Development and Preliminary Validation of a Comprehensive Marijuana Motives Questionnaire*

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ABSTRACT. Objective: Relatively little research has evaluated motives for using marijuana based on users' self-reported reasons. This article details the construction and psychometric validation of a new marijuana motives questionnaire. **Method:** Participants included 346 marijuana-using college students who completed online assessments regarding their motives for, frequency of, and problems associated with their marijuana use. **Results:** Exploratory and confirmatory factor analysis supported a 12-factor scale, including the following: (1) Enjoyment, (2) Conformity, (3) Coping, (4) Experimentation, (5) Boredom, (6) Alcohol, (7) Celebration, (8) Altered Perception, (9) Social Anxiety, (10) Relative Low Risk, (11) Sleep/Rest, and (12) Availability. Regression results indicated enjoyment, boredom, altered perception, relative low-risk,

and sleep/rest were each uniquely associated with greater frequency of use. Experimentation and availability motives were associated with less use. After accounting for use, coping and sleep/rest were associated with significantly more consequences whereas enjoyment was associated with fewer consequences. Additional results comparing the scale to an existing marijuana motives measure indicated comparatively good convergent validity. **Conclusions:** Emerging adult college students may have several different reasons for using marijuana, which are uniquely related to use and negative consequences. Results are considered in terms of their implications for brief interventions. (*J. Stud. Alcohol Drugs* 70: 279-287, 2009)

ADOLESCENCE AND EMERGING ADULTHOOD are crucial periods for the initiation of risky health-related behaviors (Arnett, 2000), and theoretical models on the determinants of alcohol use (e.g., Cooper, 1994; Cox and Klinger, 1988), smoking (e.g., Piasecki et al., 2007), and gambling (e.g., Neighbors et al., 2002) have focused on the influence of individual differences in motivations as contributing to subsequent patterns of behavior. In terms of substance use, although research has firmly established that differences in affect and behavioral regulation motives (e.g., tension reduction, social enhancement) predict patterns of drinking behaviors (e.g., Cooper, 1994; Cox and Klinger, 1990), less research has examined marijuana-use motives and their relation to use/consequences. The purpose of the present study is to develop a comprehensive marijuana motives questionnaire, conduct preliminary reliability and validity analyses, and subsequently inform the development of an empirical motivational model of marijuana use and related consequences.

Marijuana use among young adults

Marijuana is the most commonly used illicit drug among individuals ages 18-25. Among college students, 49% report

lifetime use, roughly one third report past-year use, and one fifth report past-month use. Daily marijuana use among college students is slightly more common than daily alcohol use (4.5% vs 3.7%, respectively; Johnston et al., 2005). In a recent household survey, more than half of individuals ages 18-25 had used marijuana at least once (Substance Abuse and Mental Health Services Administration, 2005), and approximately 7.4% met marijuana dependence criteria in the past year (Chen et al., 1997). Although many marijuana users do not develop long-term negative consequences, research indicates associations between heavy marijuana use and a range of physical, psychological, and social drug-related consequences (e.g., Chabrol et al., 2005; Simons et al., 2005). In light of the prevalence of marijuana use and related consequences in emerging adults, further examination of the reasons why individuals use marijuana is necessary to enhance our understanding of problematic patterns of marijuana use and to inform the development of interventions for at-risk populations, namely, college students.

Motivational models of substance use

The literature on motivations for using marijuana is relatively small and has primarily been adapted from previous research on alcohol-use motives that focused on positive and negative reinforcement motives for drinking (e.g., Cooper, 1994; Cox and Klinger, 1988). One widely used drinking motives measure assesses four motives, including drinking to (1) gain positive interpersonal rewards (social), (2) regulate positive emotions (affect enhancement), (3) avoid

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social rejection (conformity), and (4) regulate negative affect (coping) (Cooper, 1994). Previous research has indicated that social and enhancement motives are most strongly related to alcohol use in young adults, whereas drinking to cope is most strongly associated with alcohol-related problems (Cooper, 1994; Lecci et al., 2002; Neighbors et al., 2004; Stewart et al., 2001).

