



HHS Public Access

Author manuscript

Am J Drug Alcohol Abuse. Author manuscript; available in PMC 2016 February 26.

Published in final edited form as:

Am J Drug Alcohol Abuse. 2016 January ; 42(1): 25–31. doi:10.3109/00952990.2015.1105242.

Marijuana use/cessation expectancies and marijuana use in college students

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Abstract

Background—Research suggests that marijuana expectancies are associated with problematic marijuana use; however, these marijuana-related cognitions remain relatively understudied.

Objective—This study examined marijuana-related decision-making among college students by exploring the relationships among marijuana expectancies and marijuana use variables.

Method—College students ($N = 357$) endorsing lifetime marijuana use completed an online survey on marijuana use expectancies, marijuana cessation expectancies, marijuana use, and future marijuana use intentions. A simple regression framework was used to test the effect of each type of expectancies on marijuana outcome; a hierarchical regression framework tested the unique predictive validity when both types were entered into the same model.

Results—Both marijuana use expectancies and marijuana cessation expectancies independently predicted a number of marijuana use variables. Additionally, marijuana use expectancies and marijuana cessation expectancies contributed significant unique variance to the prediction of marijuana use.

Conclusions—It is important to consider both use expectancies and cessation expectancies, as these two domains of marijuana-related cognitions appear to act independently, rather than as opposite ends of the same construct. Longitudinal studies are needed to further examine how these factors interact to influence marijuana use and problems over time.

Keywords

College students; marijuana; expectancies

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

Introduction

Young adulthood (ages 18–25) represents a critical period for the initiation and development of marijuana use and dependence in the United States. In 2012, 18.7% of young adults reported use of marijuana in the past month, compared to 7.2% of youths aged 12–17 and 5.3% of adults (1). Cannabis use disorder is the most prevalent illicit substance use disorder in the US, and the rate has been on the rise in recent years (2). Even among young adults who do not meet diagnostic criteria for cannabis use disorder, marijuana use can lead to negative physical, mental, emotional, social, and occupational outcomes (3–5).

Despite evidence of the harms of marijuana use, perceived risk of marijuana use may be decreasing among young adults in the US (6). At the same time, the legal context of marijuana use in America is evolving, as four states (Alaska, Colorado, Oregon, and Washington) have legalized recreational marijuana use, with similar legislation being proposed in other states. Although it is too soon to know whether these changes will result in increased marijuana access or use problems, it is important to build a greater empirical understanding of factors that help predict why some marijuana users experience negative consequences related to their use, including dependence, while other users are able to maintain non-problematic use or succeed in cutting down or quitting. Such knowledge can address what may become an increasingly important public health issue. Research suggests that marijuana expectancies may be an important area of study, as these cognitions exert significant influence on marijuana use and related problems (7–10).

Paralleling a larger body of research on alcohol use expectancies (11,12), marijuana use expectancies (learned associations between marijuana use and the consequences of such use) have been associated with marijuana use. Studies show a protective effect of negative use expectancies (beliefs that marijuana use will lead to unpleasant outcomes) being associated with non-use and cessation of use (7,9,13). A mix of cross-sectional and longitudinal research has shown that endorsing less negative use expectancies is associated with an increased likelihood of continued marijuana use (9,10), and endorsement of positive use expectancies is associated with escalated marijuana use, higher levels of marijuana use disorders, and difficulties cutting down or quitting marijuana use (8,14–17).

The counterpart to use expectancies is cessation expectancies (associations regarding the consequences of reducing or stopping use of a substance). Although there is sparse research about this relatively new construct, a few alcohol and tobacco studies have shown that cessation expectancies also affect substance use by influencing efforts to reduce consumption (18,19) and delaying initiation of drinking in youth (20). No peer-reviewed publications to date have explored marijuana-specific cessation expectancies, but one unpublished study suggests that more positive marijuana cessation expectancies (beliefs that cutting down/stopping marijuana use would lead to beneficial outcomes) are related to marijuana change efforts among frequent users (21). Additionally, for alcohol, use and non-use expectancies appear to be distinct constructs and provide incremental validity in terms of predicting adolescent alcohol use (22).

