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Comprehensive Effects of Alcohol: Development and Psychometric Assessment of a New Expectancy Questionnaire

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A comprehensive measure of alcohol outcome expectancies was developed through the use of exploratory and confirmatory factor analyses. The questionnaire assesses both positive and negative expected effects of alcohol as well as the subjective evaluation of those effects. The measure was found to demonstrate adequate internal consistency, temporal stability, and construct validity. Criterion validity was demonstrated through structural regression analyses of the independent and combined influences of outcome expectancies and subjective evaluation on three measures of alcohol use. Information on subjects' dose-related expectancies provided further validation of the expectancy construct and yielded information about the effects people associate with drinking different amounts of alcohol.

Social learning approaches to the treatment and prevention of alcohol abuse depend on an accurate assessment of the cognitive and behavioral factors that influence the use of alcohol. Recent measurement advances in this area have focused on individuals' beliefs about the reinforcing effects of drinking alcohol (Lang & Michalec, 1990). As outcome expectancies, these beliefs have been shown to influence how often and how much people drink (Goldman, Brown, & Christiansen, 1987). Alcohol outcome expectancies have thus been conceptualized as a final common pathway in decisions about alcohol use (Cox & Klinger, 1990).

Measures of alcohol outcome expectancies have reliably discriminated heavy from light drinkers (Southwick, Steele, Marlatt, & Lindell, 1981) and problem from nonproblem drinkers (Brown, Goldman, & Christiansen, 1985). Moreover, the Alcohol Expectancy Questionnaire for Adolescents has been shown to longitudinally predict transition from nonproblem to problem drinking status among adolescents (Christiansen, Smith, Roehling, & Goldman, 1989). Attempts to change individuals' outcome expectancies and thereby alter drinking patterns have consequently been incorporated into programs designed to prevent alcohol-related problems (Fromme, Kivlahan, & Marlatt, 1986; Goldman, Brown, Christiansen, & Smith, 1991).

Whereas the assessment of alcohol outcome expectancies has clearly provided an exciting new tool for clinicians and researchers interested in predicting and possibly changing drinking behavior, available expectancy questionnaires have been criticized for a variety of methodological and conceptual inadequacies (Leigh, 1989a). For example, the Alcohol Expectancy Questionnaire (AEQ; Brown, Goldman, Inn, & Anderson, 1980) has been faulted for the exclusion of negative expected effects (Fromme et al., 1986) and for the inclusion of items unrelated to effects of alcohol (Leigh, 1989a). Both the AEQ and the Alcohol Effects Scale (Southwick et al., 1981) have been criticized for response format (i.e., dichotomous and bipolar, respectively) and factor structure (Leigh, 1989a). Continuing discussions concerning the adequacy of available expectancy measures (Adams & McNeil, 1991; Leigh & Stacy, 1991) highlight the need for more inclusive expectancy assessment.

The Comprehensive Effects of Alcohol (CEOA) questionnaire (Stroot & Fromme, 1989) was developed in response to criticisms of available expectancy measures. Because extensive discussion of theoretical and measurement issues related to expectancy assessment can be found elsewhere (Goldman et al., 1991; Leigh, 1989a; Leigh & Stacy, 1991), only those relevant to development of our scale will be summarized here.

Domain and Measurement of Alcohol Outcome Expectancies

Current expectancy questionnaires tend to measure either very generalized expectancies (e.g., "Alcohol is like magic," AEQ; Brown et al., 1980) or quite specific expectancies, such as those related to social, sexual, or aggressive outcomes of drinking (Critchlow, 1987; George, Dermen, & Nochajski, 1989). Incorporating evidence from attitude research noting better prediction of behavior with greater specificity of measurement (Ajzen & Fishbein, 1977), the CEOA was designed to assess discrete rather than global expectancies about alcohol's effects. Moreover, because research has shown that drinking alcohol results in a variety of emotional, physical, and behavioral changes (West & Sutker, 1990), the CEOA measures expectations of physiological, psychological, and behavioral outcomes associated with drinking alcohol.

Perhaps the most important clinical as well as theoretical issue concerning expectancy assessment involves the measurement of positive and negative outcome expectancies (Adams & McNeil, 1991). Path analytic studies (Stacy, Widaman, & Marlatt, 1990) have "supported the distinction between positive

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and negative alcohol expectancies as differential, prospective predictors of alcohol use" (p. 926). It has also been suggested that anticipated positive *and* negative consequences of drinking influence drinking decisions (Cox & Klinger, 1990). The most frequently used expectancy questionnaires, however, tend to be either exclusively or heavily weighted toward assessment of positive expectancies.

