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Marijuana and Cocaine Effect Expectancies and Drug Use Patterns

John Schafer
Joint Doctoral Program in Clinical Psychology
San Diego State University and University of California, San Diego

Sandra A. Brown
Department of Psychiatry, University of California, San Diego
and Veterans Affairs Medical Center, San Diego

Self-reports from 704 college students were content analyzed and used to develop the Marijuana Effect Expectancy Questionnaire and Cocaine Effect Expectancy Questionnaire. Responses were examined using exploratory and confirmatory principle components analysis. Six marijuana expectancies (34.6% of variance) were identified: (a) cognitive and behavioral impairment, (b) relaxation and tension reduction, (c) social and sexual facilitation, (d) perceptual and cognitive enhancement, (e) global negative effects, and (f) craving and physical effects. Five cocaine expectancies (32.5% of variance) consisted of (a) global positive effects, (b) global negative effects, (c) generalized arousal, (d) anxiety, and (e) relaxation and tension reduction. Drug effect expectancies distinguished between patterns of nonuse and varying degrees of use of these two drugs.

As evidence mounts that alcohol effect expectancies mediate alcohol use and behavior while drinking, more recent studies have been directed to the process by which expectancies are formed, are maintained, and influence drinking decisions. Because certain alcohol effect expectancies begin developing in childhood before personal experience with alcohol (Christiansen, Goldman, & Inn, 1982) and are evident among both nondrinking and alcohol-consuming adults (e.g., Brown, Goldman, & Christiansen, 1985), it is presumed that expectancies are acquired and maintained, at least in part, through normal learning processes (Goldman, Brown, & Christiansen, 1987; Kirsch, 1985; Marlatt & Rohsenow, 1980).

Experimental work in this arena has demonstrated that expected alcohol effects are retained despite information contradicting them and that these expectancies influence behaviors displayed after alcohol is consumed (see Hull & Bond, 1986; and Wilson, 1978, for review). For example, with regard to aggression, alcohol–aggression associations have been found to persist despite expectancy manipulation efforts to the contrary (e.g., Gustafson, 1987), and multiple competing expectancies have been found to predict level of verbal aggression in a balanced placebo designed study even when alcohol has not produced an escalation in aggressive verbalizations (Rohsenow & Bachorowski, 1984).

Within a learning theory framework, alcohol expectancies are understood to be acquired through both direct and vicarious experiences with alcohol, maintained through memory processes (Goldman, Brown, Christiansen, & Smith, in press), and influenced by adaptation level (Maisto, Connors, & Sachs, 1981). Thus, alcohol effect expectancies reflect not only ubiquitous cultural beliefs but also behavior displayed in common alcohol use situations and by prevalent models. In addition to the direct and vicarious learning, personal characteristics that moderate the effects of the drug (e.g., rate of flushing, level of gastric alcohol dehydrogenase activity) act to influence reinforcement associated with alcohol as experience with the drug progresses (Brown, 1989). Furthermore, expectancies may directly mediate the influence of other risk factors or augment their contribution to the development of problem drinking patterns and chronic alcohol dependence (e.g., Brown, 1989; Miller, Smith, & Goldman, in press; O'Malley & Maisto, 1985).

To the extent that alcohol effect expectancies are acquired and maintained through normal learning processes, other drug effect expectancies should develop in the same manner. Thus, drug expectancies that are "the anticipation of a systematic relationship between events or objects in an upcoming situation" (Goldman et al., 1987, p. 183) should be present to some degree even among those without actual experience with other drugs. Furthermore, as with alcohol effect expectancies, other drug expectancies should vary as a function of personal experience with the drug and should predict future drug use patterns through the mediational role of expectancies in drug use decisions.

Although the importance of alcohol effect expectancies has been clearly established over the past decade, the expectancy mediation hypothesis has not been tested with regard to other drug use, nor has the domain of effect expectancies for other drugs of abuse been established. Our study sought to extend expectancy theory by assessing effect expectancies associated with marijuana and cocaine and to determine whether such expectancies are associated with personal drug use patterns. It was predicted that effect expectancies could be identified for other drugs and that expectancies would vary with drug use patterns. In particular, it was hypothesized that effect expectancies for marijuana would be similar to those identified for alcohol because marijuana has some acceptance as a socially facilitative drug, both drugs have an early onset of use and high ratio

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Correspondence concerning this article should be addressed to Sandra A. Brown, Veterans Affairs Medical Center, Psychology Service (116B), 3350 La Jolla Village Drive, San Diego, California 92161.

of exposure (Blum, 1984), and the pharmacological effects of both drugs are general and diffuse (Liljequist & Engle, 1982).