In terms of research examining motivations for marijuana use, several motives have been consistently shown to be associated with marijuana use and problems, including coping or reducing negative affect, enhancing positive affect, and aiding social enhancement or cohesion (Newcomb et al., 1988; Simons et al., 1998). Additional reasons include to avoid social rejection, to enhance experiential awareness (or the enhancement of perceptual and cognitive experiences from marijuana; Simons et al., 1998), and because of addiction (Newcomb et al., 1988). Most recent work has used Simon and colleagues' five-factor measure (Zvolensky et al., 2007) and has found this measure to have good reliability, as well as significant associations between different motives and marijuana use. Specifically, enhancement and social motives were significantly positively related to increased use, and conformity motives were significantly negatively associated with such use.

Importance of examining marijuana-specific motives

Although there are many similarities between alcohol and marijuana-use motives, including the social influence of substance use in general (Arnett, 2005), empirical work studying marijuana-specific motives is warranted, given research suggesting differences in the nature of alcohol and marijuana-use motives (Simons et al., 1998). For example, Simons et al. found that there may be a stronger association between marijuana motives and marijuana use-related problems compared with relations among alcohol motives and alcohol-related problems. A limitation of previous research is the reliance on adapted drinking motives questionnaires to assess marijuana-use motives. This approach, which presumes that common motivational factors underlie both alcohol and marijuana use and does not account for motives unique to marijuana, may omit key predictors of marijuana use. Supporting this possibility, Simons and colleagues (1998) found that social and conformity motives were not significantly associated with marijuana use, whereas a subscale assessing expansion motives (created for properties specific to marijuana) accounted for the most variance in marijuana use (Simons et al., 1998).

Other recent work has found that coping motives have been found to be both a moderator and mediator between mental health and marijuana use (Brodbeck et al., 2007; Buckner et al., 2007). For example, individuals endorsing coping motives for marijuana use exhibited poorer mental

health, greater symptoms of psychopathology, and greater psychosocial distress, compared with nonusers and individuals who used marijuana for social reasons. Additionally, Buckner et al. (2007) found that coping motives was a mediator between social anxiety and marijuana-use problems.

To establish a more data-driven specific marijuana motives measure, Lee and colleagues (2007) examined self-generated marijuana motives among emerging adults and evaluated the relationship of these motives to marijuana use and consequences. Results revealed that college students endorsed 19 distinct motives for using marijuana, with enjoyment/fun being the most frequently endorsed reason, followed by conformity and experimentation, social enhancement, boredom, and relaxation. These results are noteworthy, given that previous research on marijuana motives has not identified or examined experimentation, boredom, or relaxation motives. Additionally, regression analyses revealed that experimentation motives were significantly associated with less use and fewer problems, whereas motives for enjoyment, habit, activity enhancement, and altered perception or perspectives were associated with heavier use and more problems. This study found support for the five motives examined in Simons et al. (1998) but also revealed different motives that may be important for the initiation or maintenance of marijuana use among young adults, giving a more comprehensive view of marijuana-specific motives among emerging adults. Although this work is extremely insightful and informative, the qualitative aspect of that study does not necessarily lend itself for accurate and easy assessment of marijuana motives in quantitative research.

Present study

The present study extends prior research on marijuana motives by developing and validating a new comprehensive marijuana motives measure and examining associations between various motivations for use and patterns of use and related consequences. The development of a comprehensive marijuana motives measure could enhance the specificity for studying how individuals' reasons for using marijuana predict different patterns of marijuana use and use-related consequences. Moreover, this research provides a context for future studies to investigate the influence of specific motives on the etiology and maintenance of marijuana use. Finally, given that attempts to change others' behaviors without awareness of their reasons for engaging in the behavior are likely to be unsuccessful (Newcomb et al., 1988), understanding motivations for using marijuana may inform the development of prevention and intervention programs aimed at preventing initiation or reducing rates of marijuana use among young adults. If we can better understand why individuals use marijuana, more specific programs could be developed targeting those motivations.

