1.6)	1.7(1.2)	1.6(1.5)	1.7(1.4)
Substance dependence symptoms (DSM-IV)	7.8(2.2)	8.1(2.8)	8.5(2.9)	8.3(2.8)

Note: Significant chi-square or F-tests are highlighted in bold ($p < .05$). Diagnosis was

determined by DISC-III-R interviews. Internalizing disorders were mood disorders

and anxiety disorders. Externalizing disorders were Conduct Disorder and

Oppositional Defiant Disorder. Individuals with substance use only diagnosis at intake

using the DISC-III-R were included due to a history of psychiatric diagnosis in the 6

months prior to study intake (The DISC-III-R interview only covers diagnoses made

in the 6 months prior to study intake).

Chapter 2, Table 2.

Situational and contextual factors associated with time to relapse groups of adolescents with AUD/SUD and mental health disorders (N=81)

Timing of Relapse	Immediate (N = 13)	Early (N = 20)	Late (N = 48)	Total Sample (N = 81)
<i>Substance Use Characteristics</i>				
<i>Substance Used During Relapse</i>				
Alcohol (0/1)	100.0	95.0	100.0	98.8
Marijuana (0/1)	69.2	50.0	57.4	57.5
Other drugs (0/1)*	38.5	40.0	10.6	22.5
Drug of Choice First (0/1)	7.7	20.0	23.4	20.0
Smoking (0/1)	27.3	55.0	31.3	36.7
No. Substances Used	1.5(.7)	1.4(.7)	1.3(.4)	1.3(.6)
<i>Situational Features</i>				
<i>Age of Others</i>				
Younger	27.3	15.8	9.3	13.7
Same	27.3	21.1	30.2	27.4
Older	45.5	52.6	41.9	45.2
Mixed	0	10.5	18.6	13.7
<i>Activity</i>				
Alcohol/Drug Use	72.7	55.6	59.2	60.3
Socializing	9.1	22.2	18.4	17.9
Other	18.2	22.2	22.4	21.8
<i>Location</i>				
Outside	66.7	45.5	54.5	54.3
Home	13.3	18.2	16.4	16.3
Friend's Home	13.3	27.3	16.4	18.5
Party	0	4.5	5.5	4.3
Other	6.7	4.5	7.3	6.5
<u>Contextual Features (Marlatt & Gordon, 1985)</u>				
Temptation (0/1)	84.6	95.0	91.7	91.4
Intrapersonal (0/1)	53.8	80.0	77.1	74.1
Social Pressure (0/1)*	38.5	70.0	77.1	69.1
Interpersonal (0/1)	23.1	35.0	47.9	40.7
Physiological (0/1)	7.7	10.0	12.5	11.1
<u>Developmentally-specific features (immediately before use)</u>				
Social (0/1)	61.5	70.0	66.7	66.7
Conflict/Life Stress (0/1)	53.8	57.9	70.8	65.0
Negative Emotion (0/1)	46.2	40.0	62.5	54.3
Passive Emotion (0/1)*	23.1	65.0	60.4	55.6
Active Emotion (0/1)	15.4	35.0	35.4	32.1
Desire for Drugs (0/1)	38.5	30.0	31.9	32.5
Non-problematic Use*	84.6	70.0	37.5	53.1
Abstinence Focused	46.2	42.1	39.6	41.3

Note: Chi-square analyses were used in the majority of cases. F-tests are identified by presence of mean

(standard deviation). *Significant chi-square or F-tests ($p < .05$).

Chapter 2, Table 3.

Adolescent addiction relapse contexts, and contextually-matched Drug-Taking Confidence Questionnaire scales

Relapse Context	DTCQ Scale
Conflict/Life Stress	Scale 1 (Negative Situations)
Negative Emotion	Scale 1
Social	Scale 2 (Social/Urges and Temptations)
Desire for Drugs	Scale 2
Active emotion	Scale 3 (Pleasant Emotions)
Non-problematic use	Scale 4 (Testing Personal Control)
Desire for Drugs	Scale 5 (Physical Sexual)

Note: Scales 1 and 2 of the revised DTCQ were each matched with two relapse

contexts because they contained content from each context.

Chapter 2, Table 4.

Psychiatric symptoms and self-efficacy as predictors of relapse context for comorbid adolescents

Model/Variable	Step χ^2	<i>p</i>	OR	<i>p</i>
<u>Conflict / Life Stress</u>				
DTCQ Scale 1	6.34*	.01	.53*	.02
Psych Symptoms	11.15*	.00	2.51*	.00
<u>Negative Emotion</u>				
DTCQ Scale 1	3.77	.05	.63	.06
Psych Symptoms	17.69*	.00	3.29*	.00
<u>Social</u>				
DTCQ Scale 2	3.38	.07	.64	.07
Psych Symptoms	.03	.86	1.04	.86
<u>Desire for Drugs</u>				
DTCQ Scale 2	10.08*	.00	.45*	.00
Psych Symptoms	.85	.36	1.30	.36
<u>Active Emotion</u>				
DTCQ Scale 3	1.22	.27	1.45	.29
Psych Symptoms	6.63*	.01	2.41*	.02
<u>Non-problematic Use</u>				
DTCQ Scale 4	1.83	.18	.73	.18
Psych Symptoms	3.50	.06	.64	.07
<u>Desire for Drugs</u>				
DTCQ Scale 5	10.61*	.00	.46*	.00
Psych Symptoms	.35	.56	1.16	.56

Note. Odds ratios in standard deviation units. **p* < .05.

CHAPTER 3

Classes of substance abuse relapse situations: A comparison of adolescents and adults

Abstract

Research in the process of relapse has uncovered important developmental differences in the situations that make adolescents and adults most vulnerable to relapse after substance abuse treatment. This study takes a developmental, person-centered approach to relapse by examining the latent class structure of relapse precursors in adolescents and adults. Adults (N=160) and adolescents (N=188) in substance abuse and psychiatric treatment were followed up to eighteen months after discharge to gather detailed information about their first relapse after treatment. Both adolescents and adults exhibited a 2-class structure of relapse precursors. Adult classes were labeled *Social and Urges* situations (primary precursors: social pressure and urges; 67%) and *Negative and Urges* situations (primary precursors: negative affect and urges; 33%), while teen classes were labeled *Social and Positive* situations (primary precursors: enhancing a positive emotional state and social pressure; 69%) and *Complex* situations (primary precursors: negative affect, negative interpersonal situations, social pressure, and urges; 31%). Findings are discussed in relation to developmental and clinical considerations in treating clients with substance use disorders and comorbid psychopathology.

Introduction

Classes of substance abuse relapse situations: A comparison of adolescents and adults

Substance abuse is commonly thought of as a “chronically relapsing condition” (Witkiewitz & Marlatt, 2004), with both youth and adults returning to substance abuse

at high rates after treatment. Studies estimate that between two-thirds and four-fifths of both adults and adolescents begin using again in the 6 months after an episode of community- or hospital-based drug or alcohol treatment (Brown, D'Amico, McCarthy, & Tapert, 2001; Brown, Vik, & Creamer, 1989; Cornelius et al., 2001; Hunt, Barnett, & Branch, 1971). A major focus in research examining the process of addiction relapse has been the characterization of relapse "determinants," or contextual features of situations in which adults and adolescents tend to use after they have been in treatment for alcohol or drug problems.

Several research groups have identified situations that most frequently precede relapse to substance use and the frequency of their occurrence in adults (Longabaugh, Rubin, Stout, Zywiak, & Lowman, 1996; Marlatt, 1996; Marlatt & Gordon, 1985; Miller, Westerberg, Harris, & Tonigan, 1996). In the original work conducted by Marlatt and colleagues (Marlatt & Gordon, 1985), a major distinction in this taxonomy was between intrapersonal or environmentally-determined (58% of Marlatt's original sample) and interpersonal (42%) relapse situations. Intrapersonal situations included negative emotional states (37%), negative physiological states (4%), positive emotional states (6%), testing personal control (4%) and urges and temptations (7%), while interpersonal situations included interpersonal conflict (15%), social pressure (24%) and positive emotional states (3%).

