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The interactive influence of cannabis-related negative expectancies and coping motives on cannabis use behavior and problems

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Abstract

Objectives—The present study tested whether coping motives for cannabis use moderate the effect of negative expectancies on cannabis use.

Methods—Participants were 149 (36.2% female, 61.59% non-Hispanic Caucasian) current cannabis users aged 18–36 ($M = 21.01$, $SD = 3.09$) who completed measures of cannabis-related expectancies and motives for use. Hierarchical multiple regressions were employed to investigate the predictive value of the interaction between negative expectancies and coping motives on cannabis use outcomes.

Results—Results revealed interactions between negative expectancies and coping motives with respect to past 90 day cannabis use frequency and cannabis problems. Global negative effects expectancies were associated with less frequent cannabis use, particularly among those with fewer coping motives. However, negative expectancies were related to more cannabis problems, particularly among those with higher coping motives.

Conclusions—These results suggest it may be advisable to take coping motives into account when addressing expectancies among cannabis users.

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Human Subjects

This study was approved by the institutional review board.

Contributors

Dawn Foster conducted statistical analysis and worked with Julia Buckner and Emily Jeffries to draft the manuscript. Julia Buckner conceptualized theoretical bases of the grant and oversaw data collection. Michael Zvolensky provided guidance, feedback, and support to the grant and to development of manuscript drafts. All authors contributed to and have approved the final manuscript.

Conflict of Interest

All authors declare that they have no conflicts of interest.

Keywords

cannabis expectancies; cannabis motives; global negative effects expectancies; coping motives

Cannabis remains the most commonly used illicit drug in the United States and its rate of use is increasing (Substance Abuse and Mental Health Services Administration [SAMHSA], 2013). Further, the prevalence of cannabis use disorders (CUD) is almost equivalent to all other illicit substance use disorders combined, and nearly a quarter of cannabis users meet criteria for a CUD (SAMHSA, 2013). Moreover, cannabis use is associated with a number of negative consequences, including poorer educational outcomes (for review see Lynskey & Hall, 2000) and greater risky behaviors (e.g., seatbelt disuse; Begg & Langley, 2000). Given the high rates of cannabis use and its associated negative consequences, it is important to identify psychological factors related to use that could be targeted in prevention and treatment efforts.

The majority of prior work has found negative cannabis outcome expectancies (e.g., expecting marijuana to make one feel less motivated) to be protective factors that tend to be associated with less frequent use (Buckner, Ecker, & Welch, 2013a; Buckner & Schmidt, 2008; Chabrol et al., 2006; Hayaki et al., 2010; Simons & Arens, 2007); however, some studies have found no relation between negative cannabis outcome expectancies and frequency of cannabis use (Boden, McKay, Long, & Bonn-Miller, 2013; Buckner & Zvolensky, 2014). Further, some studies find negative cannabis outcome expectancies to be positively associated with cannabis-related problems (Buckner & Schmidt, 2008, 2009). Given the mixed findings regarding negative cannabis outcome expectancies and cannabis use, it may be that other mechanisms of influence play a role in this relationship.

Cognitive mechanisms of influence that have been linked with cannabis use include motivations or reasons for use (Benschop et al., 2015; Foster, Allan, Zvolensky, & Schmidt, 2015), and these include social, enhancement, expansion, conformity, and coping motives (Simons, Correia, & Carey, 2000). Each of these motive dimensions play a role in college cannabis use (Buckner, 2013; Buckner, Zvolensky, Farris, & Hogan, 2014; Foster et al., 2015); however, coping motives have been consistently linked with cannabis problems (Buckner, 2013; Buckner, Zvolensky, & Schmidt, 2012; Bujarski, Norberg, & Copeland, 2012) and heavier use (Bonn-Miller, Vujanovic, & Zvolensky, 2008; Buckner et al., 2012; Norberg, Olivier, Schmidt, & Zvolensky, 2014). Individuals may be inclined to use cannabis to regulate negative affective states or reduce stress or tension (de Dios et al., 2010).