In contrast, effect expectancies for cocaine were predicted to differ substantially from those for alcohol and marijuana. As a stimulant, cocaine is in a different class of psychotropic compounds and exhibits a more specific effect on behavior than the other two drugs. Specifically, laboratory investigations of cocaine have demonstrated physiological and behavioral arousal, and an increase in the frequencies and domains of behavior displayed (Julien, 1987), which are in contrast to the sedative/hypnotic and anxiolytic properties of alcohol and marijuana. Additionally, cocaine is used by a smaller proportion of the population and possesses less general social acceptability, which may influence both the accuracy of effect expectancies and the emotional valence of cocaine expectancies.

In summary, it was hypothesized that the underlying factor structure of marijuana would be similar to that of alcohol and would contrast with cocaine, which was predicted to yield a factor structure more specific to the sympathomimetic effects of the drug. Because marijuana and cocaine are illegal, it was predicted that negative effect expectancies would be associated with nonuse of the drugs, whereas positive effect expectancies were predicted to be associated with increased drug use.

Method

Questionnaire Derivation

Items were derived for the assessment instruments from structured interviews with 108 individuals (50% women) who varied in age from 19–77 years. Audiotaped individual and group interviews were conducted with community volunteers from metropolitan San Diego, California, with interviewees selected to ensure broad ranges in age and exposure level to the drugs (no personal experience to daily use). Participants were informed that their responses were entirely confidential, and they were encouraged to respond in a self-disclosing fashion. Specifically, participants were asked, "What effects would you expect from a moderate amount of cocaine/marijuana?" and were encouraged to respond according to their personal beliefs or experiences. Interviewees were encouraged to use their own standards for amount and setting.

Each interview was transcribed, and a content analysis was performed on individual statements according to Nunnally's (1978) criteria. Similar statements were grouped together, and individual items were selected that best represented the diversity of content for each area, with care taken to limit redundancy. This process resulted in the selection of 70 items reflecting effects for marijuana and 64 items describing effects for cocaine.

All items were worded in the first person, phrased to control for possible acquiescence response bias, and randomly ordered to form two separate questionnaires: Marijuana Effects Expectancy Questionnaire (MEEQ) and Cocaine Effects Expectancy Questionnaire (CEEQ). To facilitate comparison with the Alcohol Expectancy Questionnaire (Brown, Goldman, Inn, & Anderson, 1980), a comparable format and instructions were developed. Specifically, a true/false format was used to respond to items concerning specific effects for marijuana or cocaine. Participants were asked to respond to each item according to their own beliefs regardless of whether they had actually used the substance.

Subjects

The MEEQ and CEEQ were completed by 704 students at two Southern California universities who received class or research credit for participation in the study; 62.7% of the students were female, and the mean age of the sample was 19.23 years (SD = 3.42) with a range from 17 to 54 years. Most of the students sampled were single (93%); 5% reported living with an unmarried partner, 1% reported being married, and 1% reported being either separated, divorced, or widowed. The sample was predominantly Caucasian (77.5%) with 7.4% Asian, 6.2% Hispanic, 5.3% Black, and 3.6% of other ethnic background.

Lifetime drug and alcohol use patterns varied from no experience to regular daily use. In terms of current use (past 3 months), beer was consumed an average of 6.63 times (SD = 6.98) per month, with 2.40 times (SD = 3.85) for wine, and 2.69 times (SD = 4.08) for hard liquor. The number of drinks typically consumed in an average 24-hr drinking period was 4.18 (SD = 5.55) for beer, 1.97 (SD = 3.48) for wine, and 2.69 (SD = 3.91) for hard liquor. Within the past 3 months, 295 students (42%) reported using marijuana, and 106 students (15%) reported using cocaine. For those reporting current drug use, marijuana was used 7.00 times (SD = 8.16) per month, and cocaine was used 3.33 times (SD = 4.46) per month.