Marlatt's original taxonomy of relapse characteristics suggested that a single category was the primary determinant of a given relapse episode (i.e., the categories were mutually-exclusive; Marlatt & Gordon, 1985). Thus, research examining cognitive and behavioral constructs related to the process of relapse has tended to use

factor analytic approaches (or variable-centered approaches) rather than person-centered approaches (e.g., Sklar, Annis & Turner, 1997; Turner, Annis & Sklar, 1997) to understanding these constructs.

However, when internal and external states are examined preceding relapse, both adults (Tate, Brown, Unrod & Ramo, 2004) and adolescents (Ramo, Anderson, Tate, & Brown, 2005) tend to have a combination of internal and external precursors to relapse rather than just one prominent situation that precipitates their relapse. Thus, it is important to design research questions to consider the heterogeneity of situations and individuals who relapse after treatment for alcohol and drug abuse. The examination of “typologies” of substance involvement (e.g., Bucholz et al., 1996), comorbidities of substance use disorders (Jackson, Sher, & Wood, 2000), and multiple outcome trajectories (Brown, Chung, Martin, & Winters, 2006) are examples of the growing person-centered approaches in the field of substance abuse. Developing typologies to characterize individual patterns of relapse can be a useful tool in understanding which mechanisms are most strongly involved in relapse.

There is reason to believe that patterns of relapse precipitants might differ for adolescents as compared to adults. The situations that most commonly precipitate relapse in adults are associated with anger or frustration, social pressure to drink, or interpersonal conflict (Litman, Eiser, Rawson, & Oppenheim, 1977; Marlatt & Gordon, 1985). Studies with youth in treatment indicate that adolescents tend to relapse more often in situations in which there is direct or indirect social pressure to use (66%) compared to adults (20%; Myers & Brown, 1990; Marlatt & Gordon, 1985). Among youth diagnosed with an independent psychiatric disorder, negative

affect and interpersonal conflict tend to precede relapse as frequently in adolescents as they do in adults. However, situations involving social pressure and using to enhance a positive emotional state are more common in youth than in adults (Anderson, Frissell, & Brown, 2007; Tate et al., 2004).

The co-occurrence of substance use disorders and other Axis I psychiatric disorders has been well documented in adults (e.g., Regier et al., 1990) and also in youth (e.g., Abrantes et al., 2004). Mood, anxiety, and externalizing disorders (e.g., conduct disorder) which can be characterized by negative affective states put adults and youth at increased risk for relapse. The Cognitive Behavioral Model of Relapse (Witkiewitz & Marlatt, 2004) and the Youth Relapse Model (Brown, 2004; Brown & Ramo, 2006) suggest that affective disturbance would influence the situations in which youth and adults find themselves, and thus their likelihood of using in those situations. Negative emotional states increase the likelihood and severity of relapse for SUD individuals at all developmental stages (Cooper, Russell, Skinner, Frone, & Mudar, 1992; Cornelius et al., 2004, Miller et al., 1996).

The current study uses a person-centered approach to examine the characteristics of relapse to substance abuse in adolescents and adults after a treatment episode. It uses latent class analysis to examine the patterns of interpersonal and intrapersonal situations that pose a high risk for relapse in adolescents and adults. The general apriori hypothesis was that the patterns of relapse situations (latent class structure) would differ between youth and adults. More specifically, we expected that social pressure situations would play a strong role as a precipitant in adolescent relapse situations, accompanied by negative precipitants such as interpersonal conflict

and negative emotional states for some youth, and accompanied by more positive emotional states for other youth. Further, we hypothesized that since adolescents tend not to endorse relapsing in negative physiological states or to think about them as high risk situations in the same way that adults do (Ramo, Myers, Brown in press), negative physiological states would not appear in any of the adolescent latent classes. Based on literature demonstrating that adults are more likely than youth to relapse when alone (e.g., Tate et al., 2004), we suggested that adult latent classes would be more dominated by negative affective states, with social pressure only accompanying negative affect for some adults.

Methods

Participants

Participants were taken from 229 adults and 244 adolescents participating in three longitudinal projects (two adult studies, one adolescent study) designed to evaluate the clinical course for individuals who have received treatment for SUDs (Abrantes et al., 2004; Brown, Glasner et al., 2006; Tate et al., 2004). The current study focused on those adults (70%) and youth (77%) who used any substances (alcohol or drugs) within the first 18 months after the initial treatment episode and were available to provide a detailed account of the situation during a follow-up interview (e.g., were not lost or passed away). Demographic and diagnostic characteristics of the youth (N=188) and adult (N=160) relapse samples are presented in Table 1.

The teen sample was drawn from four inpatient psychiatric and substance abuse treatment facilities in the San Diego area. These programs are abstinence-

focused, offer individual and group cognitive-behavioral therapy, and use a 12-step model of substance abuse treatment. Length of time in treatment generally varied from 5 days to 3 weeks (Abrantes et al., 2004). Youth were diagnosed with at least one SUD (alcohol or drug abuse/dependence) and at least one additional DSM-III-R Axis I psychiatric disorder (internalizing, externalizing, or both). The gender, ethnic, and socioeconomic composition of this sample is representative of the treatment programs from which the adolescents were drawn (all $p > .05$). Each participant in the study also had a resource person (RP) participate in the project with him/her. For adolescents, this RP is almost always a parent (96%); however, legal guardians (1%) and other family members (e.g., grandparents, aunts) with whom the adolescent lived and had ongoing (daily) contact were also included. Adolescents were excluded from the study 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).

The similarly screened and recruited adults for this study were originally recruited from consecutive admissions to an abstinence-based drug and alcohol treatment program and mental health program at the Veteran's Administration hospital in southern California. All adults were diagnosed with at least one AUD or SUD, and a portion were also diagnosed with nonsubstance Axis I disorders. Given the prevalence of antisocial personality disorder (ASPD) among SUD populations (Regier et al., 1990), such individuals were not excluded from the study. Exclusion criteria

were comparable to the adolescent sample. Adults were primarily male (90%), Caucasian (63%), and unemployed (88%), which is representative of veterans treated in these programs (e.g., Granholm, Anthenelli, Monteiro, Sevcik, & Stoler, 2003; see Table 1). Adults also had a resource person such as a partner or sibling who knew the participant well to corroborate background substance use and psychosocial information.

Procedure

In the adolescent study, parents/guardians were introduced to the study and asked to authorize chart screening for eligibility and teen screening as part of the admission process at each adolescent treatment facility. Research staff members then proceeded with preliminary chart review to determine teen eligibility for the study. If appropriate, youth and parents were separately invited to participate in this clinical research study and completed UCSD and site-specific IRB approved consent/assent. This procedure has resulted in 95% agreement for adolescents and parents who become involved in the study. If either teen or parent failed to sign the consent forms, the teen was not entered into the study. Adolescents and parents were informed of the monetary incentive for follow-up participation and that no one is paid during treatment.

Adolescents and their parents were separately interviewed by research staff during treatment (intake), and assessed 1, 2, 4, and 5 months by phone and 3, 6, 9, and 12 months in-person. Youth were not compensated while in treatment, but were paid between \$10 and \$40 for each monthly interview. A random sample of 10% of youth were administered a urine toxicology screen immediately following assessment. No

discrepancies were obtained between self report and toxicology results (i.e., all positive toxicology screens were substantiated by adolescents' verbal reports of use).

The adult sample was generated from two studies that recruited in a similar fashion as the youth sample. In both studies, adults were Veterans receiving treatment from the Alcohol and Drug Treatment Program and Substance Abuse Mental Illness Program in the San Diego Veteran's Administration Healthcare System. Most of the consecutive admission sample was treated in the 28-day residential treatment program (75%). Other patients 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 VA outpatient settings after inpatient treatment (12%). All inpatients were assigned to aftercare groups following treatment. All programs were 12-Step or cognitive behavioral therapy-based and had abstinence as a treatment goal. Interventions included psychoeducation/therapy groups and family support groups. 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.

