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Situational Determinants of Use and Treatment Outcomes in Marijuana Dependent Adults

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Abstract

Research and theory strongly support the importance of situational determinants of substance use as targets for intervention, but few studies have systematically examined situational use characteristics in marijuana dependent adults. The present study describes situational use of marijuana in a population of 87 marijuana dependent adults and reports relationships with outcomes of treatment. Use in negative affective situations was independently associated with psychological distress, maladaptive coping strategies, lower self-efficacy, and poorer outcomes post-treatment. The findings were consistent with research on using drugs to cope with negative affect providing evidence of convergence between two different methods of assessing high risk situations for substance use. The results support continued emphasis on coping with negative affect as a target in treatments for marijuana dependence.

Keywords

marijuana; addiction treatment; situational determinants

1. Introduction

Illicit drug abuse and dependence are prevalent problems in the United States. The 2011 Substance Abuse and Mental Health Services Administration (SAMHSA) National Survey on Drug Use and Health estimated that 14.9% of the U.S. population age 12 or older had used illicit drugs in the past year (SAMHSA, 2011). Results indicated that marijuana use was by far the most common illicit drug of use, with 11.5% of the population using the substance in the previous year. Among users, 35.6% meet diagnostic criteria for marijuana abuse or dependence (Compton, Grant, Colliver, Glantz, & Stinson, 2004). Long-term, chronic use of marijuana has been associated with various physical and psychological problems, including respiratory issues and problems with attention, memory, and concentration (see Stephens & Banes, in press, for a comprehensive review). Additionally, individuals who are chronic users report a variety of problems as a result of marijuana use,

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such as guilt, lower energy level, lower self-esteem, and relationship problems (Stephens, Babor, Kadden, & Miller, 2002). There is a need to identify and understand individual differences and processes that predict persistent problematic use and response to treatment.

Substantial research supports a cognitive behavioral theory of substance abuse (e.g., Marlatt, Baer, Donovan, & Kivlahan, 1988; Marlatt & Gordon, 1985; Marlatt & Gordon, 2005) that views addictive behaviors as learned, maladaptive responses to specific situations. Research on relapse to substance use following treatment clearly identifies commonalities in the types of situations that promote drug use (Cummings, Gordon, & Marlatt, 1980). The most commonly cited relapse situations across a variety of substance abusing populations, accounting for approximately 35% of lapses/relapses into the addictive behavior, involved coping with negative emotional states (e.g., frustration, anger, depression). The next most commonly cited relapse situations were social pressure (20%) and interpersonal conflict (16%). Stephens and colleagues extended this analysis of situational determinants of relapse to marijuana use following treatment and found a similar pattern (Stephens, Curtin, Simpson, & Roffman, 1994).

Findings from these retrospective studies of relapse situations led to the development of situational use inventories to more systematically assess the propensity to use alcohol or drugs in specific situations. For instance, the Inventory of Drinking Situations (IDS; Annis, Graham, & Davis, 1987) and Inventory of Drug-Taking Situations (IDTS; Turner, Annis, & Sklar, 1997) assess the frequency of using in the eight categories of relapse situations previously described by Cummings and colleagues (1980). Situational inventory assessment has been used primarily with alcohol as a way to categorize high-risk situations to predict relapse (Cannon, Leeka, Patterson, & Baker, 1990), to group participants into types of users with specific characteristics and styles of drinking (Annis & Graham, 1995), or to predict alcohol-related problem severity (Cunningham, Sobell, Sobell, Gavin, & Annis, 1995). However, surprisingly few studies have examined particular patterns of situational use as *a priori* predictors of outcomes following treatment.

Assessment of the characteristics of situations may implicitly relate to the reasons or motives for drug use. For example, use in negative affective situations is related to symptoms of depression, interpersonal sensitivity, and somatization (Turner, et al., 1997) suggesting that high rates of use in situations characterized by negative affect indicate that individuals are using to cope. Preliminary research found a correlation between categories of a situational inventory and drinking motives among college students (Carrigan, Barton Samoluk, & Stewart, 1998). The link between situational use and motives has also been found in a community sample of drug- and alcohol-abusing women (Stewart, Samoluk, Conrod, Pihl, & Dongier, 2000), providing further evidence of convergent validity between measures of situational use and motives for use. However, no such research has looked at the relationship between situational inventories and marijuana motives.

