Published in final edited form as:

Addict Behav. 2013 March ; 38(3): 1629–1634. doi:10.1016/j.addbeh.2012.10.010.

Psychometric Properties of a Valuations Scale for the Marijuana Effect Expectancies Questionnaire

Julia D. Buckner^{a,*}, Anthony H. Ecker^a, and Katherine D. Welch^a

^aLouisiana State University, Department of Psychology, 236 Audubon Hall, Baton Rouge, LA, USA 70803

Abstract

Given that marijuana remains the most commonly used illicit substance, identification of the role of potentially malleable cognitive factors in marijuana-related behaviors remains an important goal. The *Marijuana Effect Expectancies Questionnaire* (MEEQ; Schafer & Brown, 1991) assesses marijuana effect expectancies that are differentially related to marijuana use and use-related problems. Evaluation of the desirability of marijuana effect expectancies may provide additional information regarding cognitions related to marijuana use behaviors. The present study examined the psychometric properties of the *Marijuana Effect Expectancy Questionnaire-Valuations Scale* (MEEQ-V) which was developed for this study to assess the desirability of marijuana effect expectancies. The sample was comprised of 925 (73.0% female) undergraduate participants, 41.9% of whom endorsed lifetime marijuana use and 24.7% of whom reported current (past three-month) use. The MEEQ-V scales demonstrated adequate internal consistency. Most (but not all) MEEQ-V scales were correlated with their corresponding MEEQ scale. There was some support for convergent validity. MEEQ-V scales were differentially related to frequency of marijuana use and use-related problems. Most MEEQ-V scales were related to frequency of marijuana use above and beyond variance attributable to corresponding MEEQ scales. Results suggest that assessment of desirability of marijuana's effects could provide unique and important information about cognitions related to marijuana use behaviors.

Keywords

Marijuana; cannabis; effect expectancies; psychometrics

1. Introduction

Marijuana is the most commonly used illicit drug in the U.S. and more than one in four users experiences distress and/or impairment related to use that is substantial enough to warrant a

© 2012 Elsevier Ltd. All rights reserved.

*Correspondence concerning this article should be addressed to Julia D. Buckner, Department of Psychology, Louisiana State University, 236 Audubon Hall, Baton Rouge, LA 70803, USA. jrbuckner@lsu.edu, Telephone: (225) 578-4096, Fax: (225) 578-4125.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Contributors

Dr. Julia Buckner designed the study, conducted literature searches, wrote reviews of prior research, and performed the statistical analysis. All authors contributed to and have approved the final manuscript.

Conflict of Interest

All authors declare they have no conflicts of interests.

diagnosis of cannabis use disorder (CUD; Substance Abuse and Mental Health Services Administration [SAMHSA]; 2010). Marijuana use has been linked to numerous negative health and psychological consequences (see Sussman, Stacy, Dent, & Simon, 1996). Given the high rates of marijuana use and use-related problems, it is important to better understand cognitive factors related to marijuana use and use-related problems. Such understanding could inform treatment and prevention efforts.

One promising area is that of marijuana effect expectancies, or expectations regarding the effects of using marijuana. The *Marijuana Effect Expectancies Questionnaire* (MEEQ; Schafer & Brown, 1991) is the most frequently used measure of marijuana effect expectancies. The MEEQ assesses the degree to which a person expects effects to occur as a result of using marijuana. The MEEQ was developed to be used by those with and without experience using marijuana. MEEQ items were derived by asking community adult volunteers with varying levels of marijuana use (no experience to daily use) what effects they expected from the use of a moderate amount of marijuana. Based on exploratory factor analysis, six subscales were identified: Cognitive/Behavioral Impairment, Relaxation/Tension Reduction, Social/Sexual Facilitation, Perceptual/Cognitive Enhancement, Global Negative Effects, and Craving/Physical Effects (Schafer & Brown, 1991). This factor structure has been confirmed (Aarons, Brown, Stice, & Coe, 2001).

Primary marijuana users tend to endorse less Cognitive/Behavioral Impairment and Global Negative Effects and more Relaxation/Tension Reduction and Social/Sexual Facilitation than those who primarily use other substances (Aarons et al., 2001). MEEQ subscales were positively correlated with similar alcohol outcome expectancies (e.g., MEEQ-Cognitive/Behavioral Impairment related to Cognitive/Behavioral Deterioration alcohol outcome expectancy) among adolescents (Aarons et al., 2001). There is evidence of temporal stability of MEEQ subscales over a two-year period (Aarons et al., 2001).