In the first adult study ($N=141$), eligible and consenting adults completed structured and diagnostic interviews with research staff and self-report questionnaires following admission to treatment (1 to 2 weeks after last alcohol or drug use). As with youth, participants were contacted by phone at 1, 2, 4, and 5 months posttreatment. In-person follow-up interviews were conducted at 3, 6, 9, and 12 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. In the second adult

study (N=19), adults diagnosed with major depressive disorder and a 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 and 6 months posttreatment. Participants were included in analyses for the present study if they reported a relapse in the 3 or 6 month follow-up interviews.

In both adult studies, participants received \$30 for each quarterly follow-up interview and 20% were randomly selected for urine toxicology screens at each follow-up interview. A separate interviewer independently conducted collateral assessments within one week of the participants' interviews and collected data regarding participants' use of alcohol and other substances. Participant, collateral, and toxicology data were combined such that if any source indicated substance use, this was coded for analyses. No participants were excluded due to conflicting self-report and toxicology data; in 5 cases (3% of the total sample from both studies), the collateral reported use that the participant denied. Adults in the long-term follow-up study (n = 141) were compared to those in the efficacy study (n = 19), and there were no systematic differences in those veterans who participated in the two studies on age, sex, ethnicity, socioeconomic status, substance of choice or depression symptomatology (i.e., Beck Depression Inventory score at treatment discharge; all $p > .05$).

Measures

Demographic Characteristics. Adolescent participants were administered a Structured Clinical Interview (SCI; Brown et al., 1989) which assess demographics, living arrangements, medical history, family history of substance use disorders, medication review, school and work functioning, social functioning, and motivation for abstinence toward alcohol and drugs. Adult participants in the treatment outcome study were administered the Semistructured Assessment for the Genetics of Alcoholism (SSAGA; Bucholz et al., 1994), a comprehensive standardized structured psychiatric interview that was developed by the Collaborative Study on the Genetics of Alcoholism. 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. Demographic and background variables used in the present study for both adolescents and adults include gender, ethnicity, age, socio-economic status, and family history of drug and alcohol use disorders.

Psychopathology. Adolescents were 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. The DISC was separately administered to adolescents and their parents and subsequently composited using a standard protocol which has been shown to maximize reliability of diagnoses (Breton, Bergeron, Valla, Berthiaume, & St. George, 1998). Adults were administered the SSAGA or the CIDI, which diagnose alcohol and drug abuse/dependence and other psychiatric disorders. Adult and 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).

Context of First Substance Use. Adults and youth were given the Relapse Review, a version of the Contextual Cue Assessment (Marlatt & Gordon, 1985), that has been modified based on validity research demonstrating multiple precursors to relapse (e.g., Heather, Stallard, & Tebbutt, 1991; Longabaugh et al., 1996). 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 concerning their first substance use after treatment. It has been widely used in our work measuring adult and adolescent relapse processes (e.g., Brown et al., 1989; Anderson et al., 2007; Tate et al., 2004; Tomlinson, Tate, Anderson, McCarthy, & Brown, 2006). Participants provided a qualitative description of their first relapse episode, which was then coded into any of the following five dichotomous (presence or absence) pre-relapse contexts: negative intrapersonal states (e.g., coping with fear, depression, anxiety); negative physiological states (e.g., coping with physical pain); other intrapersonal experiences (e.g., dealing with urges and temptations to use, positive emotional state, testing personal control), interpersonal conflict (e.g., dealing with a negative interaction with others, tense around the opposite sex), and social pressure (in either the presence or absence of a direct offer). These five categories included each of the domains originally outlined by Marlatt and Gordon (1985), although were collapsed slightly such that *other intrapersonal states* included any internal experience that was not

negative (i.e., positive emotions, testing personal control, and coping with temptations in the presence or absence of cues). Interviewers were trained to ask specific, guided questions about relapse situations to elicit material about each of the domains which aided in making a dichotomous categorization. Interviewers were Bachelor- and Masters-level research staff who were trained by both the last author and the project coordinator. To ensure high inter-rater reliability, training was in a group format such that new interviewers were required to compare their ratings of mock relapses and then an actual relapse to those of well-established interviewers before they could assess on their own. Yearly trainings were also given for all research staff by the project coordinator.

Analyses

Dominant classes of relapse situations were identified based on latent class analysis (LCA). LCA is a statistical method used to describe the relationships among a set of categorical variables (Clogg, 1995). The assumption underlying LCA is that the frequencies with which different item endorsement profiles occur can be explained by a small number of mutually exclusive classes or subtypes, with each class having a distinctive “profile” of relapse characteristic endorsement probabilities that is constant for all members of that class (McCutcheon, 1987).

We have based our model selection on goodness of model fit, parsimony, and adequacy of the model with respect to the research questions being posed. The goodness of model fit is evaluated using a likelihood ratio X^2 test with degrees of freedom equal to $r + 1$, where r is the number of items used in the analysis. The second set of criteria are the Bayesian information criterion (BIC) and Aikake’s

information criterion (AIC) statistics that balance two components: maximizing the likelihood and keeping the model parsimonious. A low BIC value indicates a well-fitting model (Muthèn & Muthèn, 2000). A third consideration is the usefulness of the latent classes in practice. This is evaluated by the substantive interpretation of the classes in a given model, as well as the class membership probabilities (which may be thought of as the prevalence of participants in a given latent class). The entropy value, ranging from 0 to 1, is a measure of the clarity of classification, in that classification values that are close to 100% for individuals result in higher entropy and it can be a useful summary measure (Muthèn & Muthèn, 2000).

For a given model, parameter estimates include (1) class membership probabilities and (2) class-specific conditional response probabilities (CRPs). CRPs reflect the probability that an individual within a particular class has relapsed in a specific context (probability that the context was scored “present”). We characterized relapse classes by the CRPs for each relapse context, as well as by their estimated prevalence.

Results

Relapse Characteristics

In the adult sample, there were 160 individuals who experienced a relapse in the 18 months after their initial treatment episode (mean days to first use = 167.08, SD = 118.9). In the youth sample there were 188 relapsers (M = 90.23, SD = 85.9). Youth living situation after initial treatment episode was considered as a potential covariate in analyses, by examining whether discharge to a structured environment (e.g., group home) influenced relapse precursors. There were no significant differences in

frequency of relapse precursors between the youths who were placed in an unstructured environment (N=15) and those who were not (N=145). Thus, all analyses were conducted with the full youth subsample.

Frequencies of all five major relapse contexts and their more detailed sub-contexts are presented in Table 2. Adults were most likely to relapse in negative intrapersonal states (66.9%; most often when coping with frustration/anger or depression) or in other intrapersonal states (95%). Within other intrapersonal states, adults were most likely to relapse when coping with urges and temptations to use either in the presence (55%) or absence (26%) of cues.

Adolescents relapsed at similar rates as adults in negative intrapersonal (64.4%) and other intrapersonal states (86.7%); however, within other intrapersonal states, adolescents were most likely to relapse when experiencing a positive emotional state (41%) and when giving into temptations in the presence of cues (37.2%). Adults were more likely than adolescents to relapse when experiencing a negative physiological state (25% vs. 9%), while adolescents were more likely to relapse when experiencing social pressure (either directly or indirectly; 70% vs. 46%).

Typological approach to relapse contexts

Latent class analyses were applied to the five dichotomous relapse contexts of the adult and adolescent samples separately using the M-Plus program (Muthèn & Muthèn, 1998-2001). In the adult sample, models of 2 to 5 classes were evaluated. Model fit statistics for the 2- to 5-class solutions are presented in Table 3. While the AIC was slightly lower for the 3-class solution compared to the 2-class solution (760 vs. 776), the χ^2 , entropy, and BIC all favored the 2-class solution. When compared, the

BIC has been favored over the AIC as a model selection criterion (Li & Nyholt, 2001; Raferty, 2004). Thus, a multiple component 2-class solution fit the data best. The first class was labeled *Social and Urges* (67% of the sample), and had a high probability of relapsing in other intrapersonal states (most often giving into temptation in the presence or absence of cues) and when experiencing social pressure. Those in class 2, *Negative and Urges* (33% of the sample), were characterized by high probability of relapsing in a negative intrapersonal state (most often frustration/anger or depression) and another intrapersonal state (again, most commonly coping with urges). Conditional response probabilities of the five contexts are presented for the two relapse classes in Table 4.