Taken together, research suggests that changes in use expectancies contribute to the progression toward problematic marijuana use, and more limited research hints that cessation expectancies may also influence marijuana use. Understanding how patterns of marijuana use cognitions are related to marijuana use and problems is a critical step toward developing appropriate marijuana-specific prevention, intervention, and treatment strategies (8). The present study aimed to extend our knowledge of the cognitive factors affecting marijuana use by examining the associations between marijuana use and cessation expectancies, and how these cognitions relate to marijuana use in a sample of young adults. To our knowledge, this is the first concurrent examination of marijuana use and cessation expectancies among young adult users.

Based on findings from the alcohol literature (22), we hypothesized that use and cessation expectancies would be significantly associated; specifically, positive use expectancies would be negatively associated with cessation expectancies and negative use expectancies would be positively associated with cessation expectancies. Additionally, when considered independently, we hypothesized that use and cessation expectancies would be significantly associated with marijuana use such that positive use expectancies would be positively associated with marijuana use while negative use expectancies and cessation expectancies would be negatively associated with marijuana use. Finally, when considered concurrently, we hypothesized that use and cessation expectancies would provide unique variance in the prediction of marijuana use.

Method

Participants

Participants ($N = 357$) were college students endorsing marijuana use at least once in their lifetime (an additional 17 participants indicated lifetime marijuana use but did not provide any data on the measures of interest, and thus were dropped from the final analysis). The sample was predominantly Caucasian (94.5%) and female (71.1%). Participants were a mean age of 20.3 years old ($SD = 1.5$) and were relatively evenly distributed by year in school (21.3% freshmen, 25.6% sophomores, 22.4% juniors, and 30.7% seniors).

Procedure

College students between the ages of 18 and 25 inclusive were recruited from three 4-year college campuses located in the Pacific Northwest and Midwest regions of the US. Participation was solicited via flyers posted on campus and announcements with identical content posted on schools' pages on the social networking site www.facebook.com. After certifying college enrollment and age, participants provided electronic informed consent, and then completed a self-administered online survey. The measures described below were administered within a larger survey of drug use behavior and cognition; only participants endorsing lifetime marijuana use completed these items. Participating Institutional Review Boards approved all study procedures.

Measures

Marijuana use expectancies were measured using the 6-item Marijuana Effect Expectancy Questionnaire-Brief (MEEQ-B; 23). Using a 5-point Likert scale ranging from 1 (“disagree strongly”) to 5 (“agree strongly”), participants rate how much they agree with assertions about the effects of marijuana. The MEEQ-B has two scales, Positive (an example item is “marijuana helps a person relax and feel less tense [helps you unwind and feel calm]”) and Negative (an example item is “marijuana makes it harder to think and do things [harder to concentrate or understand; slows you down when you move]”). A higher Positive MEEQ-B score indicates a stronger belief that using marijuana will lead to positive outcomes; a higher Negative MEEQ-B score indicates a greater belief that using marijuana will lead to negative outcomes. The MEEQ-B has demonstrated good discriminant and convergent validity (13). Internal consistency for the MEEQ-B scales was low in the present study: Positive ($\alpha = 0.61$) and Negative ($\alpha = 0.40$).

Marijuana cessation expectancies were assessed with a modified version of the Cessation Expectancy Questionnaire (CEQ; 18). The 23-item CEQ was originally developed to assess adolescents’ expectancies for cutting down or quitting alcohol use on a 5-point Likert scale from 1 (“a lot worse”) to 5 (“a lot better”); in the current study the word “alcohol” was changed to “marijuana.” In the current sample, internal consistency for the CEQ subscales was low to good: Social ($\alpha = 0.66$) and Global ($\alpha = 0.86$). Some example items which could be affected by cutting down or quitting using marijuana are: “popularity” and “reputation at school among students” (Social), and “health” and “the future” (Global). Higher Social or Global CEQ scores indicate a greater belief that cutting down/quitting marijuana will have positive consequences socially or globally, respectively.