Studies relating positive and negative expectancies to drinking habits have yielded mixed results. Neither Rohsenow (1983) nor Southwick et al. (1981) found expectations of behavioral impairment to differ among heavy and light drinkers, whereas Leigh (1987a) found that heavy drinkers expected less impairment than did light drinkers. Using higher order principal-components analysis, Collins, Lapp, Emmons, and Isaac (1990) found that positive and negative expectancies formed separate factors, with positive but not negative expectancies predicting drinker status. Alternatively, Mann, Chassin, and Sher (1987) found that adolescents who expected more cognitive and behavioral impairment were at higher risk for alcohol problems.

Sufficient evidence seems to warrant the inclusion of both positive and negative outcome expectancies in a comprehensive measure of beliefs about the effects of drinking alcohol (Adams & McNeil, 1991). Positive expectancies, more closely associated with cues in the immediate drinking environment (Stacy et al., 1990), may be important determinants of decisions to drink. Concerns about negative, often delayed consequences (e.g., hangover) may be important determinants of the amount one drinks and decisions about ending a drinking episode.

Implicit in the notion of measuring positive and negative outcome expectancies are assumptions about the desirability of alcohol's effects. From both social learning theory (Bandura, 1977) and utility theory (Edwards, 1954), behavior is seen as a function of not only the likelihood that certain consequences will occur but also the subjective evaluation of those consequences. With the exception of the Effects of Drinking Alcohol (Leigh, 1987a) and the Expected Consequences of Drinking (Bauman & Bryan, 1980), current expectancy measures do not assess the subjective evaluation of alcohol's effects. This deficit is potentially significant because, as Leigh (Critchlow, 1987) has shown, considerable variability exists in judgments about the desirability of particular effects of drinking. Outcomes typically assumed to be negative (e.g., irresponsibility, decreased motor control), for example, are sometimes reported as positive incentive motivators of collegiate drinking (Fromme, Marlatt, Baer, & Kivlahan, in press). It therefore seems necessary to assess rather than to infer peoples' evaluation of alcohol's effects.

When assessing both outcome expectancies and subjective evaluation of those outcomes, investigators have typically multiplied probability estimates and value ratings in their analyses of drinking behavior (Bauman, Fisher, Bryan, & Chenoweth, 1985; Stacy et al., 1990). Such analyses are problematic in that an expectancy score based on high likelihood and low evaluation ratings is equivalent to an expectancy score based on low likelihood and high evaluation ratings. In the former instance, an occurrence of the effect is reasonably certain, but its low desirability makes it an unlikely motivator of drinking behavior. In the latter instance, however, even the low likelihood for the occurrence of a very desirable effect could motivate drinking. The relative utility of outcome expectancies and subjective evaluations can only be examined by the disaggregation of probability estimates and evaluation ratings.

The few studies that have investigated the independent influence of outcome expectancies and subjective evaluations of effects (Critchlow, 1987; Leigh, 1987b; Reula & Fromme, 1991) find that evaluative judgments operate independently of outcome expectancies and enhance the prediction of alcohol use. In particular, Leigh (1987b) found that evaluation of negative expectancies (i.e., impairment, disinhibition, depression) added significantly to the prediction of quantity measures of drinking above that predicted by outcome expectancies. Ruela and Fromme (1991) found that evaluations of positive *and* negative effects added significantly to the prediction of both quantity and frequency measures of drinking beyond that predicted by outcome expectancies. Preliminary results therefore suggest that drinking decisions, at least about how much one drinks, are influenced by the evaluation of alcohol's effects.

The effects of drinking alcohol are biphasic in nature, dependent on the amount of alcohol consumed and the time since the drinking episode began (West & Sutker, 1990). Current measures of alcohol expectancies, however, tend to disregard dose or to assess expected effects for an approximate amount of alcohol (e.g., "too much"). An exploratory scale included in the development of the CEOA asked respondents to estimate the number of drinks required for them to experience each expected effect of drinking alcohol. These data may provide information about an optimal target dose for expectancy assessment as well as the existence of dose-specific expectancies.