In the teen sample 2- to 5-class solutions were again considered and model fit statistics are shown in Table 3. Like the adult sample, all criteria other than the AIC favored a 2-class solution over all others, and the difference between the AIC for the 2-class and 3-class solutions was negligible (949 for the 2-class solution vs. 946 for the 3-class solution). The first class consisted of individuals who had high probability of relapsing in other intrapersonal states (most often enhancing a positive emotional state) and social situations, and was thus labeled *Social and Positive* (69%). Class 2, which was less common (33%), consisted of those relapsing when in negative intrapersonal states, other intrapersonal states, with interpersonal conflict, and in social situations, and was thus labeled *Complex*. In order to clarify the results for the adolescents, post-hoc chi-square analyses were used to examine more specific contextual differences between the two relapse classes. Within the negative intrapersonal category, those in the *Complex* class were more likely to relapse when

experiencing all negative intrapersonal contexts (coping with frustration/anger, fear, depression, boredom, pressure) compared to those in the *Social and Positive* class ($X^2_{(8, 1)} = 69.01, p < .0001$). Within the other intrapersonal category, those in the *Complex* class were more likely to relapse when giving into temptations in the presence or absence of cues (62% vs. 28%), whereas those in the *Social and Positive* class were more likely to use to enhance a positive emotional state or when testing personal control (52.3% vs. 36.0%; $X^2_{(7, 1)} = 152.65, p < .0001$).

Discussion

The present study compared characteristic relapse patterns of adults and adolescents after drug and alcohol treatment. We found two classes of relapse patterns in both adolescents and adults with important differences between the age groups. Two-thirds of the adults relapsed in social situations in which they experienced urges and temptations to drink/use (*Social and Urges* class; 67%), and one-third relapsed when they were coping with a negative emotion and also urges and temptations to drink/use (*Negative and Urges* class; 33%). In contrast, most adolescents relapsed in social situations when they were trying to enhance a positive emotional state (*Social and Positive*; 69%), while a smaller group of adolescents relapsed when dealing with a conflictual interpersonal situation accompanied by negative emotions and efforts to cope with urges and social pressures to drink/use (*Complex*; 31%).

The results of this study provide insight into the complex nature of relapse in both adolescents and adults. Comparing the teen and adult latent class results is useful. Intrapersonal situations that were not negative (i.e., enhancing a positive emotional state, testing personal control, or giving into temptation in the presence or absence of

cues) did not differentiate any of the classes in either age group. However, relapsing while in a positive emotional state was five times more common among adolescents than adults (41.0% of the teen sample vs. 8.8% of adult sample). Further, among the teen sample, a positive emotional state was more common for those in the *Social and Positive* relapse class compared to those in the *Complex* relapse group. Thus, adults tended to be dealing with urges and/or temptations when they were in negative emotional states and also when they were in social situations when they may have been confronted with direct or indirect pressures to use. By contrast, adolescents relapsed when they had urges or temptations most often when they were also experiencing negative emotions, a negative interpersonal situation, and while in the presence of others. Youth were more often using to enhance a positive emotional state when they were in social situations. These patterns are consistent with the overall finding that the most common individual relapse precursor in adults is a negative emotional state (Marlatt & Gordon, 1985) and that in adolescents it is social situations (Brown et al., 1989; Myers & Brown, 1990).

Further, the adult relapse classes were less complex (two predominant precursors in each class) than youth relapse patterns. For example, the *Complex* class of adolescents was made up of four of five possible relapse precursors (all except negative physiological states). This suggests that adolescents may have had limited experiences with alcohol and drug lapses or relapses compared to adults and thus exhibit less distinct patterns of relapse contexts. This is consistent with literature describing other important cognitive and behavioral constructs suggesting that adolescents have less distinctive patterns of thinking when they are young which

become more specialized or crystallized throughout development. Constructs that have exhibited this refinement in the content of cognitions have been expectancies of the effects of alcohol (Christiansen, Goldman & Brown, 1985; Deas, Riggs, Langenbucher, Goldman, & Brown, 2000; Dunn & Goldman, 1998) and coping self efficacy (Ramo et al., in press).

There are multiple treatment implications for the findings presented here. It is clear that among both adults and adolescents, multiple personal and environmental factors influence each relapse (Brown & Ramo, 2006; Witkowitz & Marlatt, 2004). Thus, these findings suggest that relapse prevention portions of substance abuse treatment programs should target multiple relapse antecedents rather than just one primary antecedent. Further, particular attention should be paid to urges as a precursor among adult users regardless of emotional state or social situation, whereas adolescents might need different relapse prevention foci depending on the emotional state that occurs most often (e.g., negative vs. positive).

This study benefits from a number of strengths, including making use of detailed clinician-rated information on relapse characteristics and the ability to examine relapse characteristics in both adolescents and adults using comparable methods. Further, our adult and teen samples offered ample power to detect relapse class structure. In addition, we applied a relatively novel technique (latent class analysis) to subtype patterns of relapses in adolescents and adults. Although previous studies have used analytic approaches to understand the way relapse situations cluster (Anderson et al., 2007; Tate et al., 2004), these have tended to be variable-centered approaches rather than person-centered approaches. Our method allows clinicians to

target relapse prevention to the clusters of situations that most often occur in adolescents and also adults.

The teen and adult samples used in this study represented concomitant psychopathology common among those in treatment for substance dependence and comorbid Axis I disorders. Since psychiatric comorbidity places both youth and adults at risk for a unique and potentially dangerous course of substance use following treatment (e.g., Compton, Cottler, Jacobs, Ben-Abdallah, & Spitznagel, 2003; Greenfield et al., 1998; Grella, Hser, Joshi, Rounds-Bryant, 2001), it will be important in the future to examine how psychiatric symptoms might influence the relapse class to which a person belongs. In addition, our findings need to be extended to those with fewer types of comorbidity and to large enough samples so that subgroup analyses can determine generalizability across other demographic groups. Finally, future research comparing youth and adults should incorporate important predictors of relapse for youth and adults that were not included in the present study (e.g., 12-Step attendance; Kelly & Myers, 2007; Thurstin, Alfano, & Nervioano, 1987; family and other relationship variables; McCrady, Epstein, & Hirsch, 1999; Rowe & Liddle, 2006).

Another important consideration is that our sample of adults was largely male, which is consistent with enrollment in substance abuse treatment programs in the Veteran's Administration Healthcare System. There were no specific hypotheses about gender differences in relapse patterns, as Marlatt's taxonomy of relapse precursors holds for both males and females in substance abuse treatment (Rubin, Stout, & Longabaugh, 1996). However, it would be useful to replicate these findings with a sample of adults that is more heterogeneous with respect to gender. Further,

participants for this study took part in community- and hospital-based treatment programs which were largely practice-oriented. It would also be useful to know whether these latent classes hold for those individuals who have undergone clinical trials of substance-abuse interventions, or have participated in programs that have adopted evidence-based practices, since these since these programs tend to have somewhat lower relapse rates than the community-based programs (e.g., Project MATCH Research Group, 1998). Finally, this study focused only on initial relapse circumstances, and future research should evaluate whether subsequent relapses follows similar patterns.

Findings from the current study underscore the utility of considering person-centered approaches in the study of alcohol and drug relapse patterns. This information can be applied to treatment settings in which relapse prevention is an active goal, including both substance abuse and psychiatric treatment. Clinicians can focus prevention efforts on the situations that are most common to a given client's developmental stage and vulnerabilities (e.g., situations in which they commonly used before treatment). Knowledge about contextual patterns further helps to target the situations in which adolescents and adults might be most vulnerable to relapse after treatment.

Chapter 3, in full, has been accepted for publication in as "Classes of relapse situations: A comparison of adolescents and adults," by D.E. Ramo, & S.A. Brown, in press, *Psychology of Addictive Behaviors*. Copyright 2008 by the American Psychological Association. The dissertation author was the primary investigator and author of this paper.

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Chapter 3, Table 1.