Evidence from the alcohol literature suggests interactions between coping motives and alcohol expectancies (Cooper, Russell, & George, 1988; Hasking & Oei, 2007; Hasking & Oei, 2002; Laurent, Catanzaro, & Callan, 1997). This work suggests that an interplay between motives and expectancies can impact a decision to drink (Hasking & Oei, 2002). To our knowledge, equivalent evaluations with respect to cannabis have not yet been conducted; however, it stands to reason that a similar expectancies-coping motive relationship will emerge. (Galen, Henderson, & Covert, 2001; Hasking & Oei, 2007). As such, it would be expected that the inverse relationship between negative expectancies and cannabis use would be more evident among those low in coping motives relative to those high in coping motives.

The present work was designed to examine the moderating role of coping motives in the relationship between negative cannabis outcome expectancies and cannabis use. Additionally, this study also afforded the opportunity to explore these relationships as they relate to cannabis problem severity, which has clinical significance. It was hypothesized that negative expectancies would be protective against frequent cannabis use and problem severity such that those reporting more negative expectancies would use cannabis less frequently, and experience related problems to a lesser degree. Further, we hypothesized that expectancies would moderate this relationship such that the protective effect of negative expectancies on cannabis use frequency would be especially evident among individuals who do not use cannabis for coping reasons.

Method

Participants and procedures

Cannabis users were recruited using community advertisements for a study on psychosocial factors related to cannabis use. Interested participants completed an online screening, and were eligible if they were between 18-45 years of age, reported past-month cannabis use (confirmed via urine sample using a 50 ng/ml positive cutoff), indicated cannabis as their drug of choice, and reported no interest in, or current receipt of, substance abuse treatment. Those eligible were invited to the laboratory to complete computer-based study measures, which were administered via www.surveymonkey.com. Participants were asked to refrain from cannabis use the day of their appointment and were compensated \$25 for their involvement in the study. Study procedures received Institutional Review Board approval and informed consent was obtained prior to data collection.

The present sample consisted of 149 (36.24% female) current cannabis users aged 18-36 ($M = 21.01$, $SD = 3.09$). Almost all (95.3%) endorsed drinking within the past-month and most (78.3%) reported lifetime tobacco use (25.8% endorsed past-week smoking). Participants self-reported the following ethnic/racial information: 61.59% non-Hispanic Caucasian, 24.83% African American, 0.67% Native American, 3.36% Asian, 36.36% Hispanic and Caucasian. Further, 8.05% of the sample identified with more than one race or ethnicity, and 3.36% identified with a racial or ethnic identity not listed.

Diagnostic status was determined via clinical interview using the *Structured Clinical Interview for DSM-IV Disorders* (Patient Edition, with psychotic screening module; SCID-I/P [w/ Psychotic Screen]; First, Spitzer, Gibbon, & Williams, 2007). Original ratings were compared to ratings of random sample of 20% of the recordings made by trained graduate students blind to initial diagnostic status. Percent agreement between the two raters for primary CUD diagnosis was 92.3%. The majority of the sample met DSM-IV-TR (American Psychiatric Association, 2000) criteria (with the addition of withdrawal as proposed for DSM-5; American Psychiatric Association, 2013) for a current CUD (18.6% cannabis abuse, 70.5% cannabis dependence). Rates of other current Axis I diagnoses were: 18.6% alcohol abuse, 13.2% alcohol dependence, 6.2% other substance use disorder, 31.8% social anxiety disorder, 17.8% specific phobia, 6.2% panic disorder, 4.7% major depressive disorder, and 4.7% dysthymia, 3.9% generalized anxiety disorder, 3.1% post-traumatic stress disorder, and 1.6% obsessive-compulsive disorder.