Marijuana use was measured via items from the Marijuana Smoking History Questionnaire (MSHQ; 24), a self-report instrument designed to assess marijuana users’ past and present use of marijuana. To assess quantity of marijuana use, the MSHQ item asking, “on average, how much marijuana do you smoke per occasion?” was used; participants responded on an 8-point scale corresponding to a graphic of eight marijuana cigarettes of varying size. Participants reported a mean (SD) score of 3.5 (2.1) on this item. Frequency of marijuana use was assessed with the item asking, “during a typical month, how many times do you smoke marijuana?” There was a large range of marijuana use frequency, with a mean (SD) of 15.5 (48.2) times in the past month. Due to violations of normality for this variable, a logarithmic transformation was applied to the data.

Severity of drug problems was assessed using the Drug Abuse Screening Test, Short Form (DAST-10). The version of the DAST-10 used in the present study (25) is a modified short form of the Drug Abuse Screening Test (26), which was developed to detect drug abuse and drug dependence in clinical and nonclinical samples and has demonstrated strong predictive validity for substance use disorders across a range of diagnostic guidelines, including the DSM-III, DSMIV, and ICD-10 (27). The DAST-10 includes 10 yes/no questions that inquire about use of “drugs other than alcohol” (not marijuana-specific) in the past 12 months, and responses are coded such that higher scores indicate greater problems. As the DAST includes all dichotomous items, structural equation modeling was used to index reliability. A single factor structure was modeled and demonstrated a good fit to the data ($CFI = 0.90$;

RMSEA = 0.06 [CI: 0.04–0.07], p close = ns). The recommended cut-off score for the DAST-10 is 3, with higher scores indicating that a substance use disorder is likely present (25). Participants reported a mean (SD) score of 3.1 (1.9) on this scale, with 32.2% of the sample exceeding the cut-off score of 3.

Intentions to reduce or quit using marijuana were assessed using a modified item from Etter and Perneger (1999), who assessed intentions to quit smoking tobacco with the question, “are you planning to quit smoking ... (a) within the next month, (b) within the next 6 months, (c) sometime in the future beyond 6 months, or (d) are you not planning to quit?” (28). Although the psychometric properties of this item were observed to be limited, good predictive validity in applied settings has been indicated (28). In the present study, this item was adapted to refer to using marijuana. A single dichotomous (1 = yes; 0 = no) variable reflecting intentions to reduce and/or quit using in the next six months was computed. The majority of participants (68.5%) indicated no intention to reduce/quit use.

Data analysis

All analyses were performed using StataSE 13.1 (29). Preliminary analyses were conducted to examine if demographic variables (sex, race, grade, age, college campus) were associated with the outcome variables. In the event a demographic variable was associated with a given outcome, it was entered as a covariate in subsequent analyses.

First, to test the hypothesis concerning associations among use and cessation expectancies, pairwise correlations were conducted using the MEEQ-B and CEQ scales.

Second, a regression framework was used to test the hypothesis that use and cessation expectancies would separately predict use outcomes. Specifically, the two CEQ scales were entered as predictors into a single model with marijuana use frequency as the dependent variable. These models were repeated for the other three outcome variables (i.e., quantity, DAST score, future use intentions). A separate set of models then was run with the two MEEQ-B scales replacing the CEQ scales as the predictors. For each predictor set, a Bonferroni correction was applied at the omnibus level to account for multiple comparisons across outcomes; in order to be considered significant, any given model had to be overall significant at $p < 0.0125$ (i.e. $0.05/4$).