Exploratory and confirmatory factor analyses used in the development of the CEOA will be described. To further assess the construct validity of this new measure, structural regression analyses of the relation among positive and negative outcome expectancies, evaluation of those outcomes, and alcohol use will be presented. We hypothesize that expectancies and subjective evaluations may relate differentially to frequency and quantity of alcohol use. In particular, positive expectancies and their evaluations are expected to be associated with frequency, whereas negative expectancies and their evaluations are thought to be more closely associated with quantity of drinking.

Method

Subjects

All subjects were recruited from psychology courses at a mid-Atlantic university. Data for initial exploratory analyses were provided by 344 subjects. This sample was 57% women and had a mean age of 20 years (SD = 2.12). Drinking habits were determined by Volume and Variability scores from Cahalan's Quantity–Frequency Index (Cahalan, Cisin, & Crossley, 1969), and the sample was comprised of 14% abstainers, 14% light drinkers, 24% moderate drinkers, and 48% heavy drinkers. An additional 485 subjects provided data for the confirmatory factor analysis. This sample was 66% women with a mean age of 19 years (SD = 2.57). Six percent of this sample abstained from alcohol, 12% were light drinkers, 34% moderate, and 48% heavy drinkers. Subsets of these subjects participated in test–retest analyses (n = 129) and assessment of dose-specific expectancies (n = 74). Drinking characteristics of these subsamples were comparable to the pools from which they were drawn. All subject samples were predominantly White.

Measures

In addition to the CEOA, subjects completed a demographic questionnaire, an abbreviated version of Cahalan's Quantity–Frequency Index (Cahalan et al., 1969), and the Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985).

Of the original 139 items of the CEOA, 103 items were taken from existing expectancy questionnaires. Items were included only if they were discrete (versus global) effects and if they could be worded to reflect specificity to "self." When an existing measure used bipolar response options, each endpoint was included in the CEOA. On the basis of face validity, 36 new items were included to reflect the biphasic and negative effects of drinking.

Briefly, the CEOA consists of two parts. Assessment of outcome expectancies begins with the stem "If I were under the influence from drinking alcohol . . . (e.g., "I would be friendly"). Responses are checked on a 4-point Likert scale (1 = disagree, 4 = agree). Subjective evaluation ratings of the effects are obtained by responses on a 5-point Likert scale (1 = bad, 3 = neutral, 5 = good).

Information was also obtained on subjects' dose-related expectancies. Subjects were asked to estimate the number of standard drinks they would require to experience each of the individual effects of alcohol. A standard drink was described as 12 oz of beer, 4 oz of wine, or 1 oz of liquor, either straight or in a mixed drink.

Results

Analysis of Outcome Expectancy Items

Exploratory factor analyses. Of the original 139 items, 37 items were deleted because they were not endorsed as effects ($M \leq 2.0$). Preliminary factor analyses of all 102 positive and negative items for the sample of 344 subjects failed to converge. A likely explanation for this is the low subject-to-variable ratio (for discussion of the problem of improper solutions see Bollen, 1989). Average subjective evaluation ratings were subsequently used to divide the total item pool into 46 positive items (those with a mean subjective evaluation rating of ≥ 3.0) and 56 negative items (mean evaluation rating of <3.0). Three positive and four negative items were deleted because they had a corrected item total correlation of $\leq .20$. Subsequent exploratory and confirmatory factor analyses were conducted separately for the positive and negative outcome expectancies. In order to determine the number of factors underlying the CEOA, a preliminary principal components analysis was conducted. The decision regarding the number of factors was based on examination of scree plot (Kaiser, 1960), eigenvalues > 1.0 (Cattell, 1966), and proportion of trace variance accounted for by the components. Five positive and four negative factors were retained. Items were then deleted from the item pool if their largest loading was <.40 or if the Cronbach's alpha for the factor increased. Using this criterion, 6 positive and 11 negative items were deleted.

On the basis of previous findings of intercorrelations among alcohol expectancy factors (Goldman et al., 1991; Leigh & Stacy, 1991), factor analyses were repeated using principal factors extraction and oblique rotation. The number of factors were constrained to the previously derived principal component solution. In order to assess simple structure, items were deleted if they had substantial loadings on more than one factor. They were also deleted if Cronbach's alpha increased on their deletion. The fifth positive factor and the fourth negative factor each contained a single item. These factors were dropped from further consideration because the proportion of variance accounted for by these factors was quite small. The final exploratory analysis yielded four positive factors consisting of 22 items and three negative factors consisting of 19 negative items. The factors derived from the positive items were described as follows: (a) Factor 1—Sociability, (b) Factor 2—Tension Reduction, (c) Factor 3—Liquid Courage, and (d) Factor 4—Sexuality. The factors derived from the negative items were described as follows: (a) Factor 1—Cognitive and Behavioral Impairment, (b) Factor 2—Risk and Aggression, and (c) Factor 3—Self-Perception.