Measures

Past 90 day cannabis use frequency—Past 90-day cannabis use frequency was assessed using the *Marijuana Use Questionnaire*. Respondents were asked to indicate previous 90-day cannabis use using the item “On the average, how often have you used marijuana in the past three months?” Responses ranged from 0 (*Less than once a month [including never]*) to 10 (*21 or more times a week*).

Cannabis problems—The *Marijuana Problems Scale* (Stephens, Roffman, & Curtin, 2000) was used to assess negative social, occupational, physical, and personal consequences associated with cannabis use in the past 90 days. This scale demonstrated excellent internal consistency ($\alpha = .84$) and scores ranged from 0 to 24.

Coping motives—Coping motives were assessed with the coping motive subscale (e.g., “To forget my worries”) of the *Marijuana Motives Questionnaire* (MMQ; (Simons, Correia, & Carey, 2000; Simons, Correia, Carey, & Borsari, 1998). This 5-item subscale has shown high levels of internal consistency (Zvolensky et al., 2007). Participants rated items on a 5-point scale ranging from 1 (*Never/Almost Never*) to 5 (*Almost Always/Always*). The measure yields five subscales consisting of five items each that reflect cannabis motives; however, for the purposes of the present study, only the coping motives subscale was included in analyses. Scores were computed by summing relevant items. Cronbach's alpha for the coping motives subscale was .87.

Negative cannabis effect expectancies—Negative expectancies were assessed with the global negative effects subscale (nine items; e.g., “Marijuana makes me say things I do not mean”) of the *Marijuana Effect Expectancy Questionnaire* (MEEQ; (Aarons, Brown, Stice, & Coe, 2001). Participants rated items on a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Cronbach's alpha was .66. Previous work using the MEEQ indicates that it has generally good psychometric properties with alphas ranging from .67 to .88 (Aarons et al., 2001; Buckner, Ecker, & Welch, 2013b; Schafer & Brown, 1991).

Other substance use—The *Daily Drinking Questionnaire* (DDQ; Collins, Parks, & Marlatt, 1985) was used to assess drinking over the previous month. The DDQ has shown good test-retest reliability (Marlatt et al., 1998) and good convergent validity (Collins et al., 1985). Cronbach's alpha was .77. The *Smoking History Questionnaire* was used to assess tobacco use, and has been successfully used in previous smoking studies (e.g., Brown, Lejuez, Kahler, & Strong, 2002).

Demographics—Participants provided demographic information including gender, age, race, and education level.

Statistical analyses

Zero-order correlations were obtained to examine relationships between predictor and criterion variables. Gender, race, and education level were dichotomous, dummy-coded covariates. Predictor variables were centered prior to conducting analyses. Incremental validity of covariates and predictor variables were examined in relation to criterion variables.

Models were constructed such that the criterion variables (past three month cannabis use frequency and cannabis problems) and predictor variables (global negative effects expectancies and coping motives for cannabis use) were entered at Step 1. Also at Step 1, we statistically controlled for covariates (gender, race, and education level) and other subscales related to motives (social, conformity, expansion, and enhancement). At Step 2, the two-way interaction (product term) was entered into the model (Global Negative Effects X Coping Motives). All statistical analyses were conducted using SAS 9.3.

Results

Means, standard deviations, ranges, and bivariate correlations for all of the study variables are presented in Table 1. Cannabis coping motives were positively correlated with global negative effects expectancies, cannabis use frequency, and cannabis problem severity. Further, global negative effects expectancies were positively correlated with problem severity. Additionally, coping motives were negatively correlated with gender, suggesting that relative to males, females were more likely to report using cannabis for coping reasons. Further, frequency of cannabis use was positively correlated with race such that those identifying as Caucasian were more likely to report more frequent cannabis use relative to those identifying as non-Caucasian.