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

	Adults (n=160)	Adolescents (N=188)
Gender (% male)	90	45
Years of age (SD)	44.8 (8.0)	15.9 (1.2)
Ethnicity (%)		
Caucasian	64	74
Hispanic	11	18
African-American	21	3
Other	5	5
Years of Education (SD)	13.0 (2.0)	8.9 (1.3)
Marital Status (%)	Self	Parents
Married	18	41
Widowed	4	0
Separated	14	10
Divorced	40	44
Single (never married)	26	10
Employment Status (%)		
Full time	5	7
Part time	7	28
Retired/Disability	46	
Unemployed or Never worked	41	75
Substance Use Disorder ^a (%)		
Alcohol	92.5	16.9
Cannabis	47.5	42.9
Cocaine	37.5	1.6
Amphetamine	41.3	27.2
Sedative	13.8	1.1
Opioid	15.6	.5
Other	4.4	9.8
Comorbid Psychopathology (%)		
ASPD (adults)/Conduct Disorder (teens)	16.9	86.0
Panic Disorder	3.8	4.6
OCD	5.0	23.7
PTSD	28.1	--
GAD	1.9	16.0
Schizophrenia	5.0	--
Major Depression/Dysthymia	18.1	62.6
Bipolar Disorder	6.3	19.8
ADHD	N/A	34.4

^aAdults = current, Adolescents = primary

--Adolescents were not screened for either Schizophrenia or PTSD.

Chapter 3, Table 2.

Relapse characteristics for adults and adolescents in the 18 months after alcohol/drug treatment (%)

Relapse Category	Adults (N=160)	Adolescents (N=188)
Negative intrapersonal state	66.9	64.4
Coping with frustration/anger	30.0	16.0
Coping with fear	2.5	.5
Coping with depression	14.4	14.9
Coping with boredom	3.1	16.0
Concern about doing something (pressure, anxiety)	3.1	4.8
Anxiety	11.3	10.1
Concern for feeling like a failure	1.9	1.6
Other	.6	.5
Negative physiological state	25.6	9.0
Other intrapersonal state	95.0	86.7
Enhancing a positive emotional state	8.8	41.0
Test personal control	3.1	6.4
Give into temptations in the presence of cues	55.0	37.2
Give into temptations in the absence of cues	26.3	1.6
Other	1.9	0
Interpersonal	30.0	36.2
Coping with frustration/anger	15.6	17.0
Feeling criticized	.6	3.2
Feeling rejected	2.5	2.7
Disappointment in a person	4.4	1.1
Tense around others	5.6	6.4
Nervous/uptight around the opposite sex	.6	3.7
Other	.6	2.1
Social Pressure	45.6	70.2
Direct (e.g., an offer)	28.8	44.7
Indirect (e.g., cues, but no offer)	16.9	25.5

Chapter 3, Table 3.

Model fit statistics for adult and teen latent class models

Model	χ^2 (df)	p-value	BIC	AIC	Entropy
Adult					
2-class	14.2 (20)	.82	810	776	1.00
3-class	4.09 (14)	.99	811	760	.92
4-class	1.80 (8)	.99	839	769	.95
5-class	.26 (2)	.88	868	780	.77
Adolescent					
2-class	24.35 (20)	.22	984	949	.76
3-class	9.79 (14)	.78	1001	946	.75
4-class	6.69 (8)	.57	1029	955	.66
5-class	3.85 (2)	.15	1058	964	.76

Chapter 3, Table 4.

*Conditional response probabilities for the adult and adolescent latent class analyses
(% of yes response)*

Item	Adults (N = 160)		Adolescents (N = 188)	
	Social & Urges (67%)	Negative & Urges (33%)	Social & Positive (69%)	Complex (31%)
Negative intrapersonal	0.0	100.0	50.1	97.8
Negative physiological	13.2	31.8	.06	15.6
Other intrapersonal	100.0	92.5	81.2	99.7
Interpersonal	1.9	43.9	11.1	95.0
Social	86.8	25.2	61.3	91.0

CHAPTER 4

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

Abstract

Research regarding the process of addictive relapse has uncovered important developmental differences in the key predictors of use after treatment. While affective distress predicts worse outcomes for teens and adults, coping self-efficacy appears to be a stronger predictor for adults than for teens. The present study tested whether self-efficacy mediates the relationship between depression symptoms and initial abstinence duration after treatment in adolescents (N = 208) and adults (N = 160) separately. Adults and adolescents in substance abuse and psychiatric treatment were followed up to 2 years after discharge to gather detailed information about affective state (depression symptoms), drug-taking coping self-efficacy and length of abstinence after treatment. In adolescents, self-efficacy fully mediated the relationship between depression and time to use. In adults, depression was negatively associated with self-efficacy, and self-efficacy predicted time to first substance use, but there was no mediation. Findings are discussed in relation to developmental and clinical considerations in treating clients with substance use disorders and comorbid psychopathology.

Introduction

The process of relapse to addictive behaviors has been one of the most challenging issues for researchers, clinicians and others who seek to understand and

treat these behaviors. Cognitive and behavioral models of relapse have dominated the conceptual landscape for almost three decades (see Witkiewitz & Marlatt, 2004 for a review). The original cognitive behavioral model of addiction relapse proposed by Marlatt and colleagues (see top layer of Figure 1; Marlatt & Gordon, 1980) has been compelling in its description of how personal characteristics (e.g., self-efficacy, coping resources) interact with contextual factors (e.g., high risk situations) to predict a return to substance use in adults who are motivated to abstain from addictive substances. This model has been tested by a number of research groups (e.g., Longabaugh, Rubin, Stout, Zywiak, & Lowman, 1996) and is the basis for widely used interventions to prevent relapse (Marlatt & Donovan, 2005).

Studies of adolescent substance abuse relapse suggest that the major components of the cognitive behavioral model are relevant to adolescent relapse (e.g., coping predicts posttreatment substance use; Myers & Brown, 1990b), yet significant differences exist in both the content and process of youth relapse compared to adults. In their Youth Relapse Model, S. Brown and colleagues (Brown, 2004; Brown & Ramo, 2006) have incorporated developmental and interpersonal factors shown to be particularly important for youth relapse (see round figures in Figure 1). Among these factors are contextual features of high-risk situations (Anderson, Frissell, & Brown, 2007; Brown, Stetson, & Beatty, 1989), reduced vigilance and heightened cue reactivity as compared to adults (Myers & Brown, 1990a; Tapert & Schwienburg, 2006), differential patterns of motivation (Brown, 1999, 2004; Kelly, Myers, & Brown, 2000) and social information processing (Brown, Stetson et al., 1989), as well as environmental constraints (e.g., Kypri, McCarthy, Coe, & Brown, 2004). Most of

the work leading to our understanding of relapse to date has been conducted on adult or youth samples independently. In order to most effectively examine whether there are distinct differences in the relapse process for youth and adults, it is important to compare this process simultaneously in both age groups. The present study does this by comparing the role of self-efficacy and depression symptoms in the posttreatment relapse process for teens and adults.

One important feature of most relapse models is the importance of coping self-efficacy, which has been found to influence the course of treatment and patterns of relapse in the addictive behaviors. 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 has been incorporated into the Cognitive-Behavioral Model of relapse as a key determinant of behavior in potential relapse situations (Marlatt & Gordon, 1980; Brown & Ramo, 2006; Witkiewitz & Marlatt, 2004). Within this theoretical framework, higher confidence that one can abstain in the face of substance use situations increases the probability of actually resisting urges and pressures to relapse after a period of abstinence. Indeed, coping self-efficacy has been found to predict adult relapse to alcohol (e.g., Solomon & Annis, 1990), drug (e.g., Burling, Reilly, Moltzen & Ziff, 1989), and cigarette use (e.g., Etter, Bergman, Humar, & Perneger, 2000) after treatment.