Overall, the positive factor structure accounted for 55.9% of the total variance in the positive items. Eigenvalues ranged from 7.5 to 1.4. The derived negative factor structure accounted for 46.3% of the variance in the negative items, and eigenvalues ranged from 4.9 to 1.6.

Examination of possible gender differences in factor structure. The item pool that resulted from exploratory factor analyses was subjected to separate factor analysis by gender.[1] Consistent with results from the pooled analyses, eigenvalues and scree plot evaluations for unconstrained solutions suggested the existence of four positive and three negative factors in both male and female samples. Using principal factors extraction and oblique rotation, data were constrained to the four- and three-factor solutions, and the derived factor structures for men and women were compared through analyses of the coefficients of congruence (CCs; Levine, 1977).

With the exception of Tension Reduction (discussed below), CCs demonstrated modest to strong similarity between the factor structures for men and women. Coefficients of congruence for Behavioral Impairment, Risk and Aggression, and Self-Perception were .90, .80, and .65, respectively. For the positive factors, Sociability, Liquid Courage, and Sex demonstrated CCs of .81, .76, and .73, respectively.

Comparison of the Tension Reduction factor between men and women yielded the only unacceptably low CC of .04. For women, most tension reduction effects of alcohol correlated with sexual effects, forming a Relaxation and Sex factor. For men, Tension Reduction and Sex formed distinct factors. Although interesting, this single difference between the factor structures for men and women was not seen as sufficient justification for conducting further separate analyses by gender. A complete analyses of gender differences is beyond the scope of this article.

Confirmatory factor analyses. To obtain statistical corroboration of the obtained exploratory factor structure, confirmatory factor analyses (CFA) were performed on data from the first sample of 344 subjects using the LISREL VI statistical program (Jöreskog & Sörbom, 1989). As evidenced by the chi-

[1] In response to an anonymous reviewer's comments, item selection criteria were also examined separately by gender. Of the items retained for factor analyses, two items were not initially endorsed as effects by men (i.e., get hiccups; feel shakey and jittery) and one item was not endorsed by women (i.e., feel self-conscious). Items were included in the factor analyses if endorsed by either sex. For subjective evaluations, women rated one effect (i.e., easy to act out my fantasies) as slightly more negative than positive, whereas men's ratings and the pooled item mean suggested the effect carried a positive valence.

square statistic, the models did not fit the data. In addition to chi-square, which is known to be affected by a variety of factors (see footnote 2), the adjusted goodness of fit index (AGFI) and root mean square residual (RMSR) were provided to judge the adequacy of model fit. Analyses showed positive factors had $\chi^2(203, N = 344) = 507.13$, $p < .001$, AGFI = .85, RMSR = .07; and negative factors $\chi^2(149, N = 344) = 339.29$, $p < .000$, AGFI = .88, RMSR = .06. Possible specification errors in the model were investigated in the form of complex loading structures. A combined approach to specification error searches using the modification index (MI) and the expected change (EC) statistic advocated by Saris, Satorra, and Sörbom (1987) and by Kaplan (1989) was used to point out areas of model misfit.[3] Results of the search indicated that most errors were small and theoretically indefensible. On the basis of the *t* statistic, two positive items and one negative item were deleted. After deletion of these items, positive factors yielded $\chi^2(164, N = 344) = 369.92$, $p < .001$, AGFI = .88, RMSR = .05; and negative factors $\chi^2(132, N = 344) = 260.42$, $p < .001$, AGFI = .90, RMSR = .06. All MIs and ECs remained small, suggesting that other factors such as nonnormality (see Kaplan, 1990) rather than sample size were contributing to model misfit. Thus, results of this procedure provided evidence for the existence of four positive factors and three negative factors for alcohol outcome expectancies.