Table 2 presents results from multiple linear regression analyses predicting cannabis use frequency and problem severity from interactive effects of global negative effects expectancies and coping motives. The interaction (Expectancies X Coping Motives) was significant. We conducted additional tests to see if the data met the assumption of collinearity, and results indicated that multicollinearity was not a concern for the cannabis use frequency model (GNE, Tolerance = .96, VIF = 1.04; Coping Motives, Tolerance = .89, VIF = 1.13; GNE*Motives, Tolerance = .74, VIF = 1.35) or for the cannabis problems model (GNE, Tolerance = .96, VIF = 1.04; Coping Motives, Tolerance = .88, VIF = 1.13; GNE*Motives, Tolerance = .74, VIF = 1.35).

To probe the nature of the Expectancies X Coping Motives interactions, regression lines were graphed (Figures 1 and 2) using parameter estimates from the regression equation where high and low values were specified as one standard deviation above and below respective means (Cohen, Cohen, West, & Aiken, 2003). Simple slopes analyses were conducted to examine whether the slopes of the regression lines differed significantly from zero at low and high levels of the moderator, coping motives (Aiken & West, 1991). For both interactions, low levels of coping motives reflect fewer reasons to use cannabis for coping reasons, and vice versa for high levels (likewise, low expectancies reflect fewer anticipated negative effects due to cannabis use).

For the interaction with cannabis use frequency as outcome, the slope for lower coping motives ($t = -3.12$, $p = .002$, $\beta = -0.38$) was significantly different from a slope of zero; however, the slope for higher coping motives ($t = -1.52$, $p = .13$, $\beta = -0.12$) did not differ significantly from zero (Figure 1). This interaction indicates that negative expectancies were related to less frequent cannabis use, particularly among those with lower coping motives. For the interaction with cannabis problems as outcome, both the slope for lower coping

motives ($t = 4.75$, $p = <.0001$, $\beta = 0.55$) and the slope for higher coping motives ($t = 4.61$, $p = <.0001$, $\beta = 0.35$) were significantly different from a slope of zero (Figure 2). This interaction indicates that negative expectancies were related to more cannabis problems, particularly among those with higher coping motives.

Discussion

The present study examined the interactive effects of cannabis-related global negative effects expectancies and coping motives on cannabis use frequency and cannabis-related problems. As expected, coping motives for cannabis use moderated the relationship between negative expectancies and cannabis use frequency. Among individuals endorsing less coping motivated cannabis use, negative expectancies were related to less frequent cannabis use; however, among individuals endorsing greater coping motivated cannabis use, negative expectancies were unrelated to cannabis use. Similar findings have been found among populations that tend to endorse coping motivated use (Buckner, Bonn-Miller, Zvolensky, & Schmidt, 2007; Comeau, Stewart, & Loba, 2001; Johnson, Bonn-Miller, Leyro, & Zvolensky, 2009; Moitra, Christopher, Anderson, & Stein, 2015). For instance, among cannabis-dependent military veterans, of whom almost half met DSM-IV-TR criteria for a current anxiety and/or mood disorder, negative expectancies were unrelated to cannabis use frequency (Boden et al., 2013). Similarly, among a sample of current cannabis users, of whom nearly half endorsed clinically elevated social anxiety, negative expectancies were not related to cannabis use frequency (Buckner & Zvolensky, 2014). Thus, the present study is consistent with past work, suggesting that among individuals who use cannabis to cope with negative affective states, expectations about negative outcomes do not impact their use.

Coping motives for cannabis use moderated the relationship between negative expectancies and cannabis-related problems such that negative expectancies were related to more cannabis-related problems, especially among those who endorsed high coping motives for using cannabis. These findings are consistent with prior work finding that negative expectancies are related to more cannabis-related impairment (Buckner et al., 2013a; Buckner & Schmidt, 2008, 2009; Connor, Gullo, Feeney, & Young, 2011). This relationship may be strongest among individuals who use cannabis to cope with negative affect. Taken together, it appears that among individuals who endorse more coping motives, negative expectancies are not related to greater frequency of cannabis use, but may be related to more cannabis-related problems.