Among youth, evidence as to the role of self-efficacy in outcomes from addiction treatment is mixed. Self-efficacy plays a strong theoretical role in the Youth Relapse Model (see Figure 1) and has been incorporated into interventions designed to treat adolescent substance abuse and dependence (e.g., Dennis et al., 2002; Ramo,

Brown, & Myers, 2007). However, some recent work has suggested that self-efficacy may not serve as strong a protective role in relapse as it does for adults. For example, Burlison and Kaminer (2005) examined self-efficacy as it related to drug use behavior in youth who were randomized to either a cognitive-behavioral treatment or psychoeducation group therapy. They found that substance use to enhance positive affect before treatment was associated with less substance use during treatment, but confidence in resisting urges to use was not associated with substance use during or following treatment, in either condition.

Psychiatric comorbidity is also found to play an important role in addictive relapse. In particular, depression comorbidity is high among both substance use disordered (SUD) adults and adolescents. Of SUD adults, more than a quarter in community samples (Merikangas & Gelernter, 1990; Regier et al., 1990) and up to half in clinical samples (Compton, Cottler, Jacobs, Ben-Abdallah, & Spitznagel, 2000; Hesselbrock, Meyer, & Keener, 1985) 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 (Bukstein, 2001; Clark & Neighbors, 1996; Greenbaum, Foster-Johnson, & Pettila, 1996; Kaminer, Burlison, & Goldberger, 2002; Stowell & Estroff, 1992). 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 et al., 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; Tomlinson, Brown, & Abrantes, 2004). Thus, psychiatric disorders in general and internalizing disorders in particular 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. In a study of the effects of depression on treatment outcomes in cocaine-abusing patients in treatment, R. Brown and colleagues (Brown, Monti et al., 1998) found that depression symptoms, rather than a diagnosis of depression, were associated with urges to use cocaine and alcohol in high-risk situations. The most common precursor to relapse among adults is a negative emotional state (Marlatt & Gordon, 1980), suggesting that those who are prone to these states 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). This suggests that in youth, as in adults, the presence of affective distress indicates a risk for addiction relapse.

One suggested 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 (for reviews see Clark & Beck, 1999; Solomon & Haaga, 2003). In addition, among teens and adults who are diagnosed with SUDs, substance use and relapse often occur as a direct result of affective distress (Marlatt, 1996, Anderson et al., 2007). 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, the models posit a similar pathway across age groups by which these two constructs influence substance use following a period of abstinence.

The present study examines key components of the relapse process for youth and adults. Specifically, it investigates whether coping self-efficacy mediates the relationship between depression and length of abstinence following treatment for substance abuse in adolescents and adults. 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. We hypothesize that among youth, depression would be associated with shorter length of abstinence and lower coping self-efficacy, based on similarities in existing literature across age-groups. However, since the relationship between self-efficacy and length of time to relapse is weaker in adolescents, 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. Among adults, 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).

Methods

Participants

Participants for the current study were drawn from 229 adults and 244 adolescents participating in three similarly-designed longitudinal projects (one adolescent study, two adult studies) evaluating the clinical course following treatment for SUDs (Abrantes, Brown & Tomlinson, 2004; Brown, Glasner et al., 2006; Tate, et al., 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. All adults were similarly 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 208 youth (85%) who used any substances (alcohol or drugs) in the 24 months after completion of the initial treatment episode, and 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.

Participants received inpatient or outpatient alcohol, drug and psychiatric treatment in the San Diego area. 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. In both adult studies, participants were veterans receiving treatment from the Alcohol and Drug Treatment Program and Substance Abuse Mental Illness 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 12-Step or cognitive behaviorally-based and had abstinence as a treatment goal. Interventions included psychoeducation, therapy, and family support groups. 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.

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. Adults also had a resource person participate in the study (e.g., partner, sibling) who could corroborate substance use and psychosocial information. Participants 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 and diagnostic characteristics of the youth and adult samples are presented in Table 1. Adolescents were age 13-17 and mainly Caucasian (74%) which is typical of treatment programs in Southern California. Adults were primarily male (90%), Caucasian (63%), and unemployed (88%), which is representative of the population treated at the Veteran's Administration treatment programs (e.g., Granholm, Anthenelli, Monteiro, Sevcik, & Stoler, 2003).

Of the adults and teens who used at least once after treatment, there were seven adults (4.4%) and 41 adolescents (19.7%) who were not available to provide information on depression symptoms in any interviews before they relapsed. Further, there were 3 adults (1.9%) and 63 adolescents (30.3%) who did not provide information on drug-taking self-efficacy in any interviews before they relapsed. The participants (both adults and teens) 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 and 208 teens who used in the 24 months after treatment.

Procedure

In the youth study, parents/guardians authorized chart screening for teen eligibility as part of the admission process at each treatment facility. If 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 10% of youth were administered a urine toxicology screen immediately following assessment.

The adult sample was generated from two studies that recruited in a similar fashion as the youth study. 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). As with youth, 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 adult 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 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. George, 1998).

For background and diagnostic information, adult participants in the treatment outcome study were administered the Semistructured Assessment for the Genetics of Alcoholism (SSAGA; Bucholz et al., 1994), a comprehensive standardized structured psychiatric interview that was developed by the Collaborative Study on the Genetics of Alcoholism. 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. Adult and 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. This clinician interview is a valid assessment tool for the measurement of depression symptoms and has high sensitivity and specificity for diagnosis of depression in adult alcoholics (Willenbring, 1986). 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. In the adult sample, the HDRS was administered when adults came into the study (intake), and every three months thereafter up to 1 year. For every participant (youth and adults), 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 samples and for the adults whose drug of choice was a drug other than alcohol. Adults whose drug of choice was alcohol were administered the Situational Confidence Questionnaire (SCQ; Annis & Graham, 1988). These measures assess coping self-efficacy in 50 (DTCQ) and 42 (SCQ) 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 and SCQ predict the probability that an individual will relapse. For youth and adults, we used the total self-efficacy score for the completed assessment most closely preceding their 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 summed and z-transformed to reflect self-efficacy for drug of choice in teens and adults.

To assess relapse, adults and 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 (e.g., Heather, Stallard, & Tebbutt, 1991; Longabaugh et al., 1996). 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 adult and adolescent relapse processes (e.g., Brown et al., 1989; Anderson et al., 2007; Tate et al., 2004; Tomlinson, Tate, Anderson, McCarthy, & Brown,

2006). 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: 0-405 days).

Statistical Analyses

To determine which datapoints 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.

Separate analyses were conducted for the youth and adult samples. 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. First, the independent variable and the outcome variable must be related. Second, the independent variable and mediating variables must be related. And third, 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, but does not reduce it to nonsignificance. 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 & Cudek, 1993), with values less than .08 indicating reasonable model fit; and model chi-square.

Results

Table 2 shows descriptive characteristics of depression, self-efficacy, and length of abstinence in the teen and adults samples separately. Adults had a significantly longer time to relapse than did youth (pre-transformed means: 59 days vs. 167 days; $F = 17.97, p < .05$). There were no significant differences between adult and adolescent groups on self-efficacy or depression.

All variables were examined for normality (skewness and kurtosis). In the adolescent and adults samples, the initial abstinence duration variable was significantly skewed and kurtotic and thus it was log-transformed. Since self-efficacy was measured using two different scales in the adult sample, z-scores were used for all subsequent analyses. Since there were differences in the amount of time between depression/self-efficacy measurement and initial abstinence duration for each participant, this length of time was examined as a potential covariate. In the teen sample, duration between depression measurement and initial abstinence duration was not significantly related to initial abstinence duration and thus was not used as a covariate. In the adult sample, this measurement was significantly related to initial abstinence duration and thus was used as a covariate in all path analyses.

Missing Data Imputation

Of the 208 adolescents who used in the 18 months after treatment, there were 167 HDRS interviews (80.3%) and 145 DTCQ scores (69.7%) in the period of time before they first used. Among the teens, there were no significant differences between those who had HDRS 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 DTCQ 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.). 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.

Missing data was handled using full information maximum likelihood estimation (FIML). FIML estimation has been found to provide unbiased estimates if data are missing at random. Missing at random (MAR) is a condition which exists when missing values are not randomly distributed across all observations but are randomly distributed within one or more subsamples (e.g., missing more among whites than non-whites, but random within each subsample; Klein, 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 (Little & Rubin, 1989; 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.