MEEQ subscales are differentially related to frequency of marijuana use (Schafer & Brown, 1991). Nonusers tend to report more Global Negative Effects expectancies than users (Aarons et al., 2001; Buckner & Schmidt, 2008; Galen & Henderson, 1999). However, the nature of the relations of other MEEQ subscales to use is unclear. Among adults, current users tend to endorse more Relaxation/Tension Reduction expectancies than nonusers, past-users, or less frequent users (Buckner & Schmidt, 2008; Galen & Henderson, 1999; Hayaki et al., 2010), although this does not seem to be the case with adolescents (Aarons et al., 2001). Cognitive/Behavioral Impairment expectancies were negatively related to use among adolescents (Aarons et al., 2001) but unrelated to use among adults (Buckner & Schmidt, 2008; Galen & Henderson, 1999). Social/Sexual Facilitation expectancies were positively related to use among college students (Buckner & Schmidt, 2008) but not adolescents or adults receiving inpatient substance use disorder treatment (Aarons et al., 2001; Galen & Henderson, 1999). Craving/Physical Effect expectancies were related to use in some samples (Aarons et al., 2001; Buckner & Schmidt, 2008; Galen & Henderson, 1999) but not others (Hayaki et al., 2010).

Emerging data suggest the scales are also differentially related to marijuana-related problems (Buckner & Schmidt, 2008; Hayaki et al., 2010). Among college students, Global Negative Effects and Cognitive/Behavioral Impairment expectancies were positively related to marijuana problem severity (Buckner & Schmidt, 2008). However, among female community marijuana users, Global Negative Effects and Relaxation/Tension Reduction expectancies were related to marijuana problem severity (Hayaki et al., 2010).

One factor that may contribute to these disparate findings is that the MEEQ does not assess whether users want the expected effect to occur. In fact, we know of no measure that

assesses valuation of marijuana effect expectancies. Yet, it may be that only those individuals who desire an expected effect are motivated to use more frequently or to use in a manner that is associated with marijuana-related problems. To illustrate, social anxiety and social anxiety disorder (SAD) were related to MEEQ-Cognitive/Behavioral Impairment and this expectancy mediated the relation between social anxiety and marijuana problems (Buckner & Schmidt, 2008, 2009). One interpretation of these seemingly puzzling results is that people who experience more marijuana-related impairment (in this case, socially anxious users) come to expect impairment when they use marijuana. Yet, Buckner and Schmidt (2008) tested this hypothesis and found that marijuana-related problems failed to account for the relation between social anxiety and Cognitive/Behavioral Impairment expectancies. It may therefore be that some individuals use marijuana because they want marijuana to slow their anxiety-induced racing thoughts and/or to make things around them seem less real and, perhaps, less anxiety-provoking. In other words, examination of whether users value particular expectancies may provide valuable insight into cognitive factors related to marijuana use behaviors. Valuations of the effects of other substances (alcohol) seem to increase the predictive utility of alcohol outcome expectancies (e.g., Fromme, Stroot, & Kaplan, 1993; Ham, Stewart, Norton, & Hope, 2005).

In light of the potential contribution that could be made by understanding of the role of valuations of expectancies in marijuana use behaviors, we developed the *Marijuana Effect Expectancy Questionnaire-Valuations Scale* (MEEQ-V). The aim of the current study was to examine the psychometric properties of the MEEQ-V. First, correlations between MEEQ-V scales and their corresponding MEEQ scale were conducted. Given the MEEQ was developed to be used by those with and without experience using marijuana, correlations were examined among the entire sample as well as among current users. Second, convergent validity was examined by conducting correlations between MEEQ-V scales and relevant marijuana motives and alcohol outcome expectancies' valuation scales. Third, concurrent validity was examined by testing whether MEEQ-V scales were correlated with marijuana use frequency and marijuana-related problems. Fourth, incremental validity was tested by examining whether MEEQ-V scales remained related to marijuana use and use-related problems after controlling for variance attributable to corresponding MEEQ scales. Fifth, we tested whether MEEQ-V scales interacted with their corresponding MEEQ scale to predict marijuana use and use-related problems. Sixth, given the dearth of studies explicitly examining the psychometric properties of the 48-item MEEQ, we also conducted relevant analyses for the MEEQ.

The sample consisted of undergraduates, a group well-suited to examine marijuana use given that college students and young adults are at risk for marijuana problems (Caldeira, Arria, O'Grady, Vincent, & Wish, 2008; Johnston, O'Malley, Bachman, & Schulenberg, 2007) and age of CUD onset peaks at 18–19 (Stinson, Ruan, Pickering, & Grant, 2006). Also, marijuana use rates are similar between college and non-college peers, although the rate of marijuana use is increasing among college students but not non-college peers (SAMHSA; 2010).

2. Method

2.1 Participant Selection and Procedures

Participants were recruited through the psychology undergraduate participant pool from September–November 2011. This study was approved by the university's Institutional Review Board and informed consent was obtained prior to data collection. Participants completed computerized versions of study measures using a secure, on-line data collection website (surveymonkey.com). Computerized and paper-and-pencil versions of self-report measures are highly correlated (Gwaltney, Shields, & Shiffman, 2008). The last page of the

survey contained contact information for university-affiliated outpatient clinics that provide psychosocial treatment for substance use and/or mental health disorders. Participants received research credit for completion of the survey.