Motivational models of substance use have characterized motives for use as the “final, common pathway” to use (Cox & Klinger, 1988) and “proximal determinants” of use (Cooper, 1994). Four distinct categories for substance use motivation have been hypothesized: to enhance enjoyable emotions, to cope with negative emotions, to be more social, and to conform with others (Cooper, 1994). One additional factor has been added for use in a marijuana population: to expand the mind (Simons, Correia, Carey, & Borsari, 1998). Although the most frequently endorsed motives for use of alcohol and marijuana are to be more social or for enhancement of enjoyable experiences (Simons, Correia, & Carey, 2000), using alcohol and drugs to cope with negative affect represents one particularly problematic motive. Individuals who use substances with a motive of coping with negative emotions experience more negative consequences than individuals who use for other

motives (see e.g., Bonn-Miller, Zvolensky, & Bernstein, 2007; Cooper, 1994; Cooper, Russell, & George, 1988; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007). In a study of the effect of brief, Motivational Enhancement Therapy (MET) interventions for adolescent marijuana users, Fox and colleagues found that although the social and enhancement motives were the most commonly endorsed motives, the coping motive was associated with greater marijuana problems and cannabis dependence symptoms (Fox, Towe, Stephens, Walker, & Roffman, 2011). In other studies, individuals who endorse coping motives were also more likely to have higher rates of marijuana use, anxiety sensitivity (Bonn-Miller, et al., 2007; Buckner, Heimberg, Matthews, & Silgado, 2012; Zvolensky et al., 2007), and anhedonia (Zvolensky, et al., 2007). However, most of the research on motives and marijuana use has been conducted in non-dependent populations (Bonn-Miller, et al., 2007; Simons, Gaher, Correia, Hansen, & Christopher, 2005; Zvolensky, et al., 2007).

The current study adds to the literature by describing the characteristics of use situations in an adult marijuana dependent, treatment-seeking population. Relationships between particular patterns of situational use and associated psychosocial constructs were examined to establish convergent validity of the situational use inventory in this population. Particular emphasis was given to frequent use in negative affect situations given previous findings that using to cope was predictive of greater debilitating effects. It was hypothesized that negative affect situational use would be positively associated with psychological distress and maladaptive coping strategies and negatively associated with self-efficacy for avoiding use in negative affective situations. Finally, we tested the relationships between negative affect, positive affect, and social situational use and frequency of marijuana use and related problems both before and after treatment. It was hypothesized that negative affect situational use would be particularly associated with a higher frequency of marijuana use, more dependence symptoms, and more marijuana-related problems.

2. Material and Methods

2.1 Overview of Parent Clinical Trial

The present investigation utilized data from a randomized, controlled treatment study conducted between 2002-2005 (Stephens et al., 2006). Eighty-seven participants were randomly assigned to one of two intervention conditions: 1) 9 individual sessions of combined CBT, Motivational Enhancement Therapy (MET), and Case Management (CM); or 2) 4-sessions of the same combined treatment components with the option of attending more sessions as needed (PRN) over the following 30 months. The primary hypothesis was that individuals who could return to treatment as needed would achieve superior outcomes compared to a fixed-dose treatment condition. Participants were assessed at baseline, 4 months, 10 months, 16 months, 22 months, 28 months, and 34 months. The results indicated that participants in both conditions made significant reductions in frequency of use, dependence symptoms, and marijuana problems that were sustained across all follow-up assessments ($ps < .01$). Unexpectedly, two-way condition by outcome analyses indicated that there was higher reduction in frequency of use in the 9-session condition relative to the PRN condition, but only at the 4-month follow-up. Contrary to predictions there were no statistically significant differences in marijuana use outcomes between conditions at later follow-ups. The present paper uses measures obtained from the sample at baseline and the 4-, 10-, 16-, and 22-month follow-up assessments when measures of interest were given.