Finally, in order to test the hypothesis that use and cessation expectancies would contribute unique variance in predicting outcome, hierarchical regression models were utilized wherein any relevant covariates were entered as the first block, then the two scales of the CEQ were entered as the next block of predictors, followed by the two MEEQ-B scales as the final block of predictors. Whenever a block of predictors was added to the model, a comparison to the previous, simpler model was conducted to examine if the more complex model predicted a significantly greater amount of variance. Again, a Bonferroni correction strategy was utilized such that a significance level of $p < 0.0125$ was adopted for any omnibus test.

Results

Associations among marijuana expectancies

Pairwise associations among marijuana expectancies are presented in Table 1. As expected, greater Positive MEEQ-B scores were significantly and inversely associated with both Global and Social CEQ scores. Greater Negative MEEQ-B scores were significantly associated with greater Global and Social CEQ scores.

Associations among MEEQ-B scores, CEQ scores, and outcomes

College campus and sex were associated with marijuana use frequency and thus were entered into models testing this outcome; sex was also associated with marijuana use quantity and was entered as a covariate accordingly. None of the tested demographic variables were associated with DAST score or cut down/quit intentions. Omnibus tests of the four models testing the predictive utility of the CEQ on marijuana use variables were all significant: $F(4, 278) = 10.24, R^2 = 0.13, p < 0.001$ for marijuana frequency, $F(3, 292) = 15.13, R^2 = 0.13, p < 0.001$ for marijuana quantity, $F(2, 334) = 12.31, R^2 = 0.07, p < 0.001$ for DAST score, and likelihood ratio $\chi^2(2) = 38.36, \text{Pseudo } R^2 = 0.11, p < 0.001$ for cut down/quit intentions. At the omnibus level, the MEEQ-B was a significant predictor of all outcomes except cut down/quit intentions: $F(4, 280) = 8.37, R^2 = 0.11, p < 0.001$ for marijuana frequency, $F(3, 293) = 13.40, R^2 = 0.12, p < 0.001$ for marijuana quantity, and $F(2, 344) = 5.94, R^2 = 0.03, p = 0.003$ for DAST score. Results of the simple main effects of each regression model are presented in Table 2. Greater Global CEQ scores predicted lower marijuana frequency and an increased likelihood of intending to cut down/quit in the next six months, but predicted greater marijuana quantity and problems on the DAST. Greater Social CEQ scores predicted lower marijuana frequency and quantity, a decreased likelihood of intending to cut down/quit in the next six months, and fewer problems on the DAST. Greater Positive MEEQ-B scores predicted higher marijuana frequency, marijuana quantity, and DAST score. Greater Negative MEEQ-B scores predicted lower marijuana frequency.

Unique contributions of the CEQ and MEEQ-B scales

Results of the hierarchical regression models indicated that the CEQ and MEEQ-B scales contributed significant and unique variance in the prediction of all marijuana outcomes except 6-month intentions to cut down/quit (Table 3). For marijuana frequency, the two CEQ scales accounted for a significant amount of variance, $R^2 = 0.10, p < 0.001$, after controlling for sex and college; the addition of the MEEQ-B scales resulted in a significant increase in the variance accounted for, $R^2 = 0.04, p = 0.003$. The CEQ scales were significant predictors of marijuana quantity, $R^2 = 0.09, p < 0.001$, after controlling for sex, and again inclusion of MEEQ-B scales significantly increased the predictive power of the model, $R^2 = 0.05, p < 0.001$. The same was found for DAST scores; the variance explained by the model with the CEQ scales, $R^2 = 0.07, p < 0.001$, was significantly increased when the MEEQ-B scales were added, $R^2 = 0.03, p = 0.003$. For the final outcome, cut down/quit intentions, the CEQ scales contributed significant variance to the model, Wald $\chi^2(2) = 29.45, p < 0.001$, but the addition of the MEEQ-B scales failed to increase the predictive power of the model, Wald $\chi^2(2) = 2.69, \text{ns}$. This finding was not surprising, given that the MEEQ-B scales failed to predict intentions when tested in a simple regression framework.