Of the 969 participants that began the survey, 2.5% were deemed ineligible. Reasons included being under 18 years of age ($n = 2$), incomplete responses ($n = 18$), and questionable validity ($n = 4$; detailed below). Age range was restricted to students under 25 years old to more accurately reflect factors related to use among more traditional undergraduates, excluding an additional 20 participants. Thus, the final sample consisted of 925 participants aged 18–24 ($M = 19.5$, $SD = 1.4$). Consistent with the demographics of psychology students at this University more broadly that year, the sample was 73.0% female. Participants were asked to indicate their ethnicity (i.e., Hispanic/Latino or Non-Hispanic/Non-Latino) and the majority of the sample was 95.5% non-Hispanic/Latino. Next, participants were asked to indicate their race and the racial composition was 9.2% African American/Black, 0.4% Native American, 3.1% Asian American, 83.0% Caucasian/White, 2.7% “mixed”, and 1.5% “other”.

2.2 Measures

2.2.1 Marijuana Expectancies Questionnaire (MEEQ)—As described above, the MEEQ is a 48-item list of expectations regarding marijuana use (Aarons et al., 2001; Schafer & Brown, 1991). In the present sample, most MEEQ scales demonstrated adequate internal consistency: Cognitive/Behavioral Impairment ($\alpha = .84$), Relaxation/Tension Reduction ($\alpha = .89$), Perceptual/Cognitive Enhancement ($\alpha = .76$), Global Negative Effects ($\alpha = .88$), and Craving/Physical Effects ($\alpha = .84$). The Social/Sexual Facilitation scale demonstrated somewhat low internal consistency in this sample ($\alpha = .68$).

2.2.2 Marijuana Effect Expectancies Questionnaire-Valuations Scale (MEEQ-V)—MEEQ-V items were derived from the 48-item version of the MEEQ (Aarons et al., 2001) and are rated from 1 (*bad*) to 5 (*good*) (as per Galen & Henderson, 1999). This language choice is consistent with the valuations scale of the *Comprehensive Effects of Alcohol* (CEOA; Fromme et al., 1993). As with the MEEQ, the MEEQ-V was designed to be used with adolescents and adults. In the present sample, internal consistency was adequate for all MEEQ-V Scales: Cognitive/Behavioral Impairment ($\alpha = .89$), Relaxation/Tension Reduction ($\alpha = .88$), Social ($\alpha = .73$), Perceptual/Cognitive Enhancement ($\alpha = .87$), Global Negative Effects ($\alpha = .88$), and Craving/Physical Effects ($\alpha = .80$).

2.2.3 Marijuana Use Form (MUF)—The MUF was used to assess marijuana use. Participants indicated whether they had ever used marijuana (yes/no) and whether they had used marijuana in the past three months (yes/no). Frequency of current use was assessed among current (past three months) users on a 0–9 rating scale (Buckner, Bonn-Miller, Zvolensky, & Schmidt, 2007). Scores of 0–3 indicated infrequent (less than weekly) use and scores of 4–9 indicated frequent (at least weekly) use. Similar questionnaires have been successfully used to assess marijuana use (e.g., Buckner, Heimberg, & Schmidt, 2011; Buckner & Schmidt, 2008).

2.2.4 Marijuana Problems Scale (MPS)—The MPS is a 19-item list of negative consequences related to marijuana use in the past 90 days (Stephens, Roffman, & Curtin, 2000). Participants rate cannabis use problems on a 0 (*no problem*) to 2 (*serious problem*) scale. The MPS has demonstrated adequate internal consistency (Buckner, Ecker, & Cohen, 2010; Lozano, Stephens, & Roffman, 2006; Stephens et al., 2000; Stephens et al., 2004). In the present sample, the MPS demonstrated adequate internal consistency ($\alpha = .84$) among current users.

2.2.5 Marijuana Motives Measure (MMM)—The MMM is a 25-item measure assessing the following marijuana use motives: enhancement (e.g., to get high), coping (e.g., to forget my worries), social (e.g., to enjoy a party), conformity (e.g., to fit in with a group I like), and expansion (e.g., to expand my awareness) (Simons, Correia, Carey, & Borsari, 1998). Participants indicate on a 1 (*almost never/never*) to 5 scale (*almost always/always*) the degree to which they have smoked marijuana for particular reasons. MMM subscales have demonstrated adequate internal consistency in prior work (Chabrol, Ducongé, Casas, Roura, & Carey, 2005) and in the present sample: conformity ($\alpha = .82$); enhancement ($\alpha = .90$); social ($\alpha = .87$); coping ($\alpha = .87$); and expansion ($\alpha = .91$).

2.2.6 Comprehensive Effects of Alcohol (CEOA)—The CEOA is a 38-item questionnaire that assesses both the expected effects of alcohol and the perceived value of each effect (Fromme et al., 1993). In the present sample, the CEOA subscales demonstrated adequate internal consistency: sociability ($\alpha = .88$); tension reduction ($\alpha = .76$); liquid courage ($\alpha = .87$); sexuality ($\alpha = .76$); cognitive/behavioral impairment ($\alpha = .87$); risks/aggression ($\alpha = .78$); and self-perception ($\alpha = .71$). The CEOA Valuations scales also demonstrated adequate internal consistency: sociability ($\alpha = .93$); tension reduction ($\alpha = .89$); liquid courage ($\alpha = .88$); sexuality ($\alpha = .87$); cognitive/behavioral impairment ($\alpha = .92$); risks/aggression ($\alpha = .78$); and self-perception ($\alpha = .83$).

