

Research Article

Alcohol and Aggression Without Consumption

Alcohol Cues, Aggressive Thoughts, and Hostile Perception Bias

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ABSTRACT—*Researchers and the lay public have long known of a link between alcohol and aggression. However, whether this link results from alcohol's pharmacological effects or is merely an artifact of the belief that alcohol has been consumed (i.e., placebo effect) has been debated. The current experiments examined the propensity for alcohol-related cues to elicit aggressive thoughts and hostile perceptions in the absence of alcohol or placebo consumption. In Experiment 1, participants made faster lexical decisions concerning aggression-related words following alcohol-related primes compared with neutral primes. In Experiment 2, participants who first were exposed to alcohol advertisements subsequently rated the behavior of a target person as more hostile than participants who initially viewed control advertisements. Furthermore, this effect was largest among participants who most strongly associated alcohol and aggression. Findings are discussed in terms of semantic network theory and links in memory between alcohol and its anticipated effects.*

Alcohol consumption has many effects on social behavior (see Critchlow, 1986). Our focus here is on the belief that alcohol consumption leads to increased aggression. Experimental research generally supports this causal link (see Bushman & Cooper, 1990; Ito, Miller, & Pollock, 1996). Despite this seemingly robust association, however, researchers have yet to reach consensus on the mechanism for this effect. There are

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currently two primary theoretical perspectives on this issue. First, some models hold that alcohol increases aggression pharmacologically by impairing higher-level cognitive processes (e.g., Giancola, 2000; Steele & Josephs, 1990). Studies linking impaired cognitive function, alcohol use, and increased aggression support this model (for a review, see Giancola, 2000).

The second leading perspective holds that alcohol causes aggression, at least in part, simply because of its presumed effects. Evidence from experiments using a balanced-placebo design, in which some participants consume a control beverage while others consume a placebo that they believe to be alcohol, indicates that the mere belief that one has consumed alcohol can lead to altered psychological and behavioral outcomes, including increased aggression (e.g., Lang, Goeckner, Adesso, & Marlatt, 1975; Marlatt & Rohsenow, 1980; Rohsenow & Bachorowski, 1984; but see Chermack & Taylor, 1995). Such findings suggest an implicit association between alcohol and aggression, and indicate that one pathway by which alcohol causes aggression is through this association. Drinkers also may simply expect other people to tolerate their antinormative behavior if it can be attributed to alcohol (Critchlow, 1986). However, it remains unclear whether relevant memory structures become activated only when participants believe they are consuming alcohol, or whether the mere presence of alcohol cues can activate these memory structures and affect relevant behaviors.

To the extent that such implicit memory associations exist, their operation should not depend on whether or not participants believe they have consumed alcohol. That is, mere exposure to alcohol-related cues should be sufficient to activate links to aggression in memory, thereby increasing the likelihood of an aggressive response. This notion is based on a semantic network model of memory (e.g., Abelson, 1981; Collins & Quillian, 1969), which posits that concepts that frequently co-occur (e.g.,

“bread” and “butter”) or that share a similar meaning (e.g., “kill” and “death”) are stored close together in memory. When one concept is activated, other related concepts also become more accessible through a spreading activation process (e.g., Collins & Loftus, 1975; Neely, 1977), which increases the likelihood that those related concepts will affect behavior. Such frameworks have been applied in explaining motivations for alcohol and drug use (e.g., Stacy, Leigh, & Weingardt, 1994). Specifically, when a particular outcome is primed (e.g., relaxation), motivations to engage in a behavior that will produce that outcome (e.g., drinking alcohol) are increased. Theoretically, this process also should operate in reverse: Priming concepts associated with drinking behavior should increase the accessibility of related outcomes.

This memory model also has been used to explain the effects of mere exposure to other stimuli associated with aggression. It has long been known that the mere presence of a weapon increases aggressive responding (Berkowitz & LePage, 1967). Anderson and his colleagues recently demonstrated that mere exposure to weapons increases aggressive thoughts via automatic priming (Anderson, Benjamin, & Bartholow, 1998), which then increases the likelihood of an aggressive behavioral response (Bartholow, Anderson, Carnagey, & Benjamin, 2005). These authors attributed this *weapons priming effect* to the links that form in semantic memory when weapons are repeatedly paired with aggression. To the extent that aggression is thought to frequently co-occur with alcohol, the mere presence of alcohol-related images should similarly facilitate aggressive responses.