Across all outcomes, similar results were observed when the order of the expectancy blocks was reversed (i.e. when the MEEQ-B scales were entered into the model first, followed by the CEQ scales).

Discussion

To the best of our knowledge, this is the first study to concurrently examine the associations between marijuana use expectancies and marijuana cessation expectancies, as well as the relative contribution of each domain of expectancies to marijuana use. Consistent with research on alcohol expectancies (22), positive use expectancies were negatively associated with cessation expectancies, and negative use expectancies were positively associated with cessation expectancies. Both forms of expectancies were associated with marijuana use variables, and importantly, each contributed significant unique variance in hierarchical regression models except for marijuana use intentions. Research to date on substance use expectancies (e.g., 8,31) and related work on users' motives and assessments of the pros/cons of use (32–35) has indicated the importance of considering cognitions related to use and nonuse in understanding use trajectories and developing appropriate prevention, intervention, and treatment strategies for substance use disorders. The results of the current study build on this combined body of research by suggesting the value of considering use and cessation expectancies not as opposite ends of the same spectrum, but rather as related constructs that offer distinct information when considered concomitantly. Including the measurement of both use and cessation expectancies has the potential to provide clinically useful data. For example, one could use information on expectancies of marijuana use to enhance the perceived negative consequences of use, while addressing potential barriers to cutting down by managing perceived negative consequences of marijuana use cessation.

The current study has a number of strengths. First, the present study includes the use of a relatively large collegiate sample of marijuana users from three different institutions of higher learning in different geographic locations. This study also contributes to the burgeoning literature on marijuana-related cognitions, particularly the sparse area of cessation expectancies. Finally, this study expands upon the findings from the alcohol field that suggest that use expectancies and cessation expectancies are distinct constructs.

One potential limitation of the current study is that the generalizability of the findings may be limited, as the current sample is predominantly comprised of Caucasian female college students. The three recruitment sites varied in marijuana use and expectancies, but sample size was insufficient to explore these differences further (although we controlled for this in our analyses). Additionally, causal inferences cannot be drawn, due to the cross-sectional design. The study also included all participants with at least one lifetime marijuana use, but it is possible that use and cessation expectancies (which are influenced by actual use) may vary between lighter versus heavier users. Another potential limitation of the current study is that some of the expectancies scales used had low internal consistency (i.e., both subscales of the MEEQ-B and the social effects subscale of the CEQ). Of note, the estimates for MEEQ-B in the current study were similar to those reported in previous studies examining measures of marijuana and alcohol expectancies (23,31); having only three positive and three negative items in the MEEQ-B may account for the low internal consistency. The low

reliability of the CEQ subscale may also reflect the fact that measure was adapted from an alcohol measure. Marijuana cessation expectancies may follow a slightly different factor structure than alcohol cessation expectancies and thus relevant marijuana cessation expectancies may not be fully captured by this instrument. Indeed, recent unpublished research suggests that marijuana cessation expectancies may be better operationalized using a five-factor construct (21). Finally, the DAST is not marijuana-specific, and future studies may choose to utilize a measure which focuses on marijuana.

Ultimately, for some young adults, marijuana use may represent experimental and/or non-problematic behavior, yet for others, it may lead to significant short- and long-term negative consequences. With the changing social climate around the legality of marijuana, it is important that researchers and clinicians gain a better understanding not only of the factors that lead to initiation of marijuana use, but also of those that contribute to the development and maintenance of problems related to marijuana use. Considerable research in the alcohol field has examined cognitive factors proximal to harmful drinking in young people, which has in turn led to the development of harm reduction strategies focused on influencing cognitions such as alcohol use expectancies in order to prevent or minimize the risks associated with alcohol use (36). Recently, researchers have begun adapting similar constructs to marijuana use, yet the complex interplay between cognitions and behaviors for marijuana likely differs from that of alcohol, and remains less well understood. The current study provides further evidence of the importance of different types of marijuana expectancies in influencing marijuana use and use-related problems. Future research should explore how such information may be used to develop prevention and intervention strategies targeting use and cessation expectancies among marijuana-using individuals.