Test of Mediation: Adolescents

In order to test mediation, three different path models were used. 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). It also did not fit well statistically ($X^2_{(2)} = 47.9, p < .0001$).

The second path model 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 did not fit well statistically ($X^2_{(1)} = 3.7, p < .0001$).

The third and final model tested whether self-efficacy mediated the relationship between depression and length of abstinence, which we tested with the path diagram presented in Figure 2. 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.

Test of Mediation: Adults

In adults, the same method was used to test mediation. 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 ($B = -.22$). Both CFI (.57) and RMSEA (.11) indicated poor model fit and the model did not fit well statistically ($X^2_{(2)} = 12.2, p < .05$). The second path model, specifying 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 is presented in Figure 3. 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 ($B = .19$). 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. Standardized path coefficients were significant between depression and self-efficacy ($B = -.25$) and depression and length of abstinence ($B = -.18$). 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. This model fit poorly by model fit criteria ($X^2_{(5)} = 134.91, p < .0001$; CFI = .129, RMSEA = .40) and thus, Model 2 emerged as the final, best-fitting model to describe the adult data.

Discussion

This study 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 best-fitting adolescent model indicated that self-efficacy fully mediated the relationship between depression symptoms and initial abstinence duration. These results, although inconsistent with our hypothesis, are consistent with the Youth Relapse Model premise that affective distress makes teens vulnerable to more rapid relapse in part by influencing substance use-related cognitions. However, these findings contrast with recent evidence that self-efficacy assessed during treatment is not related to relapse (Burlison & 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 Burlison 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 their 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, whereas this relationship between self-efficacy and relapse was stronger when it was measured more proximally to the episode. 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 in this area is that we examined abstinence duration 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, Burlison 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 confirm that self-efficacy is a protective factor against using in high risk situations, or whether it will keep those who have depressive symptoms from using. As such, it will be important to replicate the present analysis with teens and adults 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 that there is 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 and 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. (in press) 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 factor infrequently

considered 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 by 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.

This study has a number of strengths. First, this sample provides the opportunity to simultaneously examine 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 this study supported relapse as a dynamic process (Witkiewitz & Marlatt, 2004). This type of design is an important step toward

elucidating the cognitive and behavioral factors associated with relapse to addictive behaviors across the lifespan.

This study also had some limitations. First, data 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, this study 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, this study is limited in the conclusions it 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. Finally, the adult sample was made up of primarily male veterans, 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.

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.

Chapter 4, in full, has been submitted for publication of the material as it may appear in *Behavior Therapy*, by D.E. Ramo, M.G. Myers, & S.A. Brown. Copyright 2008 by Elsevier. The dissertation author was the primary investigator and author of this paper.

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Chapter 4, Table 1.

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

	Adolescents (N=208)	Adults (n=160)
Gender (% male)	46	90
Age (mean years)	15.9 (1.2)	44.8 (8.0)
Ethnicity (%)		
Caucasian	74	64
Hispanic	18	11
African-American	3	21
Other	5	5
Years of Education (SD)	8.8 (1.3)	13.0 (2.0)
Marital Status (%)	Parents	Self
Married	39	18
Separated	9	14
Divorced/Widowed	47	44
Single (never married)	4.3	26
Employment Status (%)		
Full time	6	5
Part time	19	7
Retired/Disability	--	46
Unemployed or Never worked	75	41
Substance use disorder (%)		
Alcohol	17.2	92.5
Cannabis	43.1	47.5
Cocaine	1.6	37.5
Amphetamine	27.2	41.3
Sedative	1.1	13.8
Opioid	.5	15.6
Other	9.8	4.4
Comorbid Psychopathology (%)		
ASPD (adults)/Conduct Disorder (teens)	84.1	16.9
Panic Disorder	4.9	3.8
OCD	23.1	5.0
PTSD		28.1
GAD	15.4	1.9
Schizophrenia		5.0
Major Depression/Dysthymia	62.9	18.1
Bipolar Disorder	23.1	6.3
ADHD	34.3	

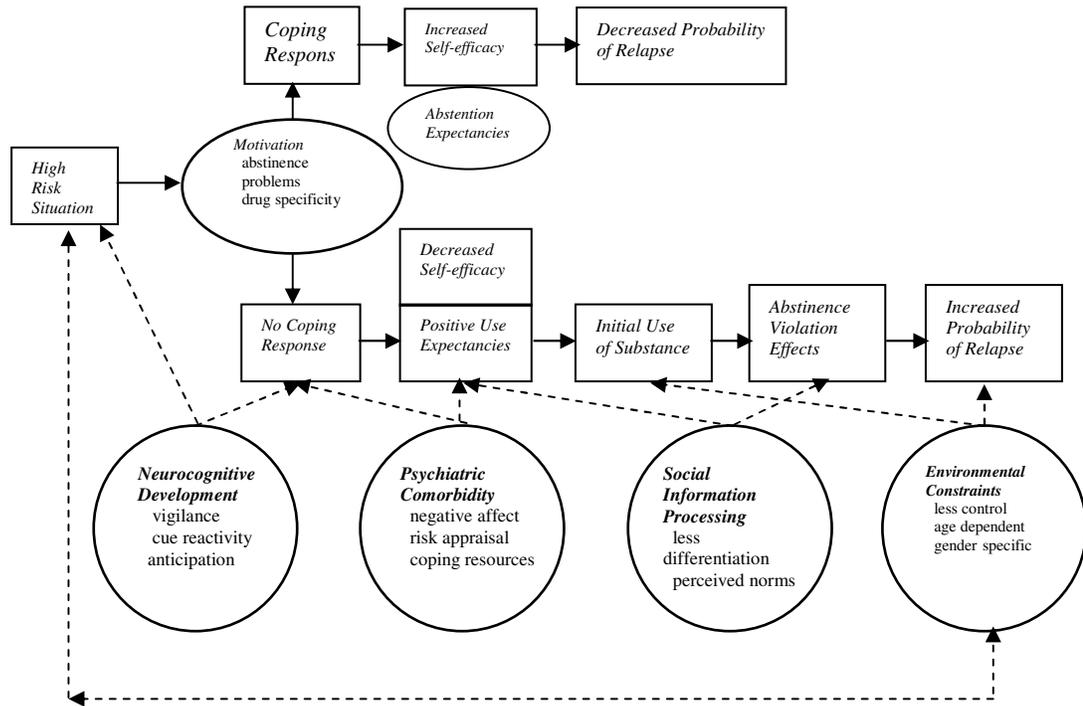
Chapter 4, Table 2.

Means (standard deviations) for Independent variables (depression, self-efficacy) and DV (length of time to relapse) in adolescent and adult samples.

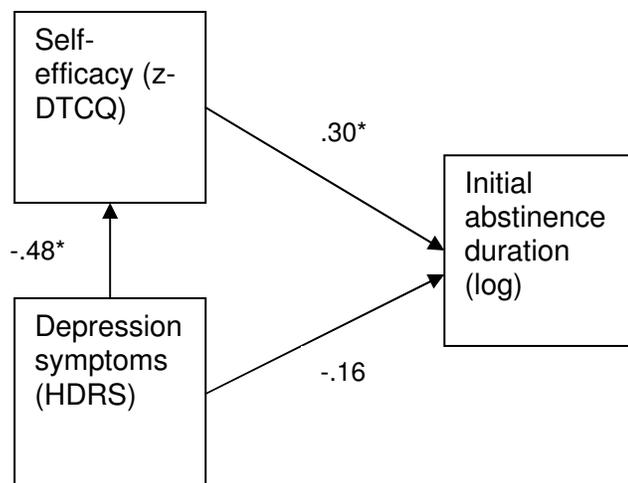
	<i>Adolescent sample (N = 208)</i>	<i>Adult sample (N = 160)</i>	<i>F</i>
Depression (HDRS)	18.35 (11.9)	19.57 (10.9)	0.41
Self-efficacy (DTCQ; max = 250)	161.96 (66.9)	177.42 (61.8)	1.35
Self-efficacy (SCQ; max = 210)		155.22 (51.3)	N/A
Days until first use	59.87 (68.0)	167.08 (118.9)	17.97*

Note. Mean difference test conducted on the full adolescent sample and those adults who's drug of choice was a drug other than alcohol (n = 71). Mean SCQ score is presented for those adults whose drug of choice was alcohol.