THE CURRENT RESEARCH

The first experiment reported here examined whether exposure to alcohol-related images increases the accessibility of aggressive thoughts. Weapon images also were included to permit direct comparison with a condition known to facilitate aggressive thoughts (Anderson et al., 1998). We hypothesized that participants would more quickly recognize aggressive words following exposure to both alcohol-related and weapon primes, compared with neutral primes. The second experiment examined whether exposure to alcohol-related cues leads to a hostile perception bias. We hypothesized that participants exposed to alcohol advertisements would later rate a story character as more hostile than participants initially exposed to neutral ads, and that this effect would be largest among participants who most strongly associated alcohol consumption with aggression.

EXPERIMENT 1

Method

Participants

Sixty male and 61 female undergraduate students (mean age = 19.2 years), recruited using an Internet-based experimental

sign-up procedure, participated in partial fulfillment of course requirements. The majority of the participants (78%) identified themselves as Caucasian; 9% identified themselves as African American, and 13% did not identify their ethnicity.

Stimuli and Task

Accessibility of aggressive thoughts was assessed using a primed lexical decision task. Prime stimuli consisted of six color images related to alcohol (e.g., beer bottle, martini glass), six images of weapons, and six neutral images (plants). Target words also represented three categories: aggression-related words, neutral words, and nonword letter strings (15 in each category).¹ On each trial, a prime image was presented for 300 ms, followed by a 200-ms interstimulus interval prior to the onset of a target word. The task was to indicate by pressing a key whether or not the letter string was a legitimate English word. The letter string remained on the screen until the participant responded, or for 3 s. An intertrial interval of 3 s followed the offset of the letter string. Each target word was paired once with an instance of each prime type (in a random order), for a total of 135 trials; each target type appeared on one third of the trials.

Procedure

Upon arrival at the lab, and after they read and signed an informed-consent form, participants were told that the purpose of the experiment was to measure the speed of language comprehension in the presence of distracting information, and that a series of pictures would be used as distractors. The lexical decision task was then explained by the experimenter and completed by the participants. At the conclusion of the task, participants were briefly interviewed to check for suspicion (none was revealed), and then were debriefed and dismissed.

Results and Discussion

Trials on which response times (RTs) exceeded 1,500 ms were excluded from all analyses (less than 4% of all values). The data from the remaining correct-response trials were subjected to a log transformation in order to reduce positive skew in the distribution (see Fazio, 1990). These logged RTs were then analyzed using a 3 (prime type: alcohol-related, weapon, neutral) \times 2 (target word type: aggression-related, neutral) repeated measures analysis of variance (ANOVA).²

¹The stimulus words may be obtained from the first author. Aggression-related and neutral words were roughly matched for number of syllables ($M_s = 1.55$ and 1.80, respectively), though frequency of usage in the English language was somewhat higher for neutral words ($M = 64.0$ per thousand) than aggression-related words ($M = 36.5$ per thousand).

²Latencies to nonwords were not included in the analysis because they were considerably longer than those to actual words ($M_s = 649, 646,$ and 644 ms in the alcohol-, weapon-, and plant-prime conditions, respectively) and would therefore have produced a spuriously large effect of word type. An ancillary analysis indicated that response latencies to nonwords were unaffected by prime type.