Method

Item selection

As described in Lee et al. (2007), the process of motive development began by asking incoming first-year college students open-ended questions about their reasons for using marijuana. These items were initially categorized into 19 different motive categories and then were coded by independent raters to assess validity of the coding scheme. Results indicated high internal consistency among the 19 motive categories.

The process of item development for the construction of a comprehensive marijuana motives measure began by reviewing the open-ended items in the 19 motive categories. The first two authors then selected six items from each of the 19 motive categories that appeared to be a good representation of the individual motive based on the definition of the category or frequency with which the item or similarly worded items appeared. Thus, 114 marijuana motive items were identified within the 19 categories and used as the initial comprehensive marijuana motives measure in this study.

Participants and procedures

The present study included secondary data analyses from a longitudinal study evaluating the efficacy of a personalized feedback intervention for marijuana use among first-year college students. Regarding the initial sample selection for the larger study, more than 4,000 incoming first-year college students were invited to participate in a screening survey assessing marijuana use and other health-risk behaviors. More than 52% completed the screening survey, and of those who responded, two groups of students were recruited to participate in the larger efficacy study: (1) students who had never used marijuana in their lifetime and (2) students who were current users of marijuana (defined as using at least once in the last 3 months). Seven-hundred seventy students met these criteria and were invited to participate in the longitudinal study ($n = 400$ randomly selected abstainers, $n = 370$ current users), with 94% ($n = 725$) of students participating. Students completed baseline and 3-, 6-, and 9-month Web-based follow-up assessments. Students randomized to intervention received the preventative intervention immediately following the baseline survey (before the beginning of college), which included personalized feedback based on responses from the baseline survey. Retention rates were greater than 90% for all assessments. All procedures received approval from the university institutional review board, and a federal Certificate of Confidentiality was obtained.

Participants in the present study were part of the larger longitudinal marijuana prevention study and included 346 students who completed the 9-month survey in which the newly created comprehensive marijuana motive questionnaire

was included, and who reported using marijuana use at least once in the last year (55.2% female; mean [SD] age = 18.1 [0.44] years). Both never using and current using students at screening (regardless of intervention condition) were eligible for the present analyses, as long as they had endorsed using marijuana at least once in the last year at the 9-month follow-up. The racial/ethnic distribution of the present sample was 71.1% white, 14.5% Asian or Pacific Islander, 6.1% Hispanic, 1.2% black, 0.9% Native American, and 6.2% other or unidentified. Students were compensated \$35 for completing the 9-month Web-based follow-up assessment.

Measures

Marijuana use, abuse, and dependence. Marijuana use and abuse/dependence criteria were assessed with items from the Global Appraisal of Individual Needs-I (GAIN-I). The GAIN-I has been used extensively to evaluate general substance use and marijuana use more specifically (Dennis et al., 2002). Previous research has shown the GAIN to have good reliability and validity, including diagnostic test-retest reliability (e.g., $\kappa = .6$) and good test-retest reliabilities for scales and individual items (.7-.9) (Chestnut Health Systems, 2002; Dennis et al., 2002, 2003). Marijuana use was assessed by an item that asked, "In the last ninety days, on how many days did you use any kind of marijuana or hashish?" Symptoms of marijuana-use disorders (abuse and dependence) were assessed using 11 (4 abuse, 7 dependence) items from the GAIN (Dennis et al., 2002) adapted for use on the Internet. Item content corresponds to abuse and dependence criteria described in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (American Psychiatric Association, 2000). Participants endorsing three or more dependence criteria in the last year were classified as meeting dependence criteria. Participants endorsing any one of four abuse criteria in the last year who were not categorized as meeting dependence criteria were classified as meeting abuse criteria.

Consequences of marijuana use. Consequences were assessed using the Rutgers Marijuana Problem Index (White et al., 2005). Respondents were asked to indicate how many times, from 0 (never) to 4 (more than 10 times), during the previous 12 months they experienced each of 18 negative consequences while using marijuana or as a result of marijuana use ($\alpha = .96$) (Simons et al., 2000; White et al., 2005). Example items include, "Not able to do your homework or study for a test," and "Missed out on other things because you spent too much money on marijuana." Items were summed to create one consequence score.