Procedure

The expectancy effect questionnaires were administered in a group classroom setting along with the Demographic Data Sheet (DDS; Brown et al., 1980) and the Customary Drinking and Drug Use Record (CDDR; Brown et al., 1989). The DDS is a brief demographic information questionnaire that elicits data on age, gender, marital status, ethnic background, educational level, occupation, socioeconomic status, religious background, and religious participation. The CDDR, which incorporates the Cahalan drinking classification procedure (Cahalan, 1970) and Drug Indulgence Index (Lu, 1974) is a self-report instrument that requests information on current (past 3 months) drinking/drug use patterns, types of drugs, the context of use, drug preferences, consumption and drug use history, life problems related to alcohol/drug use, and dependence and withdrawal symptoms. Questionnaire packets were prepared with the questionnaires presented in all possible sequences to control for possible order effects.

To assess immediate test–retest reliability of the instruments, every 10th item was selected and again presented at the end of the questionnaires. Thus, 8 items on the MEEQ and 7 items on the CEEQ were repeated for a subset of the subject pool (n = 83).

Results

Domain of Effect Expectancies

Principle components analyses were used to describe the domain of marijuana and cocaine effect expectancies. Using Nunnally's (1978) recommendations, one half of the subject sample was randomly selected (n = 350), and questionnaire responses for the cocaine and marijuana instruments were subjected to the first principle components analysis. To assess the suitability of the correlation matrix for a factor analysis, Bartlett's test of sphericity was computed for each matrix of correlations between the questionnaire items. Neither statistic suggested that the MEEQ or CEEQ arrays were significantly close to being an identity matrix ($p < .001$); consequently, the correlation matrices for the items on the MEEQ and CEEQ were used in subsequent analyses.

The questionnaire responses were analyzed using a principle components analysis with ls in the matrix diagonals and iteration to stabilized solutions. On the basis of screen tests, solutions of five, six, and seven factors were rotated for each instrument using a varimax procedure. Comrey's criteria for factor

selection (Comrey, 1978) were used to determine the final factor solutions. This process resulted in a six-factor solution for the MEEQ with eigenvalues ranging from 7.21 to 1.83 and a five-factor solution for the CEEQ with an eigenvalue range of 8.27 to 1.94. Remaining factors with eigenvalues greater than one each accounted for less than 2% of the variance in the MEEQ and CEEQ item sets. The six-factor solution accounted for 34.6% of the variance in the original item set of the MEEQ, and the five-factor solution accounted for 32.5% of the variance in the item set of the CEEQ.

Following the procedure for factor comparison outlined in Tabachnik and Fidell (1989), we conducted similar analyses using the second half of the sample (n = 354) to confirm the factor structures described above. The screen tests within the second sample yielded results comparable to the first sample. The range in eigenvalues for each sample was similar and varied between 7.77 and 2.05 for the MEEQ and between 8.44 and 2.08 for the CEEQ. The six-factor solution accounted for 34.4% of MEEQ variance, and the five-factor solution accounted for 32.5% of CEEQ variance.

Four of the six MEEQ factor correlations are considered adequately reliable with Pearson correlations of .71, .78, .88, and .89. Factor 5 was moderately replicated ($r = .60$), whereas Factor 6 had a nonsignificant correlation ($r = .20$). Item factor loadings for Factor 6, Craving and Physical Effects, in the second sample were compared with those in the first sample. Items for this factor (as defined in Sample 1) appear to be dispersed across several scales in the second sample. Three of the five CEEQ factors were confirmed in the second principle components analysis with correlations ranging from .93 to .96. The last two factors were moderately replicated ($r = .64$ and .63).[1]

The entire college sample was used to determine factor labels. Sample items and factor loadings for the MEEQ and CEEQ factors are presented in Table 1 and Table 2. The item content of the highest loading items on each factor was independently examined by three raters, and the resulting factor labels were arrived at by consensus. The six marijuana expectancy factors were labeled: 1. Cognitive and Behavioral Impairment, 2. Relaxation and Tension Reduction, 3. Social and Sexual Facilitation, 4. Perceptual and Cognitive Enhancement, 5. Global Negative Effects, and 6. Craving and Physical Effects. The five cocaine factors were labeled: 1. Global Positive Effects, 2. Global Negative Effects, 3. Generalized Arousal, 4. Anxiety, and 5. Relaxation and Tension Reduction.

The test–retest reliability of the eight repeated items on the MEEQ and seven repeated items on the CEEQ was examined for a subset of the sample (n = 83). The Pearson product-moment correlation was computed for each repeated set of items, yielding correlations of .66 ($p < .001$) for the MEEQ and .85 ($p < .001$) for the CEEQ.