The factor models derived from the previous analyses were replicated on a new sample of 485 subjects. As with the previous analysis, the models did not fit the data. Positive factors yielded $\chi^2(164, N = 485) = 438.11$, $p < .001$, AGFI = .89, RMSR = .07; negative factors $\chi^2(132, N = 485) = 334.96$, $p < .001$, AGFI = .91, RMSR = .06. Again, modification indices were small and indefensible. Results with the new sample of 485 subjects are in line with the final structure obtained on the previous confirmatory analysis based on 344 subjects. See Table 1 for factor structure.

Analysis of Subjective Evaluation Items

Subsequent analyses involving the subjective evaluation of alcohol's effects required complimentary evaluation factor scores for each of the seven alcohol expectancy scales. Confirmatory factor analyses were used to determine the adequacy with which the factor structure obtained from analyses of expectancy items fit the subjective evaluation items. These analyses were performed on a sample of 221 subjects, and the model was constrained to the previously derived four-factor positive and three-factor negative solution. Results of positive factors yielded $\chi^2(164, N = 221) = 381.97$, $p < .001$, AGFI = .80, RMSR = .08; negative factors $\chi^2(132, N = 221) = 291.80$, $p < .001$, AGFI = .83, RMSR = .07. Results of a specification error search indicated that MIs and ECs were small and indefensible. Correlations among the expectancy and evaluation scales are shown in Table 2.

Analysis of Outcome Expectancy and Evaluation Scales

In the next phase of the analyses, the unit-weighted scale scores derived from the CFA results were subjected to confirmatory factor analysis specifying four factors: (a) Positive Expectancy, (b) Positive Value, (c) Negative Expectancy, and (d) Negative Value. The model was not consistent with the data as evidenced by the chi-square statistic, $\chi^2(70, N = 221) = 954.14$, $p < .001$, AGFI = .67, RMSR = .12. However, inspecting both the MIs and the ECs revealed that evaluation scores for the Risk and Aggression scale would have substantially large loadings on the Positive as well as the Negative Value factor. Allowing the Risk and Aggression scale to load on the Positive factor resulted in a significant improvement in model fit (χ^2 change [1, $N = 221$] = 65.26, $p = .001$, AGFI = .67, RMSR = .12). Remaining large MIs were associated with moderate though substantively implausible ECs, and results of this final CFA showed reasonably good structure. Loadings on the Positive Expectancy factor ranged from .15 to .84; those for Positive Value ranged from .35 to .78; Negative Expectancy ranged from .32 to .69; and loadings on Negative Value ranged from .61 to .83. This model was accepted as evidence for the construct validity of the four factors.

Criterion-Related Validity

In addition to establishing the construct validity of the factors underlying the CEOA questionnaire, criterion-related validity of the derived factors was tested in a two-step approach. In the first step, three measures of alcohol use (i.e., quantity, frequency, and weekly consumption) were separately regressed on the Positive Expectancy and Positive Value factors and then on the Negative Expectancy and Negative Value factors. The rationale for this step was based on the observation that the Positive and Negative Expectancy factors exhibited low factor correlation as did the Positive and Negative Value factors. In the second step, the alcohol measures were regressed separately on all four factors to determine the sensitivity of the regression

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[2] Confirmatory factor analysis assumes that data do not possess systematic patterns of missing responses (see Muthen, Kaplan, & Hollis, 1987) and that the observed variables are approximately multivariate normally distributed (see Muthen & Kaplan, 1985). Very little missing data were observed in the current research and no discernable patterns could be determined. It was decided to proceed with listwise deletion. With respect to the normality assumption, all variables are categorical so that continuous multivariate normality assumptions are violated and this is known to affect goodness-of-fit tests. Consequently, selected models were reanalyzed using an approach in PRELIS (Jöreskog & Sörbom, 1988) that produces Pearson correlations among optimally scaled scores. Comparisons of the optimal score approach and the standard approach yielded no discernable differences. We also examined selected models using an approach that calculates maximum likelihood estimates of polychoric correlations among the variables. Models calculated using this approach showed difficulty in converging. Analyses proceeded under the assumption that the data were approximately multivariate normally distributed.

[3] The expected change (EC) statistic represents the change in the value of a fixed parameter if that parameter is freed (Saris et al., 1987). In combination with the modification index (MI), this statistic can direct one to parameters that, when freed, yield the largest drop in chi-square along with the largest change in the fixed parameter. Recent applications of this combined approach have suggested that it is quite successful in indicating substantively important specification error (see Kaplan, 1989). This approach has also been suggested as a possible means of evaluating the sample size problem in the context of statistical power (see Kaplan, 1990).