Marijuana motives. Participants completed two measures of marijuana motives. First, participants were asked to complete a marijuana motives measure adapted from Cooper's (1994) Drinking Motives Questionnaire (Simons et al., 1998). Participants were asked the frequency in which

they use marijuana for each of 25 reasons in five domains: (1) social (5 items, $\alpha = .86$), (2) coping (5 items, $\alpha = .92$), (3) affect enhancement (5 items, $\alpha = .90$), (4) conformity (5 items, $\alpha = .90$), and (5) experiential awareness (5 items, $\alpha = .88$). Response format included 1 = almost never/never to 5 = almost always/always.

Participants were asked to complete a second Comprehensive Marijuana Motives questionnaire developed for the present study. Participants were asked to rate how often they used marijuana for each of 114 reasons in 19 domains: (1) alcohol related; (2) altered perceptions, senses, and perspectives; (3) availability; (4) boredom; (5) celebration; (6) conformity; (7) coping; (8) enjoyment/fun; (9) experimentation/curiosity; (10) food/appetite; (11) habit; (12) image enhancement; (13) medicinal; (14) rebelling; (15) perceived low risk; (16) relaxation/sleep; (17) social anxiety; (18) social enhancement; and (19) using to engage in certain activities. Each domain consisted of six items. Response format included 1 = almost never/never to 5 = almost always/always. Reliability and validity information are reported in the next section.

Results

Analytic strategy

Analyses proceeded from psychometric evaluation to criterion validation. We began with factor analysis in identifying psychometrically sound and distinct motives that could be assessed with a reasonable number of items. Subsequently, we examined associations between these motives and behavior. Next, we compared these motives with an existing scale of marijuana motives. Finally, we evaluated marijuana abuse and dependence criteria as a function of motives. To reduce the influence of outliers on the marijuana frequency outcome (days used in previous 90), this variable was capped at 45 days in the previous 90 (i.e., values greater than 45 were recoded to 45).

Factor analysis

Participants' responses to the preliminary measure consisting of 114 reasons for using marijuana (Lee et al., 2007) were subjected to exploratory factor analysis using principal components extraction and promax rotation. Examination of eigenvalues and visual inspection of scree plots identified 12 primary factors, each with an eigenvalue greater than 1.5, that cumulatively accounted for 68% of the common variance. Item communalities generally ranged from .70 to .85, and all communalities were greater than .60. Based on item content, the scales were labeled Perceived Low Risk, Enjoyment, Sleep, Altered Perception, Boredom, Celebration, Coping, Social Anxiety, Availability, Conformity, Alcohol Related, and Experimentation. Motivations that did not emerge as significant factors from the initial set of 19

included social enhancement, activity enhancement, rebellion, food enhancement, image enhancement, medical use, and habit. Data reduction procedures were used to reduce the list of items, first by dropping all items that loaded less than .40 on any factor or greater than .40 on more than one factor. Based on these criteria, 82 items were retained. The item list was further reduced to three per subscale, using factor loadings and nonredundancy of item content as primary criteria. Confirmatory factor analysis was conducted to evaluate the 12-factor/36-item scale. Twelve latent variables were specified with three indicators, each corresponding to the relevant items. The confirmatory factor analysis fit relatively well ($\chi^2 = 1,199.02$, 528 df, $p < .001$; normed fit index = .95; Tucker-Lewis index = .97; comparative fit index = .97; root mean square error of approximation = .061). Table 1 presents factor loadings. With three exceptions, correlations among factors were all significant. Significant correlations were all positive and ranged in magnitude from .13 to .73 (three were below .13 and were not statistically significant), with the majority of associations (51 of 66) ranging from .20 to .60. Individual correlations among factors are not presented for the sake of simplicity but are available on request from the first author. All 12 motive subscales were found to be internally consistent (α 's ranging from .78 to .89, individual α 's are presented in Table 1).