Next, the unique and common variance of each expectancy scale was examined using a procedure developed by Goldman et al. (in press). An additive unit-weighted scoring system was used to summarize scores for each factor on the MEEQ and CEEQ. Items selected for each scale were based on factor loadings greater than .30. Next, items were allowed to remain on only one scale, the scale for which they loaded highest. Third, item-total correlations were computed for each scale, and items were eliminated from a scale if the coefficient alpha increased when that item was deleted. The unit-weighted scale scores correlated between .78 and .95 ($M = .89$) with their respective original factor loading defined scores. Using the unit-weighted scoring system, the coefficient alpha (α) for each scale was used to define the upper limit of reliable systematic variance. The extent to which each scale score reflects common expectancy variance was assessed by conducting a multiple regression predicting to each scale with all other scale scores acting as simultaneous predictors. Thus, the square of the resultant multiple correlation (R^2) reflects percentage of shared or common scale variance. The difference between the systematic variance (α) and common variance (R^2) is then used to define the unique variance of each scale. As shown in Table 3, MEEQ and CEEQ

Table 1
Expectancy Factors for the Marijuana Effect Expectancy Questionnaire

Sample questionnaire item	Factor loading
Factor 1: Cognitive and Behavioral Impairment	
If I've been smoking marijuana, it's harder for me to concentrate and understand the meaning of what's being said.	.588
It's difficult for me to express my thoughts clearly if I've been smoking marijuana.	.526
Marijuana slows thinking and actions.	.512
Factor 2: Relaxation and Tension Reduction	
Smoking marijuana makes me less tense or relieves anxiety; it helps me to unwind.	.583
Marijuana makes me calm.	.569
I get a sense of relaxation from smoking marijuana.	.554
Factor 3: Social and Sexual Facilitation	
Marijuana makes me talk more than usual.	.675
I'm more sociable when I smoke marijuana.	.600
Marijuana does not make me feel more romantic or attracted to members of the opposite sex.	−.479
Factor 4: Perceptual and Cognitive Enhancement	
I become more creative or imaginative on marijuana.	.543
Music sounds different when I smoke marijuana.	.484
I feel like I can focus on one thing better when I smoke marijuana.	.468
Factor 5: Global Negative Effects	
After the "high" of smoking marijuana, I feel down.	.596
Marijuana causes me to lose control and become careless.	.522
Marijuana can make me angry and possibly violent.	.522
Factor 6: Craving and Physical Effects	
I get the "munchies" (craving for snacks) when I smoke.	.727
Smoking marijuana makes me hungry.	.671
Smoking marijuana increases my cravings for things.	.504

[1] Factors 4 and 5 were extracted in reverse order as evidenced by item loadings on the factors and Pearson correlations.

Table 2
Expectancy Factors for the Cocaine Effect Expectancy Questionnaire

Sample questionnaire item	Factor loading
Factor 1: Global Positive Effects	
Cocaine makes me feel as though I'm on top of things.	.720
Cocaine gives me a sense of being in control.	.691
Cocaine makes me feel like I can do anything.	.670
Factor 2: Global Negative Effects	
Cocaine makes my judgment worse.	.661
I'm less aware of reality when I'm on cocaine.	.588
Cocaine makes me do the same thing over and over again.	.508
Factor 3: Generalized Arousal	
Cocaine makes me "hyper" (overactive, overtalkative, etc.).	.681
Cocaine speeds me up.	.661
Cocaine increases my activity level.	.634
Factor 4: Anxiety	
I grind my teeth when I'm on cocaine.	.540
I'm anxious or tense when I'm on cocaine.	.504
Cocaine gives me an uncomfortable feeling inside my stomach.	.390
Factor 5: Relaxation and Tension Reduction	
I do not become impatient and agitated when I'm on cocaine.	.640
I am not easily frustrated when I'm on cocaine.	.467
Cocaine makes me feel dreamy and mellow.	.445

scale scores are moderately predictable from other expectancy scales (range from 8% to 48%), but each scale maintains significant unique variance ranging from 20% to 64%. The latter results suggest that each effect expectancy scale reflects a specific set of beliefs about the drug effects, and consequently it is appropriate to use individual scales to depict expected drug effects.