2.2 Participants

Of the 203 individuals screened, 70 were deemed ineligible, due to current involvement in other substance abuse treatment ($N = 27$), dependence on other drugs or alcohol ($N = 26$), using marijuana on less than 50 of the last 90 days ($N=21$), or other eligibility criteria (i.e.,

the presence of a medical or psychiatric condition that may require hospitalization, legal problems that may require future incarceration, mandatory drug testing for legal reasons or employment, refusal to be randomized, and non-fluency in English; $N=15$). Of the eligible participants, 46 individuals chose not to participate in the study. The final sample included 87 participants: 43 participants were randomly assigned to the PRN condition and 44 were assigned to the 9-session condition. Participants were an average age of 35.6 years old ($SD = 8.7$) and were predominantly Caucasian (86%). The majority of participants were male (75%) and were either married or cohabitating (49%). The mean years of education was 14.2. On average, these participants used marijuana on 78% of the days in the month preceding enrollment. On the days when marijuana was used, participants reported smoking an average of 3.9 times per day.

2.3 Procedures

Print advertisements in local newspapers and radio ads offered treatment for marijuana users who wanted to quit. Interested callers were initially screened for eligibility with a brief phone interview and then invited for an in-person meeting to confirm eligibility. At the initial baseline assessment informed consent was obtained through a procedure approved by the University of Washington's Institutional Review Board. Following the provision of informed consent the Structured Clinical Interview for DSM-IV (SCID-I; First, Spitzer, Gibbon, & Williams, 1996) was administered to determine cannabis dependence and the absence of dependence on any other substance. Evidence of psychoses was ruled out. Individuals who met these criteria completed a timeline followback interview (TLFB; Sobell & Sobell, 1992) and provided a sample of urine. Several self-report measures were completed before participants were randomized to condition.

Participants were paid \$50 for completing each of the six follow-up assessments and those completing all six were entered into a lottery for an additional \$300. During these assessments, trained interviewers administered the TLFB and the SCID module for cannabis dependence and abuse. Interviewers were supervised throughout the trial by review of audiotapes to ensure reliability. Participants provided urine samples at each follow-up assessment to serve as corroboration of self-reports. Agreement between self-reported abstinence rates and urinalysis results were greater than 79% at all follow-ups.

2.4 Measures

The Inventory of Marijuana Situations (IMS) is a 41-item self-report instrument that assessed frequency of marijuana use in specific situations over the past 90 days. Participants indicated their frequency of use in each situation on a scale of 1 (Never) to 4 (Almost Always). The IMS was administered at baseline and the 4-month follow-up. The measure was adapted from the short form of the Inventory of Drinking Situations (IDS-42; Annis et al., 1987). Preliminary principal components analyses and examination of item means and standard deviations were used to refine scale compositions. A total of 21 items were eliminated because they were infrequently endorsed, did not differentiate clearly in the component structure, or were redundant to other items. Three scales emerged that measured use in negative affect situations, use in social situations, and use in positive affect situations. Items within each scale were averaged to create scales on which higher scores indicate a greater tendency to use in these situations. The Negative Affective Use scale was comprised of 10 items ($\alpha = .92$ and $.95$), the Social Use scale consisted of six items ($\alpha = .93$ and $.96$), and the Positive Affective Use scale was comprised of 4 items ($\alpha = .83$ and $.93$). Table 1 contains descriptive statistics and factor loadings of scale items.

The Situational Self-Efficacy Scale (SSES) is a 20-item self-report measure that assesses confidence in one's ability to avoid marijuana use in specific situations (Stephens, Wertz, &

Roffman, 1993, 1995). Each item is ranked on a scale of 1 (Not at All Confident) to 7 (Very Confident). Two subscales were scored based on previous research (DeMarce, et al., 2005). Self-efficacy for psychologically-distressing (PDSE) situations included eight items, such as feeling depressed or worried and feeling frustrated ($\alpha = .90$ and $.95$). Self-efficacy in non-distressing situations (NDSE) was assessed by eight items, such as feeling like celebrating and having free time to oneself without responsibilities ($\alpha = .86$ and $.93$). Items were averaged to create scale scores.

The Brief Symptom Inventory (BSI) is a frequently used self-report questionnaire of psychiatric symptoms (Derogatis & Melisaratos, 1983). The Global Severity Index (GSI) was used to measure psychological distress in the present study ($\alpha = .97$ and $.97$).