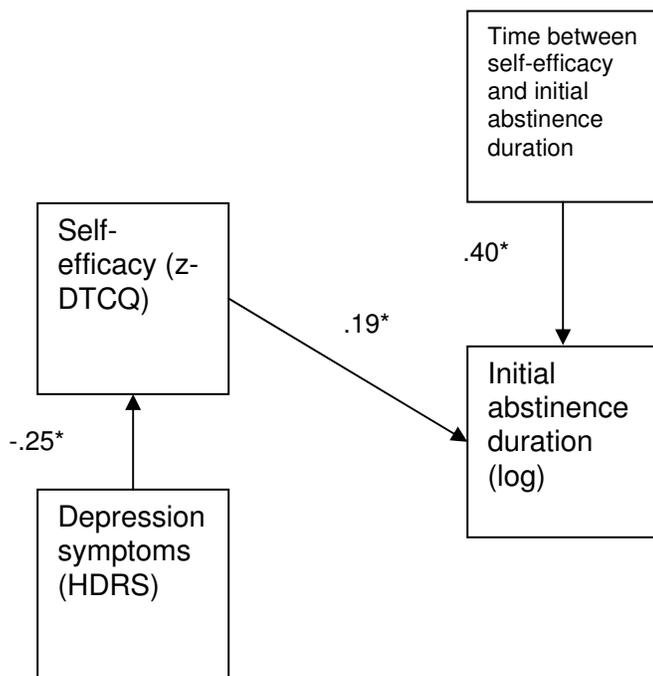
*p<.05



Chapter 4, Figure 1. *Modified cognitive behavioral model of adolescent addiction relapse.* Note: From “Measuring youth outcomes from alcohol and drug treatment,” by S.A. Brown, in press, *Addictions*. Cognitive behavioral model of relapse from “Relapse Prevention: Maintenance Strategies in the Treatment of Addictive Behaviors,” by G.A. Marlatt & J.A. Gordon, 1985. Copyright 1985 by Guilford Press. Reprinted with permission.



Chapter 4, Figure 2. *Path model of the relationships between depression symptoms, drug-taking self-efficacy, and length of abstinence in adolescents.*



Chapter 4, Figure 3. *Path model of the relationships between depression symptoms, drug-taking self-efficacy, and length of abstinence in adults.*

CHAPTER 5

GENERAL DISCUSSION

The three studies presented here take a developmental approach to explore the addiction relapse process, highlighting unique aspects of adolescence as compared to adulthood. The first study considered characteristics of relapse among adolescents with comorbid psychiatric disorders. Findings were that teens who relapsed very soon after treatment were more likely to use drugs other than alcohol or marijuana, while those who relapsed later were more likely to relapse in the company of peers when there was direct social pressure to use. Further, self-efficacy and psychiatric symptoms, two factors known to be associated with relapse in adults (Brown, Monti et al., 1998; Solomon & Annis, 1990), played an important role in predicting relapse when these youth were in a negative emotional state or experiencing conflict. These findings compare to those with comorbid adults, for whom relapse is more likely to be preceded by a negative emotional state than their SUD-only peers (Tate, Brown, Unrod, & Ramo, 2005). However, comorbid adults are also more likely to relapse when they are alone and less likely to relapse in any interpersonal situations including interpersonal conflict, compared to their non comorbid peers. Previous studies of youth relapse have highlighted the importance of interpersonal situations in predicting relapse, especially the influence of peers, who may be presenting direct or indirect pressure to use (e.g., Myers & Brown, 1990). Study 1 further demonstrates the influence of interpersonal factors on youth relapse, but draws particular attention to negative situations, both interpersonal and intrapersonal, as high risks for relapse in youth with co-occurring psychiatric conditions.

Study 2 was the first to directly compare the relapse process with an adolescent and adult sample in the same study, and sought to identify latent classes of relapse precursors in each age group. While both teens and adults demonstrated two unique classes of relapse precursors, the make-up of classes was quite different across age groups. Adult classes each had two primary precursors: *Social and urges* (primary precursors: social pressure situations and urges; 67%), and *negative and urges* (primary precursors: negative affect and urges; 33%). In contrast, teen relapse classes were not as distinct: *Social and positive* (primary precursors: enhancing a positive emotional state and social pressure; 69%), and *complex* (primary precursors: negative affect, negative interpersonal situations, social pressure, and urges; 31%). This finding is consistent with other areas of youth relapse literature, showing that youth tend to show less differentiated patterns of cognition and behavior, which become more distinct as they age and gain more experience with substance use (Christiansen, Goldman, & Brown, 1985; Deas, Riggs, Langenbucher, Goldman, & Brown, 2000; Dunn & Goldman, 1998; Ramo, Myers, & Brown, in press).

Study 3, further characterized relapse patterns in youth and adults by comparing a model of the relationship between depression, drug-related coping self-efficacy, and time to first use in youth and adults separately. In adults, the best fitting model demonstrated significant associations between depression symptoms and self-efficacy, and self-efficacy and initial abstinence duration, but no relationship between depression and initial abstinence duration. In youth, self-efficacy fully mediated the relationship between depression symptoms and initial abstinence duration. This study

made use of multiple prospective measurements of self-efficacy and depression, and demonstrated that self-efficacy had a greater influence on youth relapse than had been shown in previous studies (Burleson & Kaminer, 2005; Ramo & Brown, 2003, November). The study showed that the adolescent data confirmed the Youth Relapse Model's premise that one mechanism by which negative affect leads to quicker use after treatment is via by altering cognitions such as self-efficacy. The adult findings were less consistent with the cognitive-behavioral rationale, perhaps because the construct of negative affect was defined too narrowly, or because many of those in the study were experiencing clinical depression.

Taken together, the results of these three studies highlight the dynamic nature of the relapse process across the lifespan. While there are some factors that tend to be more salient for youth, such as the influence of peers and positive affective states compared to adults, there are clearly factors that influence both age groups strongly, including comorbid psychopathology and self-efficacy. The findings here highlight the importance of the person-environment interaction in understanding relapse. Clinicians should consider developmental stage in their treatment of substance abusing clients, but also cognitive (e.g., self-efficacy) and behavioral (e.g., high-risk situations) factors that are known to vary between adolescents and adults. Researchers and clinicians who have an interest in preventing relapse should ideally tailor interventions to these target characteristics in each of their clients by assessing high risk situations, psychiatric symptoms, and self-efficacy often as they are working with both teens and adults.

The present studies were conducted with youth who had co-occurring mental health problems in addition to just substance use disorders. While many of the youth who present for alcohol and drug treatment have co-occurring disorders (Greenbaum, Foster-Johnson, & Petrila, 1996), these studies should be extended to more diverse samples of youth presenting for SUD treatment: those with and without comorbid psychopathology. Similarly, the adults in Studies 2 and 3 were Veterans presenting to inpatient and outpatient treatment at the San Diego Veteran's Administration healthcare system. Most of these participants were men, which is typical of Veteran's Administration substance abuse treatment programs. These studies should also be replicated with samples that include more women.

The studies presented here, while unique in their tests of the Cognitive Behavioral and Youth Relapse models, do not consider many of the factors known to be associated with relapse across the lifespan. For example, neurocognitive aspects of addiction play a differential role on relapse in teens compared to adults (e.g., Riggs et al., 2007), and access to substances increases as youth become more independent, affecting the extent to which relapse may occur after treatment (Kypri, McCarthy, Coe, & Brown, 2004). Future research in the examination of developmental aspects of relapse should expand their scope by incorporating these factors.

These studies have furthered the body of work identifying ways in which the process of addiction relapse is complex. They highlight the importance of more longitudinal studies that take advantage of state-of-the-art statistical methods to identify ways that treatment can be better targeted both developmentally and individually. With study methods that mirror the dynamic nature of the relapse

process, it will become increasingly easier to design treatments that best help those afflicted with addictive disorders.

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