Associations with use and consequences

Table 2 presents means and standard deviations for motive subscales and their correlations with marijuana use and related consequences. Analyses revealed 10 of 12 motives were positively correlated with use and/or consequences, with the exception of experimentation, which was negatively associated with use, and availability, which was uncorrelated with use and consequences.

Unique predictive utility

Multiple regression was used to evaluate the unique associations of motives with use and consequences. First, we simultaneously regressed all 12 motives on use (Table 3). The set of motives accounted for 28.5% of the variance in use. Specific results indicated relative low risk, enjoyment, sleep, boredom, and altered perceptions were uniquely and positively associated with use when controlling for all other motives. In addition, experimentation and availability were uniquely and negatively associated with use when controlling for all other motives.

Next, we evaluated marijuana-related negative consequences as a function of motives, after accounting for use. Thus, hierarchical multiple regression was used. Use was entered at Step 1 and accounted for 14.3% of the variance in marijuana-related negative consequences. The set of 12 motives was entered at Step 2 and accounted for an additional

TABLE 1. Motive items and confirmatory factor analysis standardized factor loadings

Motives	Factor loading
Enjoyment ($\alpha = .89$)	
To enjoy the effects of it	.89
Because it is fun	.86
To feel good	.83
Conformity ($\alpha = .84$)	
Because you felt pressure from others who do it	.74
Because you didn't want to be the only one not doing it	.83
To be cool	.84
Coping ($\alpha = .89$)	
To forget your problems	.89
Because you were depressed	.89
To escape from your life	.83
Experimentation ($\alpha = .88$)	
Because you were experimenting	.76
Because you were curious about marijuana	.89
To see what it felt like	.87
Boredom ($\alpha = .88$)	
Because you had nothing better to do	.86
To relieve boredom	.84
Because you wanted something to do	.83
Alcohol ($\alpha = .84$)	
Because you were drunk	.90
Because you were under the influence of alcohol	.73
Because you had gotten drunk and weren't thinking about what you were doing	.78
Celebration ($\alpha = .87$)	
To celebrate	.84
Because it was a special day	.82
Because it was a special occasion	.84
Altered Perceptions ($\alpha = .83$)	
Because you want to alter your perspective	.84
To allow you to think differently	.83
So you can look at the work differently ^a	.71
Social Anxiety ($\alpha = .88$)	
Because it makes you more comfortable in an unfamiliar situation	.82
To make you feel more confident	.85
Because it relaxes you when you are in an insecure situation	.86
Relative Low Risk ($\alpha = .80$)	
Because it is safer than drinking alcohol	.79
Because it is not a dangerous drug	.79
Because there are low health risks	.71
Sleep ($\alpha = .84$)	
To help you sleep	.80
Because it helps make napping easier and enjoyable	.79
Because you are having problems sleeping	.82
Availability ($\alpha = .78$)	
Because it is readily available	.76
Because you can get it for free	.60
Because it is there	.86

^aItem was mistyped on the survey. Intended item should read, "So you can look at the world differently."

18.0% of the variance in marijuana-related negative consequences. Specific results, presented in Table 4, indicated that sleep and coping were uniquely associated with experiencing more consequences, whereas enjoyment was uniquely associated with experiencing fewer consequences.

Comparison with an existing measure of marijuana motives

Finally, we conducted hierarchical regression analyses comparing this new 36-item measure with an existing 25-

item measure of marijuana motives (based on a drinking motives questionnaire; Simons et al., 1998). In examining use, the five motives from the scale constructed by Simons and colleagues were entered at Step 1. The 12 motives as described previously were entered at Step 2. Results revealed the motives at Step 1 accounted for 15.5% of the variance in use. Enhancement and expansion motives were uniquely and positively associated with use, whereas conformity was negatively related to use. Motives at Step 2 accounted for an additional 16.0% of the variance in use ($F = 6.35$, 12/326 df, $p < .001$). Of the new motives from the comprehensive mea-