The COPE Inventory is a 60-item measure that assesses a broad range of coping strategies for stressful life situations. The measure, administered only at baseline, asked participants how often they responded in certain ways to stressful or difficult situations on a scale of 1-4: 1, "I usually don't do this at all"; 2, "I usually do this a little bit"; 3, "I usually do this a medium amount"; and 4, "I usually do this a lot" (Carver, Scheier, & Weintraub, 1989). The following subscales of the COPE measure were used in the current study: Active Coping ($\alpha = .73$), Acceptance ($\alpha = .46$), Planning ($\alpha = .83$), Substance Use ($\alpha = .91$), Mental Disengagement ($\alpha = .34$), and Behavioral Disengagement ($\alpha = .75$).

The Timeline Follow-Back (TLFB) was used to assess marijuana and other drug use frequency at each assessment (Sobell & Sobell, 1992). The semi-structured interview has yielded reliable and valid data in multiple marijuana treatment trials (e.g., Litt, Kadden, & Stephens, 2005; Stephens, et al., 2002; Stephens et al., 2004). A 30-day window of use at each assessment point was used for analyses in this study.

The Marijuana Problems Scale (MPS) assessed problems associated with marijuana use at each assessment (Stephens, Roffman, & Curtin, 2000). The MPS assesses for 19 negative consequences on a three-point scale over the previous 90 days: 0 (not a marijuana problem), 1 (minor problem of marijuana use), and 2 (major problem of marijuana use). The MPS had good internal consistency ($\alpha = .81$ and $.89$).

The Structured Clinical Interview for DSM-IV (SCID-I; First, et al., 1996) assessed cannabis dependence and abuse symptoms at baseline and all follow-up assessments. Symptoms were assessed only for the past 90 days in order to correspond to the reporting period of other measures and account for any potential change in symptomatology since the last assessment period. For the purposes of the present analyses, the number of dependence items met were summed to create an index of dependence severity.

3. Results

Of the 87 participants, 94.3% completed the 4-month follow-up ($n = 82$), 89.7% completed the 10-month follow up ($n = 78$), 88.5% completed the 16-month follow-up ($n = 77$), and 87.4% completed the 22-month follow-up ($n=76$). Participants in the PRN condition were more likely to attrite at the 16-month follow up ($p < 0.05$) but there were no differences by condition at other follow-ups. Baseline demographic and control variables were compared for those who completed and did not complete each follow-up assessment. No significant differences were found by attrition status and there were no interaction effects between attrition and condition at any follow-up.

3.1 Situational Use

Means and standard deviations of the Negative Affective, Positive Affective, and Social Use scales of the IMS are presented in Table 2. Use in social situations was endorsed more frequently than either type of affective situation at both assessments ($ps < .05$). Two-way condition by time ANOVAs performed on each IMS subscale showed only significant time effects, indicating significant reductions in the mean use at 4-month follow-up relative to baseline ($ps < .01$) but no main or interactive effects of treatment condition. Intercorrelations of the IMS scales ranged from .36 – .47 ($ps < .01$) at baseline and from .73–.82 ($ps < .01$) at the 4-month follow-up. All three scales were moderately stable between the baseline assessment and 4-month follow-up (Negative Affective Use, $r = .24$, $p < .05$; Social Use, $r = .30$, $p < .01$; Positive Affective Use, $r = .41$, $p < .01$). Negative Affective Use was correlated with fewer years of education ($r = -.27$, $p < .05$) and Social Use was related negatively to age ($r = -.33$, $p < .01$). No other differences were observed between demographic variables and situational use scales.

3.2 Convergent Validity

Table 3 displays correlations between IMS scales, coping strategies, psychological distress scores, and situational self-efficacy. Consistent with hypotheses, the Negative Affective Use subscale of the IMS at baseline was positively correlated with the BSI Global Severity Index, and the Substance Use, Behavioral Disengagement, and Mental Disengagement subscales of the COPE. Negative Affective Use at baseline also was negatively associated with more adaptive Active Coping and Planning subscales of the COPE. No significant relationships were observed between the Social or Positive Affective Use scales and COPE subscales at baseline.