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Table 1

Pairwise correlations among marijuana use expectancy and cessation expectancy scales.

	CEQ _{global}	CEQ _{social}	MEEQ-B _{positive}
CEQ _{global}			
CEQ _{social}	0.45 ^{**}		
MEEQ-B _{positive}	-0.16 [*]	-0.27 ^{**}	
MEEQ-B _{negative}	0.26 ^{**}	0.20 ^{**}	-0.20 ^{**}

Reported r is significant at the $p < 0.05$ level after Bonferroni correction for multiple comparisons. MEEQ-B, Marijuana Effect Expectancy Questionnaire-Brief; CEQ, Cessation Expectancy Questionnaire. Due to missing data, ns for individual correlations ranged from 334–347.

* $p < 0.01$,

** $p < 0.001$.

Table 2

Independent effects of use and cessation expectancies on marijuana outcomes.

Expectancy	Outcome variable											
	Frequency			Quantity			DAST			6-month intention*		
	B	SE	p	B	SE	p	B	SE	p	B	SE	p
<i>Model 1: CEQ</i>	10.24	0.13	<0.001	15.13	0.13	<0.001	12.31	0.07	<0.001	38.36	0.11	<0.001
Sex	-15.36	6.20	0.01	-1.09	0.26	<0.001						
College			ns									
Global	-29.24	8.70	0.001	1.25	0.38	0.001	1.48	0.33	<0.001	3.44	0.65	<0.001
Social	-39.82	13.09	0.0003	-2.76	0.52	<0.001	-1.67	0.44	<0.001	-1.38	0.64	0.031
<i>Model 2: MEEQ-B</i>	8.37	0.11	<0.001	13.40	0.12	<0.001	5.94	0.03	0.003			ns
Sex			ns	-0.79	0.27	0.003						
College			ns									
Positive	13.22	4.00	0.001	0.71	0.17	<0.001	0.45	0.13	0.001			ns
Negative	-13.44	4.48	0.003			ns			ns			ns

* Intentions tested in a logistic regression framework. Omnibus tests provided in italics, as the *F*-score, R^2 , and *p* value (or likelihood ratio χ^2 , Pseudo R^2 , *p* value for the intentions variable). Results presented are the individual effects from simple regressions testing each outcome. Model 1 and Model 2 represent separate models. MEEQ-B, Marijuana Effect Expectancy Questionnaire-Brief; CEQ, Cessation Expectancy Questionnaire; DAST, Drug Abuse Screening Test.

Table 3

Hierarchical regression of use and cessation expectancies on marijuana outcomes.

Outcome	Order	Block	F	(df _{num} , df _{den})	p	R ²	R ²
Frequency	1	Sex/college	4.21	(2, 280)	0.016	0.03	
	2	CEQ	15.82	(2, 278)	<0.001	0.13	0.10
	3	MEEQ-B	5.94	(2, 276)	0.003	0.16	0.04
Quantity	1	Sex	14.59	(1, 294)	<0.001	0.05	
	2	CEQ	14.73	(2, 292)	<0.001	0.13	0.09
	3	MEEQ-B	9.36	(2, 290)	<0.001	0.19	0.05
DAST	1	CEQ	12.31	(2, 334)	<0.001	0.07	
	2	MEEQ-B	5.89	(2, 332)	00.003	0.1	0.03
6-month intention*	1	CEQ	29.45	2	<0.001		
	2	MEEQ-B			<i>ns</i>		<i>ns</i>

* Intentions tested in a logistic regression framework (Wald χ^2). Results presented when covariates entered as Block 1 (when applicable), CEQ scales entered next, and then MEEQ-B scales entered last. Results were similar when order of the expectancies blocks was reversed. MEEQ-B, Marijuana Effect Expectancy Questionnaire-Brief; CEQ, Cessation Expectancy Questionnaire; DAST, Drug Abuse Screening Test.