It is worth noting that the majority of the sample (81.46%) endorsed 2 or more problems on the MPS, which is clinically relevant given the DSM-5 cut-off of 2 for a CUD diagnosis. As such, these findings have potentially important clinical implications for the prevention and treatment of cannabis use and CUDs. First, these findings suggest that negative expectancies can serve as a protective factor against cannabis use (Buckner et al., 2013a; Buckner & Schmidt, 2008; Chabrol et al., 2006; Hayaki et al., 2010; Simons & Arens, 2007), especially among individuals who engage in less coping motivated cannabis use. Providing information about the negative health consequences of cigarette smoking has been shown to change expectancies related to smoking and subsequently increase motivation to quit smoking (Copeland & Brandon, 2000). Thus, individuals at risk for using cannabis may benefit from

psychoeducation regarding the negative effects of cannabis use. Second, coping motives for cannabis use may serve as a target during treatment. Individuals in treatment for cannabis cessation/reduction may benefit from targeted cognitive-behavioral strategies to cope with their anxiety and depressive symptoms to cope with their negative affect (per National Institute of Drug Abuse, 2010).

This study should be considered in light of limitations that can inform future research. First, due to the cross-sectional nature of this study, causal inferences cannot be made and prospective and experimental work will be an important next step. Second, self-report measures were used and future work could benefit from multi-method (e.g., biological verification of cannabis use, ecological momentary assessment of momentary relations between motives, expectancies, and cannabis use), multi-informant (e.g., collateral reports of cannabis use) approaches. Third, the negative expectancies subscale demonstrated adequate internal consistency. The subscale includes items related to negative affect (e.g., “Marijuana can cause me to become depressed and disappointed with myself,” and “Marijuana can make my feelings change from happy to sad”); however, it also includes items that might be less conceptually related to coping motives (e.g., Marijuana tastes and smells bad”). Despite these limitations, the present study is an important step toward understanding the role of coping motives in the relationship between negative effect expectancies and cannabis use frequency. It also provides novel insight regarding the inconsistent findings in the relation between negative effect expectancies and cannabis use in prior work.

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Figure 1. Interaction between global negative effects expectancies and coping motives for cannabis use with respect to frequency of use.

Figure 2. Interaction between global negative effects expectancies and coping motives for cannabis use with respect to problem severity.

Table 1

Means, Standard Deviations, and Correlations among Variables

	1.	2.	3.	4.	5.	6.	7.
1. Global Negative Effects	-						
2. Coping Motives	0.18 [*]	-					
3. Gender	-0.03	-0.28 ^{***}	-				
4. Race	-0.08	-0.05	-0.04	-			
5. Education Level	0.05	0.05	0.04	0.10	-		
6. Cannabis Use Frequency	-0.10	0.24 ^{**}	0.06	0.17 [*]	0.01	-	
7. Cannabis Problems	0.39 ^{***}	0.21 ^{**}	-0.05	-0.05	0.06	0.02	-
Mean or %	14.05	13.08	36.24% Female	57.79% Caucasian	83.77% Some college	7.57	6.24
Standard Deviation	4.37	5.16	--	--	--	2.15	4.82
Minimum	9.00	5.00	0.00	0.00	0.00	2.00	0.00
Maximum	39.00	25.00	1.00	1.00	1.00	10.00	24.00
Cronbach's α	0.67	0.87	--	--	--	--	0.84

Note. N = 149

† $p < .10$

Gender was dummy coded, males = 1 and females = 0; Race was dummy coded, Caucasians = 1 and non-Caucasians = 0; Education Level was dummy coded, some college = 1 and less = 0. Correlations were conducted on raw (non-centered) variables.

*** $p < .001$.** $p < .01$.* $p < .05$.

Table 2

Hierarchical regressions for variables predicting cannabis use frequency and problem severity from global negative effects expectancies, cannabis coping motives, and interaction terms.