Expectancies and Drug Use

Expectancy endorsement was next examined in relation to four drug use patterns: nonuser, infrequent user, recreational user, and regular user. Subjects whose current drug use was inconsistent with past use (e.g., current nonuser, past frequent user) or use of other substances and subjects previously in alcohol or drug treatment programs were excluded from this portion of the analyses. Nonusers ($n = 91$) of marijuana were defined by no history of use of the drug and no reported alcohol or drug problems (e.g., legal, financial, relationship). Infrequent marijuana users ($n = 138$) included those currently (during the last 3 months) reporting marijuana use of no more than once per month with a lifetime exposure of fewer than 50 times and no reported alcohol or drug problems. Recreational marijuana users ($n = 23$) were defined as those currently reporting less than weekly use of the drug, lifetime exposure to the drug of greater than 50 and fewer than 300 times, and a maximum of one drug problem. Regular users ($n = 51$) were defined as those reporting at least weekly marijuana use with exposure of greater than 300 times.

One hundred twelve students reported no current or lifetime cocaine use and no alcohol or drug problems. Because cocaine use patterns vary markedly from marijuana, infrequent cocaine users ($n = 17$) were defined as those who reported using cocaine at least once within the last 3 months with a lifetime exposure of fewer than 10 times and no alcohol or drug problems. Those reporting cocaine use of fewer than 7 times within the past 3 months, a lifetime exposure to the drug of between 10 and 50 times, and a maximum of two reported alcohol or drug problems were categorized as recreational cocaine users ($n = 27$). Regular cocaine users ($n = 16$) used cocaine at least weekly with a lifetime exposure of greater than 50 times.

To assess whether marijuana expectancy endorsement varied as a function of drug use, a multivariate analysis of variance (MANOVA) was performed on the five reliable scale scores for the MEEQ. Using Wilks's criterion, the marijuana use groups (i.e., nonusers, infrequent users, recreational users, and regular users) were found to differ significantly on the MEEQ scales, $F(15, 815) = 10.19$, $p < .001$ (see Table 4).

Two significant linear functions were extracted in a dimension reduction analysis, with canonical correlations of .56 and .30 accounting for 31% and 9% of the variance for the linear combinations of the MEEQ scale scores, respectively. Two factor correlations with the first linear function were >.30 (see Huberty & Morris, 1989): Global Negative Effects (.95) and Social and Sexual Facilitation (.35). The second linear function had three scales with significant correlations: Perceptual and Cognitive Enhancement (.77), Relaxation and Tension Reduction (.47), and Cognitive and Behavioral Impairment (−.31).

Table 3
Unique and Common Variance of MEEQ and CEEQ Scales

Scale	Coefficient α	R^2	$\alpha - R^2$
Marijuana Effect Expectancy Questionnaire (MEEQ)			
1 (13 items)	.72	.34	.38
2 (9 items)	.76	.44	.32
3 (10 items)	.59	.36	.23
4 (9 items)	.68	.49	.20
5 (10 items)	.70	.21	.49
6 (6 items)	.64	.21	.42
Cocaine Effect Expectancy Questionnaire (CEEQ)			
1 (15 items)	.86	.30	.56
2 (17 items)	.79	.14	.64
3 (8 items)	.77	.36	.42
4 (8 items)	.60	.16	.43
5 (4 items)	.45	.08	.38

Table 4
Marijuana and Cocaine Expectancy Scale Scores by Drug Use Groups

Scale	Nonuser		Infrequent user		Recreational user		Regular user	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Marijuana Effect Expectancy Questionnaire								
n	91		138		23		51	
1. Cognitive and Behavioral Impairment	9.48	2.91	8.88	2.74	9.17	2.95	7.92	3.03
2. Relaxation and Tension Reduction	6.59	2.52	5.91	2.45	5.70	2.25	6.82	1.88
3. Social and Sexual Facilitation	5.89	2.47	4.84	2.33	4.39	1.85	4.77	1.77
4. Perceptual and Cognitive Enhancement	5.86	2.43	4.47	2.34	5.04	2.08	5.84	1.91
5. Global Negative Effects	5.82	2.47	3.26	2.04	2.70	2.10	2.29	1.87
6. Craving and Physical Effects	4.46	1.75	5.05	1.28	5.35	.65	4.88	1.43
Cocaine Effect Expectancy Questionnaire								
n	112		17		27		16	
1. Global Positive Effects	8.29	4.38	6.41	4.38	6.96	3.98	10.00	3.23
2. Global Negative Effects	10.49	3.99	6.24	3.44	8.00	3.44	6.31	3.86
3. General Arousal	6.38	2.30	6.47	1.59	7.11	1.12	7.31	1.08
4. Anxiety	3.41	1.83	4.06	1.56	5.67	1.57	6.00	1.27
5. Relaxation and Tension Reduction	1.11	1.11	1.65	1.06	1.19	1.33	1.16	1.12

Scheffé tests were conducted on the linear function group centroids to determine the pattern of differences across marijuana use groups. As shown in Figure 1, nonusers were significantly different ($p < .05$) from all use groups on the first linear function, and the heaviest use group differed ($p < .05$) from nonusers and infrequent users on the second function.