Table 1
Expectancy Factor Structure and Loadings From Confirmatory Analysis

Factor	Loadings
Positive factors	
Sociability	
I would act sociable	.74
It would be easier to talk to people	.66
I would be friendly	.62
I would be talkative	.61
I would be outgoing	.60
I would be humorous	.58
It would be easier to express feelings	.53
I would feel energetic	.40
Tension Reduction	
I would feel calm	.76
I would feel peaceful	.58
My body would feel relaxed	.53
Liquid Courage	
I would feel courageous	.79
I would feel brave and daring	.76
I would feel unafraid	.66
I would feel powerful	.61
I would feel creative	.33
Sexuality	
I would be a better lover	.75
I would enjoy sex more	.73
I would feel sexy	.52
It would be easier to act out my fantasies	.48
Negative factors	
Cognitive and Behavioral Impairment	
I would be clumsy	.99
I would feel dizzy	.91
My head would feel fuzzy	.88
My responses would be slow	.76
I would have difficulty thinking	.76
My writing would be impaired	.73
I would feel shaky or jittery the next day	.66
My senses would be dulled	.57
I would neglect my obligations	.55
Risk and Aggression	
I would take risks	.86
I would act aggressively	.84
I would be loud, boisterous, or noisy	.84
I would act tough	.75
I would feel dominant	.61
Self-Perception	
I would feel moody	.99
I would feel guilty	.84
I would feel self-critical	.70
My problems would seem worse	.69

Note. Table reflects the final item content of the Comprehensive Effects of Alcohol questionnaire following confirmatory factor analyses.

coefficients to the inclusion of all factors in their prediction of the alcohol use measures.

It should be noted that the following analyses were essentially separate multiple regressions of an observed variable (the alcohol use measures) on the four factors, as carried out in the structural equation modeling framework. As such, the structural part of the model was just-identified with degrees of freedom for testing the fit of the model coming entirely from the measurement structure. It was considered premature to commit to any causal ordering among the exogenous factors themselves in their prediction of the various alcohol measures. We were simply interested in the separate and joint influence of Positive and Negative Expectancy and Positive and Negative Value as they predict the alcohol use measures.

Table 2
Correlations Between Expectancy Factors (Upper Diagonal) and Between Positive and Negative Value Factors (Lower Diagonal)

Factors	1	2	3	4	5	6	7
1. Sociability	—	.26	.43	.45	.02	.23	−.19
2. Tension Reduction	.59	—	.09	.25	−.11	−.16	−.15
3. Liquid Courage	.56	.41	—	.46	.20	.67	.06
4. Sexuality	.51	.45	.55	—	.03	.30	.03
5. Impairment	.12	.17	.41	.23	—	.32	.46
6. Risk and Aggression	.32	.22	.64	.42	.62	—	.21
7. Self-Perception	.05	.04	.25	.13	.59	.54	—

Note. All correlations greater than .08 are significant at the $p < .05$ level.

Results of the structural regressions of the alcohol measures on the Positive Expectancy, Positive Value, Negative Expectancy, and Negative Value factors are displayed in Table 3. The Positive Value factor was significantly associated with each of the dependent alcohol use measures. For weekly consumption, a significant relation was also found for the Positive Expectancy factor.

Unlike results for positive factors, the models for the negative factors fit the data reasonably well. Because the degrees of free-

Table 3
Standardized Structural Regression Coefficients of Alcohol Use Measures on Expectancy and Values Factors: Separate Models and Full Model

Alcohol measure	Expectancy	Value
Separate model—Positive		
Quantity	.03	.25*
Frequency	.06	.32*
Weekly consumption	.13*	.26*
Separate model—Negative		
Quantity	−.28*	.04
Frequency	−.30*	.18
Weekly consumption	−.13	.16*
Full model—Positive		
Quantity	.27*	−.41*
Frequency	.37*	−.46*
Weekly consumption	.30*	−.27*
Full model—Negative		
Quantity	−.08	−.02
Frequency	−.13	.06
Weekly consumption	−.04	−.08

* $p < .05$.

dom come from the measurement part of the model, this finding again highlighted the construct validity of the negative factors. Results of the regressions indicated that Negative Expectancy had a significant negative impact on quantity and frequency. With respect to weekly consumption, Negative Expectancy and Negative Value had nearly equivalent influence with appropriate signs.