		B	SE	t	p	β	R²	Adj R²	F
Past Three Month Cannabis Use Frequency									
Step 1	Covariates								
	Gender	0.73	0.36	2.01	0.0463	0.16*	0.00468	0.0989	4.25**
	Race	0.79	0.35	2.27	0.0249	0.18*	0.03125		
	Education Level	-0.32	0.50	-0.65	0.5171	-0.05	0.03241		
	Global Negative Effects Expectancies (GNE)	-0.06	0.04	-1.65	0.1017	-0.13	0.03865		
	Cannabis Coping Motives	0.13	0.03	3.86	0.0002	0.32***	0.12930		
Cannabis Problems									
Step 2	Interaction	0.02	0.01	2.58	0.0110	0.23*	0.16817	0.1330	4.78***
	GNE * Cannabis Coping Motives								
Step 1	Covariates								
	Gender	-0.03	0.79	-0.04	0.9676	-0.003	0.00272	0.1477	6.13***
	Race	0.17	0.75	-0.23	0.8173	-0.02	0.00547		
	Education Level	0.48	1.08	0.44	0.6586	0.03	0.00970		
	Global Negative Effects Expectancies (GNE)	0.40	0.09	4.71	<.0001	0.36***	0.15847		
	Cannabis Coping Motives	0.13	0.08	1.77	0.0789	0.14†	0.17651		
Step 2	Interaction	-0.03	0.02	-2.11	0.0367	-0.18*	0.20153	0.1678	5.97***
	GNE * Cannabis Coping Motives								

Note. *N* = 149

Gender was dummy coded, males = 1 and females = 0; *Race* was dummy coded, Caucasians = 1 and non-Caucasian = 0; *Education Level* was dummy coded, some college = 1 and less = 0.

Predictor variables were centered prior to inclusion in regression models.

p < .001

* *p* < .05

Table 3

Hierarchical regressions for variables predicting cannabis use from global negative effects expectancies, cannabis coping motives, and interaction terms.

Criterion/Predictor		B	SE	t	p	β	R ²	Adj R ²	F
Past Three Month Cannabis Use Frequency	Step 1	Covariates							
		Gender	0.73	0.36	2.01	0.0463	0.16 [*]	0.00468	0.0989
		Race	0.79	0.35	2.27	0.0249	0.18 [*]	0.03125	
		Education Level	-0.32	0.50	-0.65	0.5171	-0.05	0.03241	
		Global Negative Effects Expectancies (GNE)	-0.06	0.04	-1.65	0.1017	-0.13	0.03865	
Cannabis Problems		Cannabis Coping Motives	0.13	0.03	3.86	0.0002	0.32 ^{***}	0.12930	
	Step 2	Interaction							
		GNE * Cannabis Coping Motives	0.02	0.01	2.58	0.0110	0.23 [*]	0.16817	0.1330
									4.78 ^{***}
	Step 1	Covariates							
Cannabis Problems		Gender	-0.03	0.79	-0.04	0.9676	-0.003	0.00272	0.1477
		Race	0.17	0.75	-0.23	0.8173	-0.02	0.00547	
		Education Level	0.48	1.08	0.44	0.6586	0.03	0.00970	
		Global Negative Effects Expectancies (GNE)	0.40	0.09	4.71	<.0001	0.36 ^{***}	0.15847	
		Cannabis Coping Motives	0.13	0.08	1.77	0.0789	0.14 [†]	0.17651	
Cannabis Problems	Step 2	Interaction							
		GNE * Cannabis Coping Motives	-0.03	0.02	-2.11	0.0367	-0.18 [*]	0.20153	0.1678
									5.97 ^{***}

Note. $N = 149$

Gender was dummy coded, males = 1 and females = 0; *Race* was dummy coded, Caucasians = 1 and non-Caucasian = 0; *Education Level* was dummy coded, some college = 1 and less than high school = 0.

Predictor variables were centered prior to inclusion in regression models.

 $p < .001$

*
 $p < .05$