Unexpectedly, Social Situational Use at baseline was correlated positively with the BSI at baseline and all three IMS scales were significantly correlated with BSI at the 4-month follow-up (see Table 3). As anticipated, Negative Affective Use was negatively correlated with PDSE at baseline whereas the other IMS scales showed no relationships with self-efficacy. However, at the 4-month follow-up, all situational use scales were significantly and negatively correlated with both self-efficacy scales. In order to determine the unique relationships of IMS scales with psychological distress and self-efficacy and to determine whether the unexpected relationships between social and positive affective situational use and psychological distress were an artifact of covariance with negative affective use, we computed regression equations predicting BSI scores from all three situational use scales simultaneously at both the baseline assessment and 4-month follow-up (see Table 4). In these analyses, Negative Affective Use at both assessments remained significantly associated with concurrent BSI scores, indicating unique relationships between constructs after accounting for other types of situational use. Similarly, Negative Affective Use was the only scale to remain correlated with PDSE in these multivariate analyses, further supporting the unique relationships between use in negative affective situations and lower confidence for resisting use in such situations. There were inconsistent and generally weaker relationships between Social Use and Positive Affective Use and the measures of psychological distress and self-efficacy. Notably, there was no relationship between Positive Affective Use and any measure of self-efficacy, whereas Social Use was negatively related to NPDSE after controlling for other types of use.

3.3 Relationship with Marijuana Use and Consequences

Prospective analyses between IMS scales and marijuana use and consequences were conducted twice, first using baseline IMS to predict 4-month outcomes immediately following treatment and then using 4-month IMS to predict outcomes at more distal follow-ups. Table 5 contains bivariate correlations of the baseline IMS scales with baseline and 4-

month follow-up marijuana use and related outcome variables. As expected, baseline Negative Affective Use was positively correlated with marijuana problems and dependence symptoms at baseline and with marijuana problems at the 4-month follow-up. Predicted relationships with frequency of use were not found at baseline or 4-month follow-up and the relationship with dependence symptoms was no longer significant in the prospective prediction of 4-month outcomes. The IMS scales also were not associated with complete abstinence for the assessed period at any time point (data not shown). Social Use at baseline was also correlated with marijuana problems at baseline. Baseline Positive Affective Use was prospectively associated with marijuana problems and dependence symptoms at the 4-month follow-up. All IMS scales at 4-month follow-up were positively correlated with outcomes at all follow-up time points (not shown).

Multiple regression analyses examined Negative Affective Use, Positive Affect Use, and Social Use simultaneously as multivariate predictors of marijuana use and related consequences to determine whether there were additive and unique effects of the different types of situational use. Table 5 shows standardized regression coefficients of baseline IMS scales on outcomes, controlling for baseline frequency of use. Consistent with hypotheses, Negative Affective Use at baseline was uniquely associated with the baseline marijuana problems and dependence symptoms. However, there were no significant predictors in the models predicting frequency of use or dependence symptoms at baseline. Baseline IMS scales did not predict any of the marijuana use outcome variables at the 4-month follow-up.

When these analyses were repeated using 4-month situational marijuana use scales to predict marijuana use variables at 4, 10, 16 and 22 month follow-ups controlling for 4-month frequency of use, several significant relationships were observed (see Table 6). Negative Affective Use at the 4-month follow-up uniquely predicted marijuana problems and dependence symptoms at 4-months. Negative Affective Use at 4-months also was associated with marijuana problems and marijuana dependence symptoms at the 16-month follow-up but not at 10 or 22 months. The Positive Affective Use subscale at 4 months predicted problems and dependence symptoms at 10 months but no other outcomes at future follow-ups.

4. Discussion

The present paper extends the analysis of situational determinants of substance use to an adult, treatment-seeking, marijuana dependent population. Negative affective use, although the least endorsed situational context, showed convergent validity in its positive relationships with psychological distress and maladaptive coping strategies. Only negative affective use uniquely predicted lower self-efficacy in psychologically distressing situations, supporting a potential mechanism for deleterious effects. Use in negative affective situations showed relationships with adverse outcomes from marijuana use that were consistent with similar findings in the literature on motives for drug use. As a whole, the findings support key tenets of cognitive behavioral formulations of drug use and abuse and they emphasize the particular importance of negative affect in sustaining drug use problems in this population.