2.2.7 Infrequency Scale—To identify responders who provided random or grossly invalid responses, we included four questions from the *Infrequency Scale* (Chapman & Chapman, 1983). As in similar studies (e.g., Buckner et al., 2010; Cohen, Iglesias, & Minor, 2009), those who endorsed three or more infrequency items were excluded ($n = 4$).

3. Results

3.1 Substance Use Patterns

Over half the sample (58.1%) denied lifetime marijuana use (“never users”), 17.2% reported lifetime use but denied current use (“past users”), 13.6% endorsed less than weekly current use (“infrequent users”), and 11.1% endorsed current weekly use (“frequent users”). Regarding alcohol, 88.5% endorsed lifetime use and 80.6% reported current use.

3.2 Correlations among MEEQ and MEEQ-V scales

Means, standard deviations, and bivariate correlations among the MEEQ-V Scales appear in Table 1. A similar pattern emerged among the entire sample as among current users. Effect sizes ranged from small to large, suggesting that although some scales were related, the scales appear to assess distinct constructs.

Among all participants, Relaxation/Tension Reduction ($r = .54, p < .001$) and Perceptual/Cognitive Enhancement ($r = .47, p < .001$) MEEQ-V scales were strongly correlated with their corresponding MEEQ scale. Social/Sexual Facilitation ($r = .37, p < .001$) and Craving/Physical Effects ($r = .28, p < .001$) MEEQ-V scales were moderately correlated with their corresponding MEEQ scale. Cognitive/Behavioral Impairment MEEQ-V ($r = -.12, p < .001$) was negatively related to its corresponding MEEQ scale, although the size of this effect was small. Global Negative Effects MEEQ-V scale was unrelated to its corresponding MEEQ scale ($r = .03, p = .432$). A slightly different pattern emerged among current marijuana users. Relaxation/Tension Reduction ($r = .56, p < .001$), Perceptual/Cognitive Enhancement ($r = .56, p < .001$), and Social/Sexual Facilitation ($r = .44, p < .001$) MEEQ-V scales were strongly correlated with their corresponding MEEQ scale. Global Negative Effects scales were moderately correlated ($r = .32, p < .001$). Craving/Physical Effects ($r = .07, p = .579$)

and Cognitive/Behavioral Impairment ($r = -.001, p = .983$) MEEQ-V scales were unrelated to their corresponding MEEQ scale.

3.3 Convergent Validity

First, the relations among MEEQ scales and MMM scales were examined. As hypothesized, Relaxation/Tension Reduction MEEQ was significantly correlated with Coping Motives ($r = .47, p < .001$), Social/Sexual Facilitation MEEQ was significantly correlated with Social Motives ($r = .52, p < .001$), and Perceptual/Cognitive Enhancement MEEQ was significantly correlated with Enhancement Motives ($r = .37, p < .001$).

Next, indices of convergent validity were examined for the MEEQ-V scales. As hypothesized, Tension Reduction MEEQ-V was significantly correlated with Coping Motives ($r = .32, p < .001$), Social/Sexual Facilitation MEEQ-V was significantly correlated with Social Motives ($r = .46, p < .001$), and Perceptual/Cognitive Enhancement MEEQ-V was significantly correlated with Enhancement Motives ($r = .50, p < .001$).

We also examined whether MEEQ-V scales were correlated with relevant valuations scales from the CEOA scale among all participants. As predicted, the Cognitive/Behavioral Impairment MEEQ-V was correlated with the Cognitive/Behavioral Impairment CEOA-V ($r = .61, p < .001$), Relaxation/Tension Reduction MEEQ-V was correlated with Tension Reduction CEOA-V ($r = .54, p < .001$), and Social/Sexual Facilitation MEEQ-V was correlated with both Social CEOA-V ($r = .56, p < .001$) and Sexuality CEOA-V ($r = .56, p < .001$).

3.4 Concurrent Validity

A multivariate analysis of variance (MANOVA) was conducted to examine the relations between marijuana use frequency and MEEQ-V scales (Table 2). Marijuana use group (never, past, infrequent, frequent) was the independent variable. Group status was significantly related to all MEEQ-V scales. Tukey post hoc analyses were conducted to examine the nature of these relations. Frequent users reported valuing Relaxation/Tension Reduction, Social/Sexual Facilitation, Perceptual/Cognitive Enhancement, and Craving/Physical Effects more than the other three groups. Frequent users reported valuing Cognitive/Behavioral Impairment more than never users and ex-users. Infrequent users reported more Cognitive/Behavioral Impairment, Relaxation/Tension Reduction, Social/Sexual Facilitation, and Perceptual/Cognitive Enhancement than never users. Infrequent users only differed from ex-users on Craving/Physical Effects.