TABLE 2. Bivariate correlations between marijuana use, related consequences, and motive subscales

Variable	Mean (SD)	Marijuana use	Marijuana-related consequences
Marijuana use	9.95 (14.38)	—	.38 [‡]
Marijuana-related consequences	3.91 (8.53)	.38 [‡]	—
Motive			
Enjoyment	3.54 (1.28)	.33 [‡]	.06
Conformity	1.65 (0.94)	-.00	.27 [‡]
Coping	1.59 (0.92)	.17 [†]	.40 [‡]
Experimentation	2.30 (1.17)	-.15 [†]	.06
Boredom	2.37 (1.17)	.27 [‡]	.25 [‡]
Alcohol	2.02 (0.97)	-.01	.16 [†]
Celebration	2.36 (1.10)	.18 [†]	.26 [‡]
Altered perception	1.91 (1.04)	.27 [‡]	.33 [‡]
Social anxiety	1.57 (0.86)	.13 [*]	.34 [‡]
Relative low risk	1.88 (1.06)	.30 [‡]	.30 [‡]
Sleep/rest	1.51 (0.80)	.30 [‡]	.43 [‡]
Availability	2.85 (1.12)	.04	.09

* $p < .05$; [†] $p < .01$; [‡] $p < .001$.

sure, boredom, relative low risk, and sleep/rest were uniquely and positively associated with use, above and beyond what was accounted for by the Simons measure. Additionally, experimentation was negatively associated with use.

A parallel analysis of consequences (controlling for use) similarly revealed the newly constructed motives measures accounted for significant variance ($R^2\Delta = 7.5\%$; $F = 3.17$, 12/325 df, $p < .001$), over and above the 14.3% accounted for by the motives from the existing measure. At Step 1, coping and conformity motives assessed with the Simon's measure was uniquely and positively associated with use. At Step 2, coping and sleep/rest motives were uniquely and positively related to use, whereas experimentation was negatively related to use, after controlling for the five existing motives at Step 1.

Moreover, when reversing entry order (i.e., newly created measure entered at Step 1 and existing measure at Step 2), the existing motives measure only accounted for 3.0% in use ($F = 2.80$, 5/326 df, $p < .05$), over and above the 28.5%

TABLE 3. Multiple regression with motive categories predicting marijuana use

Motive	<i>B</i> (SE)	β	<i>t</i>
Enjoyment	2.55 (0.65)	.23	3.95 [‡]
Conformity	-0.68 (0.98)	-.04	-0.70
Coping	0.56 (1.09)	.04	0.51
Experimentation	-3.17 (0.68)	-.26	-4.66 [‡]
Boredom	2.12 (0.83)	.17	2.57 [*]
Alcohol	0.26 (0.81)	.02	0.33
Celebration	-0.77 (0.77)	-.06	-1.01
Altered perception	1.72 (0.84)	.13	2.04 [*]
Social anxiety	-1.42 (1.24)	-.08	-1.14
Relative low risk	2.53 (0.81)	.19	3.14 [†]
Sleep/rest	3.54 (1.11)	.20	3.18 [†]
Availability	-1.68 (0.78)	-.13	-2.17 [*]

Notes: *B* = unstandardized coefficient; β = standardized coefficient.

* $p < .05$; [†] $p < .01$; [‡] $p < .001$.

TABLE 4. Hierarchical multiple regression with motive categories predicting marijuana-related problems, controlling for marijuana use

	<i>B</i> (SE)	β	<i>t</i>
Step 1			
Marijuana use	0.22 (0.03)	.38	7.56 [‡]
Step 2			
Enjoyment	-0.86 (0.38)	-.13	-2.25 [*]
Conformity	0.52 (0.57)	.06	0.93
Coping	1.77 (0.63)	.19	2.81 [†]
Experimentation	-0.33 (0.41)	-.05	-0.82
Boredom	-0.27 (0.48)	-.04	-0.55
Alcohol	0.52 (0.47)	.06	1.11
Celebration	0.48 (0.44)	.06	1.08
Altered perception	0.82 (0.49)	.10	1.67
Social anxiety	-0.37 (0.72)	-.04	-0.51
Relative low risk	0.52 (0.47)	.06	1.10
Sleep/rest	1.96 (0.65)	.18	3.00 [†]
Availability	-0.07 (0.45)	-.01	-0.15

Notes: *B* = unstandardized coefficient; β = standardized coefficient.