Similarly, differences in endorsement of cocaine expectancies across the four cocaine use groups were assessed with a MANOVA on the five CEEQ scale scores. The cocaine use groups differed significantly on the CEEQ scales $F(15, 498) = 11.98$, $p < .001$, using Wilks's criterion. Table 4 shows the CEEQ scale means and standard deviations for each drug use group.

Two significant linear functions were extracted through dimension reduction analysis, with canonical correlations of .74 and .28. Thus, cocaine use accounted for 55% of the variance in the first linear combination of the CEEQ scale scores and 8% of the variance in the scale scores in the second linear function. Scale 4, Anxiety, had a significant correlation of .51, and Scale 2, Global Negative Effects, correlated −.38 with the first linear function. Two scales had correlations >.30 with the second discriminant function: Global Positive Effects (.74) and Anxiety (.40). Scheffé tests on drug use group centroids, as displayed in Figure 2, indicate that nonusers were significantly different ($p < .05$) from all use groups, and nonusers and infrequent users had lower scores than the heaviest use group on the first linear function. The heaviest use group had significantly higher ($p < .05$) scores on the second function than infrequent users had.

Gender differences in drug effect expectancies were assessed among groups with and without drug experience. Given the size of several drug use groups, all those with experience with each drug were combined for these analyses. Scale scores were calculated for users and nonusers for each of the expectancy instruments. MANOVAs indicated no differences in scale scores based on Wilks's criterion between men and women without marijuana or cocaine experience, $F(1, 78) = .449$, $p = .844$; $F(1, 106) = .748$, $p = .589$, respectively. Men and women with marijuana experience did differ in MEEQ scale scores, $F(1, 202) = 3.011$, $p < .01$, with women expecting more ($p < .05$) cognitive and behavioral impairment ($M = 9.00$, $SD = 2.79$) and global negative effects ($M = 3.21$, $SD = 2.02$) compared with men ($M = 8.17$, $SD = 2.97$; and $M = 2.63$, $SD = 2.03$). Men expected more relaxation ($M = 6.48$, $SD = 2.17$) and perceptual/cognitive enhancement ($M = 5.32$, $SD = 2.12$) than did female marijuana users ($M = 5.75$, $SD = 2.46$; and $M = 4.49$, $SD = 2.32$). The MANOVA assessing gender differences in CEEQ scale scores for those with cocaine experience failed to reach significance, $F(1, 58) = 1.380$, $p = .248$.

Discussion

The results of our study extend expectancy theory to drugs other than alcohol and provide examination of the range of expectancies associated with marijuana and cocaine. The present findings are consonant with expectancy theory (e.g., Gold-

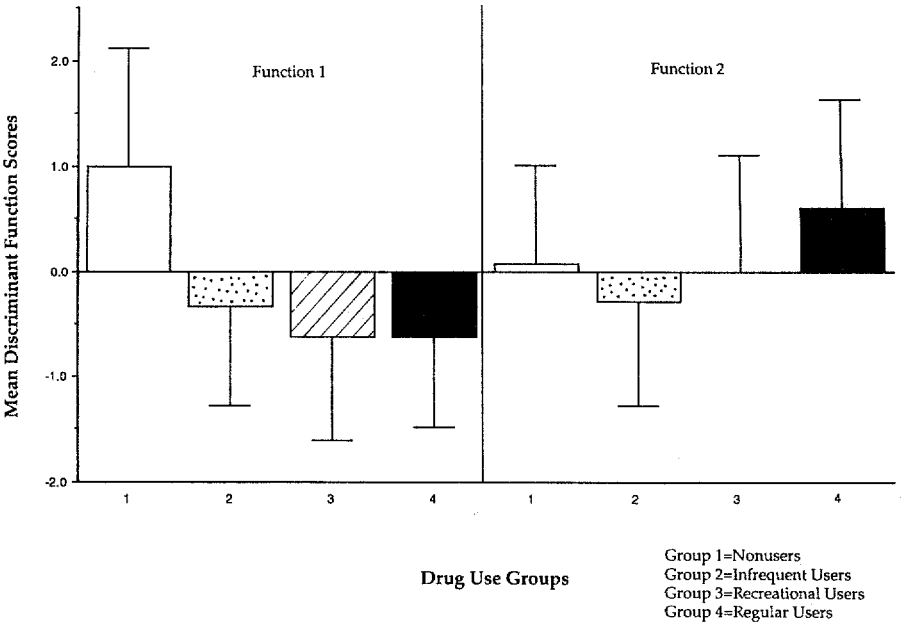

Figure 1. Marijuana Effect Expectancy Questionnaire: Canonical discriminant function scores of drug use groups.

man et al., 1987) in that drug effect expectancies are shown to be related to the actual use patterns of the respective drugs.