Among current users, severity of marijuana-related problems was significantly correlated only with MEEQ-Global Negative Effects ($r = .23, p < .001$) after using Bonferroni corrections to control for Type I error ($p < .05/6 = .008$). There was a trend for problems to be correlated with the following MEEQ scales (although the size of these effects was small): Cognitive/Behavioral Impairment ($r = .16, p = .017$), Social/Sexual Facilitation ($r = .15, p = .020$), Perceptual/Cognitive Enhancement ($r = .14, p = .037$), and Craving/Physical Effects ($r = -.25, p = .031$). Marijuana-related problems were significantly correlated only with Global Negative Effects MEEQ-V ($r = .18, p = .006$) with a trending relation to Cognitive/Behavioral Impairment MEEQ-V ($r = .14, p = .033$).

3.5 Incremental Validity

Next, we examined the MEEQ-V subscale's unique contributions to frequency of marijuana use and number of marijuana-related problems to determine whether each MEEQ-V provided incremental information about marijuana use behaviors above and beyond its corresponding MEEQ scale (Table 3). All MEEQ-V scales except Cognitive/Behavioral

Impairment remained significantly related to marijuana use frequency. On the other hand, only Cognitive/Behavioral Impairment remained significantly related to marijuana-related problems (Table 3).

3.6 MEEQ X MEEQ-V Interactions Predicting Marijuana Use Behaviors

A series of hierarchical linear regressions was conducted to determine whether MEEQ scales interacted with their corresponding MEEQ-V scale to predict use and use-related problems. Predictors were entered in three steps: (1) the covariates of age and gender; (2) MEEQ scale; (3) corresponding MEEQ-V scale; and (4) MEEQ X MEEQ-V interaction. Z-scores were used to reduce multicollinearity. Bonferroni corrections were used to control for Type I error for each dependent variable ($p < .008$). No interaction was significant.¹

4. Discussion

The additional assessment of valuations regarding marijuana effect expectancies appears to provide a more comprehensive measure of expectancies than assessment of effect expectancies alone. Specifically, after controlling for the variance attributable to each corresponding MEEQ scale, all MEEQ-V scales except Cognitive/Behavioral Impairment remained significantly related to frequency of marijuana use. The current findings are consistent with the alcohol literature in which the addition of valuations scales appears to enhance the predictive utility of alcohol outcome expectancy scales (e.g., Fromme et al., 1993; Ham et al., 2005).

MEEQ-V scales were differentially related to frequency of marijuana use. Specifically, valuations regarding particular expectancies (Relaxation/Tension Reduction, Social/Sexual Facilitation, Perceptual/Cognitive Enhancement, and Craving/Physical Effects) differentiated those who never used marijuana from those who have used. Current users reported valuing Global Negative Effects and Cognitive/Behavioral Impairment more than never users, suggesting that valuing these two marijuana effects may place individuals at risk for using marijuana. Frequent users reported placing greater value on Relaxation/Tension Reduction, Social/Sexual Facilitation, Perceptual/Cognitive Enhancement, and Craving/Physical Effects than other participants, suggesting that valuing these effects may place users at risk for becoming more regular users. In fact, valuing these expectancies was uniquely, incrementally related to marijuana use frequency after controlling for corresponding MEEQ scales. It may be that users who especially value (and perhaps rely on) marijuana's relaxation, social facilitation, cognitive enhancement and/or physical effects properties are likely to become more frequent users. Thus, interventions aimed at reducing or ceasing marijuana use may benefit from cognitive restructuring techniques targeting these valuations. Longitudinal work will be an important next step in testing these hypotheses.

On the other hand, only the MEEQ-V Cognitive/Behavioral Impairment subscale was incrementally associated with marijuana-related problems. This subscale is comprised of items that include marijuana use leading to slowed thinking and actions, changes in perception of time and distance, becoming drowsy, and personality alternations. Thus, users who value these effects may use to experience these cognitive and behavioral changes in some situations (e.g., as a sleep aid) but experience unintended consequences that impair functioning (e.g., slowed reaction time resulting in driving impairment, personality alternations resulting in interpersonal difficulties).

¹Results from non-significant interaction analyses available from the corresponding author upon request.

It is noteworthy that not all MEEQ-V scales were significantly or substantially correlated with their respective MEEQ scale. Specifically, Cognitive/Behavioral Impairment and Global Negative Effects MEEQ-V scales exhibited small correlations with their respective MEEQ scales. Thus, it cannot be assumed that these negative expectancies are undesirable. It is also noteworthy that MEEQ-V scales did not moderate the relations of MEEQ scales to marijuana use or problem severity, suggesting these constructs are uniquely, rather than synergistically related to marijuana-related behaviors. Future work would benefit from examining whether there are individual difference variables related to the desirability of these expectancies and whether desiring these expectancies is related to greater marijuana use and/or impairment among some vulnerable individuals. For instance, socially anxious individuals may especially value marijuana's social/sexual facilitation and relaxation/tension reduction effects, which may play a role in their vulnerability to cannabis dependence (Buckner et al., 2008). Also, our finding that Cognitive/Behavioral Impairment MEEQ-V was incrementally related to marijuana problems suggests that Cognitive/Behavioral Impairment MEEQ may have mediated the relationship between social anxiety disorder status and marijuana-related problems in prior work (Buckner & Schmidt, 2008) because socially anxious individuals value effects such as slowed thinking and changes in personality.