Finally, the joint impact of all four factors on the three alcohol use measures was assessed. Results of the regressions indicated that when all four factors were considered jointly, only Positive Expectancy and Negative Expectancy were significantly related to the alcohol use measures. Results also suggested a moderate though nonsignificant influence of Positive Value on quantity. Negative Value was not found to be significantly related to any of the alcohol use measures.

Temporal Stability of Expectancy and Evaluation Ratings

The final 76-item scale, comprised of 38 expectancy and 38 evaluation ratings, was subjected to test–retest analyses. One hundred twenty-nine subjects completed the CEOA over a 2-month time interval. With probability levels all $<.01$, correlations between scores for the first and second administrations fell into the following ranges: $r = .66$–$.72$ (Positive Expectancy), $r = .59$–$.78$ (Positive Value), $r = .75$–$.81$ (Negative Expectancy), and $r = .53$–$.65$ (Negative Value).

Analysis of Dose-Related Expectancies

Dose-related expectancies are represented by the number of drinks subjects indicated they would need to consume in order to experience each of the 38 alcohol effects. These expected drink scores were averaged within each of the seven expectancy scales to test whether dose-related expectancies differed by drinker status. One-way analysis of variance by drinker status (i.e., abstainer/infrequent, light, moderate, and heavy drinkers) were conducted on subjects' estimated number of drinks. Using Bonferroni adjustments for probability levels, all F statistics were significant at less than .002. Degrees of freedom ranged from 122 to 175 (varying by the number of missing values for each scale). Results for the positive factors are as follows: Sociability, $F(3, 171) = 5.14$; Tension Reduction, $F(3, 175) = 5.96$; Liquid Courage, $F(3, 134) = 5.39$; and Sexuality, $F(3, 122) = 9.06$. Results for the negative factors are as follows: Cognitive and Behavioral Impairment, $F(3, 122) = 8.76$; Risk and Aggression, $F(3, 124) = 5.67$; and Self-Perception, $F(3, 112) = 4.26$. Post hoc analyses using Tukey's procedure revealed that the mean scale scores for the heavy drinkers were significantly higher than those for the abstainer/infrequent and light drinker categories.

Expected drink scores were next averaged across the four positive and three negative expectancy factors to test differences in the number of drinks required to experience positive and negative effects of alcohol. Paired t tests confirmed that subjects expected to consume more drinks to experience negative ($M = 5.8$ drinks, $SD = 2.2$) than positive ($M = 4.4$ drinks, $SD = 1.9$) effects of alcohol, $t(73) = 10.8$, $p < .001$.

Discussion

A comprehensive measure of alcohol outcome expectancies was developed through use of exploratory and confirmatory factor analyses. The measure assesses both positive and negative expected effects of alcohol as well as the subjective evaluation of those effects. The 76-item questionnaire was found to demonstrate adequate internal consistency, temporal stability, and construct validity. Outcome expectancies and subjective evaluations were found to vary in their independent and combined influences on three measures of alcohol use.

The positive and negative valence of alcohol's effects, originally based on subjects' subjective evaluation ratings, was supported through confirmatory factor analyses. Analysis of scale scores identified two higher order factors of positive and negative expectancies that were virtually uncorrelated. Effects such as increased sociability and tension reduction were viewed as positive, whereas effects such as cognitive and behavioral impairment and negative self-perception were considered negative consequences of drinking alcohol.

Examination of gender differences in the factor structures for alcohol's effects between men and women revealed few differences. The only noteworthy difference was that for women, sexual and tension reduction effects of alcohol tended to covary. For men, however, these effects were distinct. These results may suggest that women associate sexual activities with feelings of relaxation whereas men do not. Any significant gender differences in alcohol expectancies will more likely be evident in examination of mean scale scores. A full investigation of gender differences, however, is beyond the scope of this article.

The Risk and Aggression scale loaded on both positive and negative value factors, suggesting an ambivalence with which these effects are considered. Marlatt and Rohsenow (1980) have suggested that drinking may give people an excuse to engage in otherwise socially proscribed behaviors such as aggression, and our own research (Fromme, Ruela, Delvacchio, & Rivet, 1991) has shown increased risk taking to be associated with alcohol use. Although people may view the behaviors of risk taking and aggression as inherently negative, they may see the opportunity to engage in these behaviors after drinking as a positive side effect of alcohol use.