* $p < .05$; [†] $p < .01$; [‡] $p < .001$.

accounted for by the new measure. Similarly, when controlling for use, the existing five-factor measure accounted for only 3.7% of the variance in consequences over and above the 29.6% accounted for by use (14.3%) and the newly constructed 12-factor measure (18.0%).

Associations with abuse and dependence

In the last set of analyses, we were interested in evaluating unique associations between marijuana motives and abuse/dependence. One participant did not complete abuse/dependence items. In the present sample, 161 participants did not meet criteria for either abuse or dependence, 85 met criteria for abuse but not dependence, and 99 met criteria for dependence. Moreover, 184 (53.3%) of participants met either abuse and/or dependence criteria.

To simplify analyses, logistic regression was used to evaluate unique associations between motives and whether participants met abuse and/or dependence criteria versus not meeting neither abuse nor dependence criteria. The logistic regression analysis was completed in two steps. To parallel the previous results, the existing scale was entered at Step 1, followed by the newly presented motive scale at Step 2. The five subscales from the existing measure accounted for significant variation in meeting abuse and/or dependence criteria ($\chi^2 = 35.53$, 5 df, $p < .001$; $n = 345$; Nagelkerke $R^2 = .13$). In Step 1, only the Enhancement subscale was uniquely (positively) significant. At Step 2, the addition of the 12 newly constructed subscales accounted for significant additional unique variance ($\chi^2 = 57.72$, 12 df, $p < .001$; $n = 345$; Nagelkerke $R^2\Delta = .19$). At Step 2, altered perception was uniquely and positively associated with meeting abuse and/or dependence criteria, whereas experimentation was associated with significantly lower likelihood of meeting abuse and/or dependence criteria.

Analogous to the previous analyses, we reran the logistic regression reversing the order of entry, with the 12 subscales from the newly created motives scale entered at Step 1, followed by the five scales from the existing motives scale entered first (Step 2). The results of this analysis paralleled the previous findings. Results at Step 1 revealed that the 12 motives accounted for significant variation in abuse/dependence status ($\chi^2 = 88.01$, 12 df, $p < .001$; $n = 345$; Nagelkerke $R^2 = .30$). In Step 1, endorsement of higher levels of motivation related to enjoyment and altered perception were uniquely and positively associated with a greater likelihood of meeting abuse and/or dependence criteria, whereas a stronger endorsement of experimentation was associated with a significantly lower likelihood of meeting abuse and/or dependence criteria. The addition at Step 2 of the five motives from the existing scale did not account for additional variance ($\chi^2 = 5.23$, 5 df, $p = \text{NS}$; $n = 345$; Nagelkerke $R^2\Delta = .02$). Nevertheless, the Enhancement subscale from this set was uniquely associated with likelihood of meeting abuse and/or dependence criteria.

Discussion

The purpose of the present study was to develop and examine preliminary reliability and validity of a young adult comprehensive marijuana motives questionnaire. The present study extends the initial qualitative work conducted by Lee et al. (2007) to develop a quantitative measure of marijuana motives from the perspective of marijuana users and to explore the motives relevant to young adult college students to better inform our understanding of different antecedents of patterns of use.

Results from the present study suggest that young adult college students have several different motivations for using marijuana. The 36 items representing 12 different motives were originally derived from users' responses to open-ended questions about use. The 12-motive subscales were internally consistent and associated with marijuana use and/or consequences. In particular, motives related to relative low risk, enjoyment, sleep, boredom, and altered perceptions were uniquely and positively associated with use, whereas experimentation and availability motives were uniquely and negatively associated with use. Regarding marijuana-related consequences, sleep and coping motives were uniquely associated with experiencing more consequences, whereas similar to use, the enjoyment subscale was uniquely associated with experiencing fewer consequences. In addition, we compared this new 36-item measure with an existing measure with documented reliability and validity (Simons et al., 2000) and found the newly developed measure to provide better criterion validity. In combination, these results provide strong evidence for the utility of this assessment tool.