Findings provide initial support for the psychometric properties of the newly developed MEEQ-V. In addition to support for concurrent validity with marijuana use frequency and problems, internal consistency was adequate for all MEEQ-V scales. Regarding convergent validity, MEEQ-V scales were significantly correlated with relevant MMM scales (i.e., Relaxation/Tension Reduction MEEQ-V with Coping Motives, Social/Sexual Facilitation MEEQ-V with Social Motives, Perceptual/Cognitive Enhancement MEEQ scale was significantly positively correlated with Enhancement Motives) and with relevant valuations of alcohol outcome expectancies (Cognitive/Behavioral Impairment MEEQ-V with Cognitive/Behavioral Impairment CEOA-V, Relaxation/Tension Reduction MEEQ-V with Tension Reduction CEOA-V, Social/Sexual Facilitation MEEQ-V with Social and Sexuality CEOA-Vs). Yet the size of these correlations (ranging from medium to large effect sizes) suggests that although the MEEQ-V scales were related to theoretically relevant marijuana use motives and alcohol outcome expectancies, MEEQ-V scales appear to be tapping constructs that are distinct from those assessed with these other measures.

The current study also provides important information regarding the psychometric properties of the 48-item version of the MEEQ (Aarons et al., 2001). First, this study adds to a growing body supporting the internal consistency of most MEEQ scales (Aarons et al., 2001; Buckner & Schmidt, 2008; Galen & Henderson, 1999). However, consistent with prior work (Aarons et al., 2001; Schafer & Brown, 1991; Simons & Arens, 2007), the Social/Sexual Facilitation MEEQ scale demonstrated somewhat low internal consistency, calling into question the utility of this scale. Second, emerging data suggest that the MEEQ scales are differentially related to marijuana-related problems among young adults (Buckner & Schmidt, 2008; Hayaki et al., 2010). Third, although prior work examined the MEEQ's convergent validity with alcohol outcome expectancies (Aarons et al., 2001), this is the first known study to examine the convergent validity of MEEQ scales with marijuana motives.

The study should be considered in light of limitations. First, the cross-sectional nature of the design limits our ability to test causal relations and the test-retest reliability of this measure. Given that a person's values and expectations could change following intervention, it will be important to establish the temporal stability of this scale to determine whether it is sensitive to intervention-related changes. Second, the sample was comprised solely of undergraduates. Although this strategy allows for the examination of factors related to cannabis use among a particular vulnerable population (Caldeira et al., 2008; Johnston et al., 2007), replication

with other populations is necessary. Third, use was measured via a categorical measure of frequency of use and future work could benefit from the use of a continuous measure of both frequency and quantity of use. Fourth, given that participants completed study measures online, some participants may have completed measures under the influence of marijuana or other substances and replication in a more controlled environment will be an important next step. Fifth, the MEEQ-V was based on the 48-item MEEQ (Aarons et al., 2001). Yet, there is some support for a brief version of the MEEQ (Torrealdy et al., 2008) and future work would benefit from examining whether valuations of this brief scale provide useful information regarding marijuana use behaviors.

Acknowledgments

Role of Funding Sources

Funding for this study was provided in part by NIDA Grant 5R21DA029811-02. NIDA had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication.