Use in social situations was more commonly endorsed in this dependent sample both before and after treatment. Endorsement of all situational use scales decreased after treatment, consistent with the known effect of the treatments on other indices of use. Indeed, the three IMS scales appeared to be only moderately stable over time, indicating that there was substantial change in the types of situations in which use occurred within individuals, perhaps as a result of participating in CBT that focused participants on the importance of attending to situational determinants. Positive correlations between IMS scales at the

baseline and 4-months indicated that individuals who endorsed high use in one situation were more likely to use in other situations, as well. IMS scale scores likely covary with each other and with frequency of use in general because the measure asks participants to respond in terms of how often they use in specific situations. A similar correlation between different motives scales has been noted in the literature, perhaps again because measures of motives use scales also implicitly measure frequency of use (Fox, et al., 2011; Simons et al., 1998; Zvolensky, et al., 2007).

Convergent validity of the negative affect use subscale was evident in the positive correlations with psychological distress and maladaptive coping strategies. Negative affective use also was negatively correlated with more adaptive coping strategies. These findings help establish that a tendency to use marijuana in negative affective situations reflects both current affective disposition and a maladaptive coping style. The similarity to findings in the drug use motives literature suggests that measuring use in negative affective situations may indirectly assess the coping motive (Brodbeck, Matter, Page, & Moggi, 2007; Bujarski, Norberg, & Copeland, 2012). Further, negative affective use was negatively correlated with self-efficacy in psychologically distressing situations both at baseline and after treatment. Importantly, this finding was unique to negative affective use in analyses controlling for other types of situational use and further supported both the convergent and discriminant validity of the measure.

Although all three posttreatment IMS scales showed univariate relationships with marijuana use outcomes and consequences, multivariate analyses showed that use in negative affective and positive affective situations retained some unique predictive power. The findings for negative affective use are similar to the literature on the coping motive, which has found unique effects of the coping motive on drug use problems when controlling for other motives for use (e.g., Cooper et al., 2008; Fox, et al., 2011). Positive affective use at 4 months also predicted greater marijuana use at the concurrent time point and use, problems, and dependence symptoms at one future time assessment. Although this relationship was not predicted, enhancement motives have sometimes been associated with negative outcomes among alcohol users (Agrawal et al., 2008; Cooper, 1994; Cooper et al., 1995) and marijuana users (Zvolensky, et al., 2007). Some investigators have theorized that the relationship between positive affective use and negative outcomes may be representative of a first step toward using in negative affective situations or using to cope.

The absence of relationships between situational use and overall frequency at baseline in this study may have been due to little variance in frequency of use in this dependent sample of users. The situational use scales at 4 months were consistently related to frequency of use at all follow-ups when there was greater variability in frequency of use.

This study appears to be the first to examine specific marijuana use situations both before and after treatment in a marijuana dependent, treatment-seeking, adult population. Further, it used both cross-sectional and prospective analyses to examine the relationships of different types of situational use with drug use outcomes. Finding that using marijuana in negative affect situations was particularly associated with psychological distress, maladaptive coping strategies, lower self-efficacy, and more negative outcomes parallel research on the coping motive in relation to various drugs of abuse. Negative affective situational use as measured in the current study appeared to be a reasonable proxy for assessing the coping motive and may be a useful alternative for individuals who have difficulty discerning their own internal motives for use.

Several limitations should be noted. The self-selected convenience sample was limited in size and too small for a thorough psychometric study of the IMS measure. Further

refinement of the IMS via both exploratory and confirmatory factor analytic studies would be useful to be sure that the measure was a reasonably comprehensive assessment of all relevant situations. Sample size decreased throughout the follow-up period due to attrition, which may have compromised power to find relationships and the generalizability of results. Additionally, the sample was disproportionately Caucasian and male, which could impact the generalizability of the findings. Future research should focus on recruitment of a more diverse sample. Future research should also attempt to extend findings to those individuals who are not treatment-seeking, not dependent, and who are in earlier stages of change (e.g., precontemplation and contemplation) in order to fully test the importance and predictive value of situational determinants of use among a population that may be less motivated to change. There was no direct measure of motives for use and thus the usefulness of assessing situational use as a proxy for motives must be regarded as tentative pending future research.