Well-defined expected effects are evident for both marijuana and cocaine. Two of the factors extracted from the item set regarding anticipated effects of marijuana are generally negative (Cognitive/Behavioral Impairment and Global Negative Effects), three of the factors are positive in nature (Relaxation/Tension Reduction, Social/Sexual Facilitation, and Perceptual and Cognitive Enhancement), and the last factor extracted appears to have a neutral valence (Craving/Physical Effects). As predicted, marijuana effect expectancies have considerable overlap with those of alcohol. When comparing the factor

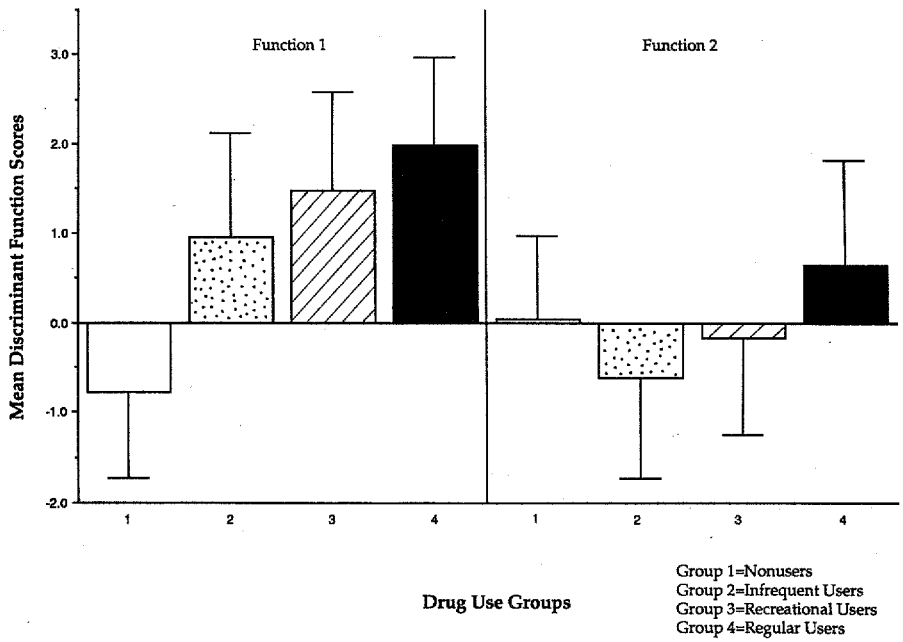

Figure 2. Cocaine Effect Expectancy Questionnaire: Canonical discriminant function scores of drug use groups.

structure of the MEEQ with the similarly derived structure of the Alcohol Expectancy Questionnaire (Brown et al., 1980; Christiansen et al., 1982), one sees that common expectancy domains include social and sexual facilitation, tension reduction, cognitive and behavioral impairment, and cognitive enhancement. Several of these effects (e.g., Social and Sexual Facilitation, Tension Reduction) are consonant with the social aspects of marijuana use and also the pharmacological effects of the drug. MEEQ factors similarly overlap with alcohol expectancies identified by other instruments such as the Alcohol Effects Questionnaire (Southwick, Steele, Marlatt, & Lindell, 1981). This measure uses a different assessment procedure (i.e., bipolar adjective checklist) to define three factors: Stimulation and Perceived Dominance, Pleasurable Disinhibition, and Behavioral Impairment. The positive factors identified for the MEEQ are roughly congruent with the former two, and the negative factors of the MEEQ overlap with the latter factor.