References

- Aarons GA, Brown SA, Stice E, Coe MT. Psychometric evaluation of the marijuana and stimulant effect expectancy questionnaires for adolescents. *Addictive Behaviors*. 2001; 26:219–236. [PubMed: 11316378]
- Buckner JD, Bonn-Miller MO, Zvolensky MJ, Schmidt NB. Marijuana use motives and social anxiety among marijuana-using young adults. *Addictive Behaviors*. 2007; 32:2238–2252. [PubMed: 17478056]
- Buckner JD, Ecker AH, Cohen AS. Mental health problems and interest in marijuana treatment among marijuana-using college students. *Addictive Behaviors*. 2010; 35:826–833. [PubMed: 20483200]
- Buckner JD, Heimberg RG, Schmidt NB. Social anxiety and marijuana-related problems: The role of social avoidance. *Addictive Behaviors*. 2011; 36:129–132. [PubMed: 20832947]
- Buckner JD, Schmidt NB. Marijuana effect expectancies: Relations to social anxiety and marijuana use problems. *Addictive Behaviors*. 2008; 33:1477–1483. [PubMed: 18694625]
- Buckner JD, Schmidt NB. Social anxiety disorder and marijuana use problems: The mediating role of marijuana effect expectancies. *Depression and Anxiety*. 2009; 26:864–870. [PubMed: 19373871]
- Buckner JD, Schmidt NB, Lang AR, Small JW, Schlauch RC, Lewinsohn PM. Specificity of social anxiety disorder as a risk factor for alcohol and cannabis dependence. *Journal of Psychiatric Research*. 2008; 42:230–239. [PubMed: 17320907]
- Caldeira KM, Arria AM, O'Grady KE, Vincent KB, Wish ED. The occurrence of cannabis use disorders and other cannabis-related problems among first year college students. *Addictive Behaviors*. 2008; 33:397–411. [PubMed: 18031940]
- Chabrol H, Ducongé E, Casas C, Roura C, Carey KB. Relations between cannabis use and dependence, motives for cannabis use and anxious, depressive and borderline symptomatology. *Addictive Behaviors*. 2005; 30:829–840. [PubMed: 15833585]
- Chapman, LJ.; Chapman, JP. Infrequency Scale. Madison, WI: Unpublished test; 1983.
- Cohen AS, Iglesias B, Minor KS. The neurocognitive underpinnings of diminished expressivity in schizotypy: What the voice reveals. *Schizophrenia Research*. 2009; 109:38–45. [PubMed: 19230620]
- Fromme K, Stroot EA, Kaplan D. Comprehensive effects of alcohol: Development and psychometric assessment of a new expectancy questionnaire. *Psychological Assessment*. 1993; 5:19–26.
- Galen LW, Henderson MJ. Validation of cocaine and marijuana effect expectancies in a treatment setting. *Addictive Behaviors*. 1999; 24:719–724. [PubMed: 10574312]
- Gwaltney CJ, Shields AL, Shiffman S. Equivalence of electronic and paper-and-pencil administration of patient-reported outcome measures: A meta-analytic review. *Value in Health*. 2008; 11:322–333. [PubMed: 18380645]

- Ham LS, Stewart SH, Norton PJ, Hope DA. Psychometric assessment of the comprehensive effects of alcohol questionnaire: comparing a brief version to the original full scale. *Journal of Psychopathology and Behavioral Assessment*. 2005; 27:141–158.
- Hayaki J, Hagerty CE, Herman DS, de Dios MA, Anderson BJ, Stein MD. Expectancies and marijuana use frequency and severity among young females. *Addictive Behaviors*. 2010
- Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. *Monitoring the Future National Survey Results on Drug Use 1975–2007 Volume II: College Students & Adults Ages 19–45*. Bethesda, MD: National Institutes of Health & U.S. Department of Health and Human Services; 2007.
- Lozano BE, Stephens RS, Roffman RA. Abstinence and moderate use goals in the treatment of marijuana dependence. *Addiction*. 2006; 101:1589–1597. [PubMed: 17034438]
- Schafer J, Brown SA. Marijuana and cocaine effect expectancies and drug use patterns. *Journal of Consulting and Clinical Psychology*. 1991; 59:558–565. [PubMed: 1918560]
- Simons JS, Arens AM. Moderating effects of sensitivity to punishment and sensitivity to reward on associations between marijuana effect expectancies and use. *Psychology of Addictive Behaviors*. 2007; 21:409–414. [PubMed: 17874892]
- Simons JS, Correia CJ, Carey KB, Borsari BE. Validating a five-factor marijuana motives measure: Relations with use, problems, and alcohol motives. *Journal of Counseling Psychology*. 1998; 45:265–273.
- Stephens RS, Roffman RA, Curtin L. Comparison of extended versus brief treatments for marijuana use. *Journal of Consulting and Clinical Psychology*. 2000; 68:898–908. [PubMed: 11068976]
- Stephens RS, Roffman RA, Fearer SA, Williams C, Picciano JF, Burke RS. The Marijuana Check-up: Reaching users who are ambivalent about change. *Addiction*. 2004; 99:1323–1332. [PubMed: 15369571]
- Stinson FS, Ruan WJ, Pickering R, Grant BF. Cannabis use disorders in the USA: Prevalence, correlates and co-morbidity. *Psychological Medicine*. 2006; 36:1447–1460. [PubMed: 16854249]
- Substance Abuse and Mental Health Services Administration. *Summary of National Findings (Office of Applied Studies, NSDUH Series H-38A, HHS Publication No. SMA 10-4586 Findings)*. Rockville, MD: 2010. Results from the 2009 National Survey on Drug Use and Health: Volume I.
- Sussman S, Stacy AW, Dent CW, Simon TR. Marijuana use: Current issues and new research directions. *Journal of Drug Issues*. 1996; 26:695–733.
- Torrealday O, Stein LAR, Barnett N, Golembeske C, Lebeau R, Colby SM, Monti PM. Validation of the Marijuana Effect Expectancy Questionnaire-Brief. *Journal of Child & Adolescent Substance Abuse*. 2008; 17:1–17. [PubMed: 22058648]