Nevertheless, the findings have important implications for the treatment of substance use disorders. Treatments that target use in negative affective situations and maladaptive coping strategies may be more effective than treatments that do not take into account use to cope with psychological distress. Treatments should both directly target the sources of negative affect and increase adaptive coping strategies when it occurs in order to improve outcomes. While these tenets of CBT for drug use are often stated, the present findings extend the evidence to a population of adults dependent on marijuana and they establish the linkage between literatures on situational determinants and motives for drug use.

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Highlights

- Negative affective use associated with psychological distress, maladaptive coping
- Negative affective use predicted lower self-efficacy
- Negative affective use associated with various treatment outcomes
- Results were broadly consistent with the motives literature

Table 1
IMS Descriptive Statistics and Factor Loadings

	Mean (Std. Dev.)	Negative Affective Use	Social Use	Positive Affective Use
1. When I was depressed about things in general	3.07 (0.81)	0.77		
3. When I had an argument with a friend, romantic partner, or spouse	2.43 (1.04)	0.66		
5. When I felt jumpy and physically tense	3.09 (0.85)	0.65		
9. When I felt sad	2.88 (0.92)	0.82		
13. When I was unhappy with my job	2.84 (1.11)	0.69		
17. When I felt empty inside	2.78 (1.02)	0.80		
19. When I was feeling lonely	2.73 (1.08)	0.74		
25. When I was angry	2.79 (0.97)	0.71		
29. When there were problems with people at work	2.33 (1.13)	0.66		
41. When I felt no one really cared what happened to me	2.30 (1.14)	0.75		
2. When I met a friend and he/she suggested that we smoke pot together	3.35 (0.97)		0.88	
7. When I was relaxed with a friend and wanted to have a good time	3.17 (0.92)		0.77	
10. When I was at a party or out with friends and other people were smoking marijuana	3.32 (1.06)		0.88	
18. When someone in the same room was smoking marijuana	3.23 (1.08)		0.87	
34. When I was invited to someone's home and they offered me pot	3.34 (1.00)		0.87	
38. When I was having fun with friends and wanted to increase our enjoyment	2.89 (1.07)		0.75	
4. When I felt confident and relaxed	2.79 (0.85)			0.74
12. When everything was going well	3.13 (0.79)			0.84
20. When I felt satisfied with something I had done	2.78 (0.95)			0.74
28. When I was feeling content with my life	2.89 (0.88)			0.79

Table 2
Descriptive Statistics for Predictors and Control Variables at Baseline and 4-Months

	Baseline		4-Months	
	Mean	Std. Dev.	Mean	Std. Dev.
<u>IMS Scales</u>				
Negative Affective Use	2.73	0.75	1.83	0.80
Social Use	3.22	0.88	2.18	1.01
Positive Affective Use	2.90	0.71	1.96	0.85
<u>COPE Scales</u>				
Planning	2.56	0.70		
Active Coping	2.48	0.60		
Acceptance	2.70	0.53		
Substance Use	2.59	0.98		
Behavioral Disengagement	1.70	0.55		
Mental Disengagement	2.29	0.57		
<u>Situational Self-Efficacy</u>				
Psychologically Distressing Self-Efficacy	3.64	1.33	4.97	1.61
Nonpsychologically Distressing Self-Efficacy	2.68	1.19	4.13	1.63
<u>Outcome Variables</u>				
% Days Use During Last Five Weeks	0.78	0.24	0.36	0.38
Marijuana Problems	8.99	3.55	5.42	4.28
Marijuana Dependence Symptoms	5.72	1.13	2.78	2.09

Table 3
Bivariate Correlations Between IMS, COPE subscales, BSI, and Situational Self-Efficacy