Given the pharmacodynamics of the drugs studied, different types of effect expectancies were predicted for cocaine. The CEEQ reflects positive effect expectancies (Global Positive Effects, and Relaxation and Tension Reduction), negative expectancies (Global Negative Effects, and Anxiety) and a factor with mixed connotations (Generalized Arousal). Of note, two of the factors identified for cocaine were very similar to those on the MEEQ and AEQ: the Global Positive and Relaxation and Tension Reduction factors. The extraction of a tension reduction factor was not predicted in the original hypotheses and seems counterintuitive. It may be that certain effect expectancies are associated with recreational use of any drug, whereas other expectancies develop in conjunction with use of a specific substance. For example, relaxation and tension reduction expectancies have been associated with alcohol, marijuana, and cocaine and were not significantly different across drug use groups in our study. Tension reduction expectancies may be acquired through vicarious social learning experiences before personal drug use and may be reinforced through the social context of drug use and physiological changes following ingestion. In contrast, anxiety and generalized physiological arousal, which are consonant with the sympathomimetic effects of cocaine, may be effect expectancies specific to stimulants. The arousal factor refers to behavioral hyperactivity; both factors are unique to the CEEQ and represent specific expectancies distinguishable from those identified for marijuana and alcohol.

Drug use patterns were associated with drug effect expectancies. In particular, nonuse of both drugs was associated with stronger negative drug consequences and, to a lesser degree, the most frequent use of each drug was associated with greater expectation of positive drug effects. This suggests that expectancies of negative consequences may act as a deterrent to experimentation with marijuana and cocaine; however, once drug use is initiated, perceived reinforcement may influence extensiveness of use.

The effect expectancies identified for marijuana and cocaine were similarly maintained by college men and women without drug experience. Among those having used marijuana, women appeared to associate slightly more negative effects with the drug (e.g., Cognitive and Behavioral Impairment, Global Negative Effects) whereas men tended to report more Relaxation/Tension Reduction and Perceptual/Cognitive Enhancement. Although overall cocaine expectancies did not vary significantly across cocaine-using groups of college men and women, the sample sizes for these select groups were relatively small. In contrast, reliable sex differences in expectancy scores have been identified among adults for alcohol (e.g., Brown et al., 1980; Rohsenow & Bachorowski, 1984). The lack of consistent gender differences across these use groups suggests that gender role prescriptions may be less well defined for these drugs, which are used by smaller portions of the population in fewer social settings and modeled less often in the media. However, these findings should be considered tentative because all drug users were compared together rather than by drug use categories and because some gender sample sizes were quite small.

Our study was exploratory in nature, and further work is necessary to assess the stability of the identified factors and the extent to which drug effect expectancies predict future drug use behavior. Although the confirmatory principle components analysis demonstrated adequate replication of the factor structure of most scales, not all scales met criteria for stability. A possible limitation of this effort to articulate cocaine and marijuana expectancies is that the initial stage of item development may not have sampled the entire domain of the expected effects because items were derived from verbal report and because associations with drug use may have existed that were not easily verbalized (Brown et al., 1980). The factor solutions drawn from this college sample account for approximately one third of the variance in the original item sets and may vary in noncollegiate samples. Furthermore, respondent burden, item wording, or other factors may have affected item intercorrelations.

Our results provide a basis for generalizing the construct of expectancy to the broader framework of addiction theory. The identified factors for marijuana and cocaine have in common general positive and negative expectancies as well as drug-specific expectancies. Expected drug effects differed across drug use groups as alcohol expectancies have been found to vary with drinking patterns (e.g., Brown et al., 1985; Southwick et al., 1981). The unexpected finding of a tension reduction factor for cocaine, similar to those associated with alcohol and marijuana, highlights the importance of stress-reducing perceptions associated with drug use in general. It is interesting to note that this expected effect of cocaine differs from the actual behavioral impact of the drug (Julien, 1987). As noted previously (Brown et al., 1980), effect expectancies may vary in degree of congruence with actual drug effects and may be maintained as well as influence drug taking behaviors despite these discrepancies. Furthermore, in addition to the pharmacologically produced stress-buffering effects of a drug (Sher, 1987), expected tension reduction may produce changes in affect, behavior, and physiological response when the drug is used. In this way, expectancy fits within the biopsychosocial model of addiction (e.g., Brownell, Marlatt, Lichtenstein, & Wilson, 1986), in which cognitive factors and stress play a significant role in the development and maintenance of substance abuse. Additionally, the associational network of alcohol and drug effect expectancies may determine decisions of continued use of a substance as well as decisions to experiment with alternative substances. To the extent that expectancies change with drug experience, these new stimulus–response associations may rein-

force the drug-taking behavior and anticipatory cognitions associated with drug use. However, such speculation warrants further investigation of the effects of common expectancies for different drugs.

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