Highlights

- The MEEQ-V assesses desirability of marijuana effect expectancies
- MEEQ-V scales had adequate internal consistency and convergent validity
- Most MEEQ-V scales were correlated with their corresponding MEEQ scale.
- MEEQ-V scales were differentially related to marijuana use and use-related problems
- Most MEEQ-V scales were related to use after controlling for MEEQ scale

Table 1
Bivariate Correlations among MEEQ- Valuations Subscales for Entire Sample and for Current Cannabis Users

Subscales	1	2	3	4	5	6	M (SD)
1. Cognitive/behavioral impairment		.14*	.06	.24**	.78**	.49**	21.24 (7.00)
2. Relaxation/tension reduction	.13**		.69**	.84**	.04	.40**	30.75 (5.58)
3. Social/sexual facilitation	.12**	.79**		.72**	-.04	.30**	32.20 (4.97)
4. Perceptual/cognitive enhancement	.26**	.88**	.78**		.09	.51**	29.76 (5.58)
5. Global negative effects	.84**	.12**	.10**	.22**		.35**	16.91 (6.55)
6. Craving/physical effects	.60**	.46**	.40**	.56**	.53**		17.49 (4.22)
M (SD)	18.80 (6.68)	27.36 (6.76)	29.57 (5.42)	25.87 (6.63)	15.54 (5.98)	14.95 (4.28)	

Note. Correlations below the diagonal are for the entire sample ($N = 925$). Correlations above the diagonal (shaded area) are for current marijuana users only ($n = 229$).

* $p < .05$;

** $p < .001$

Table 2
Relations between Marijuana Use Frequency and Marijuana Effect Expectancies' Valuations

	Never Used (<i>n</i> = 537) <i>M</i> (<i>SD</i>)	Past Use (<i>n</i> = 159) <i>M</i> (<i>SD</i>)	Infrequent Use (<i>n</i> = 126) <i>M</i> (<i>SD</i>)	Frequent Use (<i>n</i> = 103) <i>M</i> (<i>SD</i>)	<i>F</i>
Cognitive & Behavioral Impairment	17.75 (6.43) ^{a,b}	18.87 (6.13) ^c	20.42 (6.17) ^b	22.20 (7.81) ^{a,c}	16.67 ^{**}
Relaxation & Tension Reduction	25.75 (6.97) ^a	27.89 (5.67) ^{a,b}	29.25 (5.84) ^{a,c}	32.60 (4.63) ^{a,b,c}	38.47 ^{**}
Social & Sexual Facilitation	28.39 (5.34) ^a	29.77 (4.94) ^{a,b}	31.10 (5.26) ^{a,c}	33.53 (4.25) ^{a,b,c}	33.43 ^{**}
Perceptual & Cognitive Enhancement	24.05 (6.61) ^a	26.40 (5.46) ^{a,b}	28.33 (5.80) ^{a,c}	31.54 (4.74) ^{a,b,c}	52.14 ^{**}
Global Negative Effects	14.99 (5.87) ^a	15.48 (5.13)	16.57 (5.85) ^a	17.26 (7.35) ^a	5.73 ^{**}
Craving & Physical Effects	13.90 (4.06) ^a	14.82 (3.53) ^{a,b,c}	16.64 (4.02) ^{a,b,c}	18.55 (4.24) ^{a,b,c}	48.02 ^{**}

Note. Means with same superscripts are significantly different at $p < .05$ as per Tukey post hoc analyses.

^{**}
 $p < .001$

Table 3

Predicting Current Marijuana Use Frequency and Number of Marijuana-Related Problems When MEEQ and Corresponding MEEQ-V Scale Simultaneously Regressed

	β	t	P	sr^2	β	t	P	sr^2
Marijuana Use Frequency								
Cognitive & Behavioral Impairment								
MEEQ	-.26	-4.12	<.001	.069	.13	2.03	.043	.018
MEEQ-V	.11	1.72	.086	.012	.13	2.02	.045	.017
Relaxation & Tension Reduction								
MEEQ	.17	2.23	.027	.020	.09	1.17	.243	.006
MEEQ-V	.17	2.25	.025	.020	.01	.15	.879	.000
Social & Sexual Facilitation								
MEEQ	.20	2.84	.005	.032	.15	2.00	.047	.017
MEEQ-V	.089	2.15	.033	.018	.04	.58	.561	.001
Perceptual & Cognitive Enhancement								
MEEQ	.15	1.96	.051	.016	.15	1.84	.068	.015
MEEQ-V	.17	2.17	.031	.019	-.03	-.31	.758	.000
Global Negative Effects								
MEEQ	-.32	-4.75	<.001	.090	.18	2.62	.010	.029
MEEQ-V	.13	1.97	.050	.016	.11	1.66	.099	.011
Craving & Physical Effects								
MEEQ	-.22	-2.03	.046	.049	-.27	-2.39	.020	.072
MEEQ-V	.31	2.87	.005	.097	.07	0.62	.538	.005

Note. β = standardized coefficient.