	Baseline COPE Subscales					Psychological Distress		Self-Efficacy	
	Active	Planning	Acceptance	Substance Use	Behavioral Disengagement	Mental Disengagement	BSI	PDSE	NPDSE
<u>Baseline IMS</u>									
Negative Affective Use	-0.25 *	-0.31 **	0.06	0.41 **	0.34 **	0.21 *	0.48 **	-0.26 *	-0.07
Social Use	-0.14	-0.19	0.06	0.21	0.16	0.19	0.22 *	-0.09	-0.19
Positive Affective Use	-0.04	-0.04	0.21	0.13	0.10	0.02	-0.01	-0.11	-0.14
<u>4-Month IMS</u>									
Negative Affective Use							0.61 **	-0.79 **	-0.68 **
Social Use							0.32 **	-0.64 **	-0.73 **
Positive Affective Use							0.37 **	-0.63 **	-0.69 **

*
p < 0.05

**
p < 0.01

BSI: Brief Symptom Inventory

PDSE: Psychologically-Distressing Self-Efficacy

NPDSE: Nonpsychologically-Distressing Self-Efficacy

Table 4
Standardized Regression Coefficients of IMS Subscales with Psychological Distress and Situational Self-Efficacy

	Baseline			4-Month Follow-Up		
	BSI	PDSE	NPDSE	BSI	PDSE	NPDSE
<u>Baseline IMS:</u>						
Negative Affective Use	0.59**	-0.28*	0.06			
Social Use	0.05	0.04	-0.18			
Positive Affective Use	-0.30**	0.00	-0.08			
R ²	0.29**	0.07	0.04			
<u>4-Month Follow-Up IMS:</u>						
Negative Affective Use				0.84**	-0.73**	-0.25*
Social Use				-0.20	-0.17	-0.42**
Positive Affective Use				-0.11	0.07	-0.15
R ²				0.40**	0.62**	0.59**

*
p < 0.05

**
p < 0.01

BSI: Brief Symptom Inventory

PDSE: Psychologically-Distressing Self-Efficacy

NPDSE: Nonpsychologically-Distressing Self-Efficacy

Table 5
Bivariate Correlations and Standardized Regression Coefficients of Baseline IMS and Outcomes

	Bivariate Correlations						Standardized Regression Coefficients [†]			
	Baseline			4-Month Follow-Up			Baseline		4-Month Follow-Up	
	% days use	MPS	Dependence symptoms	% days use	MPS	Dependence symptoms	MPS	Dependence symptoms	% days use	MPS
Baseline IMS										
Negative Affective Use	0.07	0.47**	0.34**	-0.02	0.26*	0.19	0.50**	0.33*	-0.07	0.15
Social Use	-0.02	0.33**	0.17	-0.02	0.15	0.05	0.15	-0.01	-0.01	- 0.09
Positive Affective Use	0.07	0.08	0.21	0.06	0.28*	0.23*	-0.19	0.07	0.08	0.19
R ²							0.31**	0.14*	0.10	0.12*

*
p < 0.05

**
p < 0.01

MPS: Marijuana Problems Scale (#)

[†] controlling for baseline frequency of use

Table 6
Bivariate Correlations and Standardized Regression Coefficients of 4-Month IMS and Outcomes

	4-Month Follow-Up [†]			10-Month Follow-Up [†]			16-Month Follow-Up [†]			22-Month Follow-Up [†]		
	MPS	Dependence symptoms	% days use	MPS	Dependence symptoms	% days use	MPS	Dependence symptoms	% days use	MPS	Dependence symptoms	% days use
4-Month IMS:												
Negative Affective Use	0.66**	0.60**	0.01	0.20	0.23	0.11	0.38*	0.28*	0.04	0.23	0.09	
Social Use	-0.03	0.07	-0.31	-0.25	-0.23	-0.08	-0.16	-0.08	-0.02	-0.08	-0.02	
Positive Affective Use	0.23	0.10	0.33	0.58**	0.48*	0.18	0.34	0.20	-0.04	0.14	0.26	
R ²	0.61**	0.61**	0.37**	0.28**	0.32**	0.36**	0.28**	0.34**	0.21**	0.11	0.16*	

* p < 0.05

** p < 0.01

MPS: Marijuana Problems Scale (#)

[†] controlling for 4-month frequency of use