Outcome expectancies and subjective evaluations for alcohol's positive and negative effects were tested as independent and combined influences on three indexes of alcohol use: typical quantity, frequency, and a separate measure of weekly consumption. When only positive effects of drinking were tested, subjective evaluation proved to be a more significant predictor than outcome expectancies for all indexes of drinking. To the contrary, when only negative effects were tested, outcome expectancies were more significant predictors of frequency and quantity of drinking than subjective evaluations. When outcome expectancies and subjective evaluations for positive and negative outcomes of drinking were tested simultaneously, only outcome expectancies emerged as significant determinants of alcohol use. Thus, when outcome expectancies and subjective evaluations are considered jointly, cognitive measures of likelihood appear to overwhelm affective appraisals of value for alcohol's effects.

The utility of measuring both outcome expectancies and sub-

jective evaluations may be greater in clinical than in research settings. By measuring subjective evaluations, clinicians would be able to track clients' affective appraisal of drinking and, consequently, might better predict future involvement with alcohol. Highly valued effects of drinking could precipitate relapse whereas devalued effects might protect against it. As a growing body of clinical research has shown, attention to both clients' cognitive processes and affective experience is vital to facilitate behavior change (Greenberg & Safran, 1987).

Information on subjects' dose-related expectancies provided further validation of the expectancy construct and yielded interesting information about the effects people associate with drinking different amounts of alcohol. Consistent with the biphasic effects of alcohol, respondents of all drinking habits said they needed to consume more alcohol to experience the negative than to experience the positive effects of drinking. For all effects, heavy drinkers reported that they required significantly more alcohol than infrequent or light drinkers to achieve the same effects. This perhaps reflects the development of tolerance among heavy drinkers, thereby necessitating their consumption of higher doses than light drinkers to achieve the specified effects.

These findings also suggest that, in addition to outcome expectancies, people hold beliefs about the dose required to achieve those expected outcomes. Further research on the existence and impact of dose-related expectations may lend yet another tool to the clinician involved in habit change. The Alcohol Skills Training Program, for example, focuses on participants' dose-related expectancies (Fromme et al., in press). In challenging participants' beliefs about the amount of alcohol necessary to achieve desirable and avoid undesirable effects, this program has proven to be successful in significantly reducing participants' alcohol consumption (Kivlahan, Marlatt, Fromme, Coppel, & Williams, 1990).

Limitations common to all expectancy questionnaires (i.e., generalizability and model misfit) exist for the CEOA as well. With respect to generalizability, the CEOA was developed using college student samples. Although doubt has been cast regarding the similarity of college students to the general population (Crowley, 1991), other expectancy questionnaires have been developed on college samples and used effectively in both treatment settings (Brown, 1985) and the general population (Rather, Goldman, Roehrich, & Brannick, 1992). There appears to be no reason to question similar applicability of the CEOA, and clinical use of the measure is currently under investigation (A. Millar, personal communication, December 11, 1989).

With respect to model misfit, LISREL analyses have failed to statistically corroborate the hypothesized factor structures of all expectancy questionnaires tested (Leigh, 1989b). We have given possible statistical explanations for this in footnote 2. From a conceptual perspective, however, perhaps the expectancy construct cannot be accurately modeled without reference to the context in which alcohol use occurs. Anticipated effects of drinking, and most certainly the subjective evaluation (e.g., desirability) of those effects, may vary greatly with factors such as the drinker's companions, the setting, and the time of day. An idiographic approach to expectancy assessment (Leigh & Stacy, 1991) might yield a more accurate model of outcome expectancies but would quickly become unwieldly. The assessment of every contextual factor that might influence one's expectancies would be impractical for both treatment and research applications.

Based on social learning theory and redressing weaknesses of earlier expectancy questionnaires, the CEOA is a new tool for measuring beliefs about the effects of drinking alcohol. Possible advantages over other available questionnaires include the assessment of (a) specific, self-relevant outcomes, (b) both positive and negative expected effects, and (c) subjective evaluations of alcohol's effects. Moreover, use of Likert response scales for the CEOA allows the measurement of expectancy strength (Collins et al., 1990), which is important in both clinical and research settings. Expectancy assessment through use of the CEOA may facilitate ongoing efforts to predict and possibly change drinking behaviors.

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