Mean RTs for aggression-related and neutral words as a function of type of prime are presented in Table 1. The predicted Prime Type \times Target Type interaction was significant, $F(2, 240) = 8.24, p < .0004$ (Greenhouse-Geisser adjusted), $\epsilon = .96$. Planned simple-effect tests comparing RTs to aggression-related and neutral words within each prime condition indicated that responses were faster to aggression-related than to neutral words on weapon-prime trials, $t(120) = 4.22, p < .001, d = 0.58$, and on alcohol-prime trials, $t(120) = 2.19, p < .05, d = 0.29$. In contrast, responses were somewhat faster to neutral words than to aggression-related words following neutral primes, $t(120) = -1.87, p = .06, d = 0.23$, though this difference is irrelevant to our primary predictions. The ANOVA also showed a significant main effect of target type, $F(1, 120) = 5.78, p < .05, d = 0.31$, indicating that participants responded more quickly overall to aggression-related words ($M = 553$ ms) than to neutral words ($M = 558$ ms). Error rates also were examined by subjecting the arcsine of the square root of the percentage correct in each condition to a repeated measures ANOVA. Participants were slightly less accurate in identifying aggression-related words ($M = 96.4\%$) compared with neutral words ($M = 97.2\%$), $F(1, 120) = 6.55, p < .05$. However, accuracy did not differ according to prime type ($F < 1$), and the interaction of prime type and target type also was not significant ($F < 1$), so the pattern of latencies in Table 1 cannot be attributed simply to a speed-accuracy trade-off.

These results support the hypothesis that alcohol and aggression-related concepts can become linked in semantic memory, as are weapons and aggression-related concepts (e.g., Anderson et al., 1998; Bartholow et al., 2005). Specifically, the pattern of recognition latencies for aggression-related words obtained here replicates that reported by Anderson et al. (1998) for weapon primes, and shows a similar effect with alcohol primes. Most important, the current findings suggest that alcohol-related cues might facilitate aggressive responses, through increased accessibility of aggressive thoughts (see Anderson & Bushman, 2002), in the absence of either actual or expected alcohol consumption.

Nevertheless, the implications of this finding for models of alcohol-related aggression are unclear unless exposure to

alcohol-related cues also increases hostility. Therefore, we conducted a second experiment to investigate whether the presence of alcohol-related cues can alter social perceptions associated with aggression. An important prediction derived from theories of aggression (e.g., Anderson & Bushman, 2002; Huesmann, 1998) is that once aggressive thoughts become activated in memory, other people's ambiguously hostile behaviors tend to be interpreted as hostile (Bushman & Anderson, 2002). To the extent that alcohol-related cues increase the accessibility of aggressive thoughts, as indicated by Experiment 1, a hostile perception bias may occur in the presence of such cues.

Moreover, to the extent that the alcohol priming effect is due to memory associations between alcohol and aggression, this effect should be largest among individuals who most strongly associate alcohol and aggression. Recent theories of alcohol use have posited a major role for memory processes in drinking-related outcomes (e.g., Goldman, 1999). Specifically, research shows that alcohol-related outcome expectancies—generalized beliefs (thought to be stored in long-term memory; e.g., see Stacy, Widaman, & Marlatt, 1990) concerning the positive and negative effects of drinking alcohol—are important determinants of both concurrent and future alcohol use (e.g., Bartholow, Sher, & Strathman, 2000; Sher, Wood, Wood, & Raskin, 1996). Such beliefs concerning the effects of alcohol pervade American society and are not necessarily based on direct experience; elementary-school children with no personal drinking histories hold alcohol outcome expectancies (e.g., Dunn & Goldman, 1998; Lang & Stritzke, 1993; Miller, Smith, & Goldman, 1990). In a related vein, Friedman, McCarthy, Förster, and Denzler (2005) recently showed that young men primed with alcohol-related words rated a series of young women as more sexually attractive, compared with participants who were primed with neutral words, and that this effect was dependent on participants' levels of sex-related alcohol expectancies. If alcohol-related cues elicit a hostile perception bias, and if this effect is due to associations drawn from beliefs about alcohol, individuals with the strongest aggression-related alcohol outcome expectancies should show the most hostile perception bias when exposed to alcohol-related cues.

TABLE 1

Mean Reaction Times (in Milliseconds) to Aggression-Related and Neutral Words as a Function of Prime Type in Experiment 1

Prime type	Target type			
	Aggression-related words		Neutral words	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Alcohol	551 _a	81	562 _b	89
Weapon	549 _a	79	562 _b	86
Plant	559 _a	87	552 _a	86

Note. $N = 121$. For ease of interpretation, the table presents raw response latencies; logged latencies were used in data analyses. Within each row, means that do not share a subscript differ at $p < .05$ or less; latencies for aggression-related and neutral words in the plant-prime condition differ at $p = .06$.