The present study demonstrated that marijuana motives can be differentially related to use and consequences. Repli-

cating findings from Lee et al. (2007), experimentation was negatively related to both use and problems. This finding is not at all surprising, given the developmental period of the sample in which experimentation and exploration are considered defining development tasks of emerging adulthood (Arnett, 2000). Simons et al. (2000) compared the similarities and differences between marijuana- and alcohol-use motives in a sample of college students. Compared with social marijuana-use motives, social alcohol-use motives were more strongly endorsed and predictive of alcohol use, suggesting that social facilitation motives may play a stronger role in alcohol versus marijuana use (Simons et al., 2000). Findings from the present study suggest that motives related to social anxiety, in addition to social facilitation motives, would be important to assess and may be developmentally and clinically important for young adult populations. The present research also suggests that having higher motivations regarding coping and sleep/rest issues is associated with more marijuana-related problems. The association between coping motives for marijuana use and related problems is consistent with previous research (Simons et al., 2005).

The present study has several clinical implications and can directly inform the understanding of young adult marijuana use. For example, using marijuana because it is believed to have relative low risk was associated with reported greater marijuana use and consequences, a finding consistent with Kilmer et al. (2007), suggesting that students who use more frequently and who have had academic and social consequences related to their marijuana use were more likely to report that those consequences were not likely to occur in the future. Interventions based in a motivational framework might benefit from examining consequences experienced despite the perception of marijuana being a low risk substance.

The present study should be viewed in light of several limitations. First, the sample consisted of first-year college students from a single institution. The participants for the present study were specifically recruited to participate in a longitudinal marijuana prevention project during the transition to college. Second, a limitation is that this sample was a relatively light using sample, with an average of once per week use. This may explain in part why an "addiction" factor did not emerge, despite the inclusion of items representing habit or feeling addicted in the initial item set and that previous research has identified addiction as a potentially important motivation underlying problematic marijuana use (Newcomb et al., 1988). A related issue is that, although the sample overall consisted of relatively light users, there was considerable variability in the frequency of marijuana use and related consequences; however, the present analyses did not examine whether the questionnaire's factor structure varied across different levels of marijuana use. Future research could examine whether marijuana motives vary across different levels. Although a strength of the study is the design

of the motives based on qualitative responses from young adults transitioning to college, many of the motives might not be relevant for different ages, as well as emerging adults not matriculating to college. It is also important to acknowledge that the confirmatory factor analysis was conducted on the same sample as the exploratory factor analysis; ideally, separate samples should be used for these analyses (Smith and McCarthy, 1995). Third, the exploratory factor analysis included a ratio of participants to items that was suboptimal, according to some conventions. However, exploratory factor analysis results showed that all items had high communalities, which substantially reduces the influence of sample size on exploratory factor analysis results (MacCallum et al., 1999).

The cross-sectional nature of the study limits our ability to draw causal inferences. Although the present study was a preliminary examination of a comprehensive marijuana motive measure, causal inferences regarding the associations between motives and different patterns of use cannot be drawn. Although many of the associations found with the new measure are consistent with research on alcohol- and marijuana-use motives (e.g., Simons et al., 2005), the present study does not examine the temporal relationship of these measures. For example, it may be that those who use more justify their behavior by believing marijuana is less risky than other substances. Future research should examine the temporal relationships between motives and marijuana-use behavior.

Future research should further examine the reliability and validity of this marijuana motive questionnaire, particularly in samples of noncollege young adults and those with more frequent marijuana use (e.g., daily use). The present research offers a rare examination of a range of reasons young adult college students might use marijuana. To intervene successfully with individuals experiencing problems related to their marijuana use, it is imperative that we understand and acknowledge their own reasons for using marijuana.

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