EXPERIMENT 2

Method

Participants

Sixty-one male and 64 female undergraduate students (mean age = 19.2) participated in partial fulfillment of course requirements; roughly 80% were Caucasian.

Materials and Measures

Alcohol Outcome Expectancies. Fromme, Stroot, and Kaplan (1993) developed the Comprehensive Effects of Alcohol scale (CEOA) as a measure of beliefs concerning the effects of

drinking alcohol. The measure consists of two parts. In Part A, participants list the extent to which they believe that they would experience particular outcomes while under the influence of alcohol, using a 4-point scale ranging from *disagree* to *agree*. In Part B, participants evaluate each of the effects of alcohol to which they responded in Part A, using a 5-point scale ranging from *bad* to *good*. The original version of the scale consists of 38 items, associated with four positive and three negative expectancy subscales. We used a brief version of the CEOA, consisting of 15 items associated with six subscales: aggression-risk (5 items—e.g., “I would be aggressive”; $\alpha = .80$), impairment (2 items—e.g., “I would be dizzy”; $\alpha = .70$), sex (2 items—e.g., “I would enjoy sex more”; $\alpha = .79$), sociability (2 items—e.g., “It would be easier to talk to people”; $\alpha = .82$), tension reduction (2 items—e.g., “I would feel calm”; $\alpha = .60$), and self-perception (2 items—e.g., “I would feel moody”; $\alpha = .48$).³

Alcohol Use and Problems. A combined measure of quantity and frequency of alcohol use was calculated by multiplying participants’ estimates of how often they had consumed alcohol each week over the past 3 months by the average number of drinks consumed per occasion. Alcohol problems were assessed by items asking participants whether they had been arrested for driving under the influence and whether they had been hospitalized or received treatment because of alcohol use. A separate index of aggression-related alcohol problems was calculated from two items asking participants whether or not they had ever been in a physical fight while drinking or inflicted serious injury on other people as a result of drinking.

Priming Stimuli. Alcohol-related print advertisements (e.g., Budweiser[®] beer, Grey Goose[®] vodka) and neutral print advertisements (e.g., Bounty[®] paper towels, Kraft[®] cheese) were taken from popular magazines. We took care to ensure that none of the ads contained aggressive content and that the ads were as similar as possible across conditions except for the products advertised. Each participant viewed a total of six ads of one type, depending on condition. Participants were asked to rate the ads using global favorability scales; examination of these ratings confirmed that the alcohol-related and neutral ads were viewed quite similarly.

Person Perception Task. The “Donald” paragraph, first developed by Srull and Wyer (1979), consists of 12 sentences that portray a main character, Donald, engaging in a series of ambiguously hostile behaviors (e.g., refusing to pay rent until his apartment is repainted). Participants were asked to read the paragraph and make a series of evaluative judgments about Donald, using 11-point Likert-type scales anchored at 0 (*not at all*) and 10 (*extremely*). They rated Donald on six positive traits

(*dependable, kind, interesting, considerate, intelligent, and thoughtful*) and six negative traits (*boring, hostile, narrow-minded, unfriendly, selfish, and dislikable*). Given that our main interest was in hostility ratings, we examined those ratings separately and averaged ratings on the other trait dimensions into global positive and negative scales, respectively ($\alpha = .95$ for positive and $.89$ for negative). Inspection of the correlation structure indicated that ratings on the *boring* dimension did not correlate well with the other negative ratings; ratings for *boring* were therefore excluded from the negative ratings scale.

Procedure

Participants were randomly assigned to either the neutral- or the alcohol-prime condition before arrival at the laboratory and participated in individual sessions. Upon arrival, they completed an informed-consent form, alcohol-outcome-expectancy and alcohol-use questionnaires, and filler items. Participants were informed that our interest was in how advertisements in various formats (i.e., magazine and Internet) are rated and that they had been randomly assigned to see the magazine ads.

After finishing the advertisement ratings, the participants were asked by the experimenter to provide some pilot data for an unrelated experiment on impression formation. After verbally consenting, participants were asked to read “a short paragraph about two friends” and to form a mental impression of Donald. Once participants had finished reading the paragraph, they were asked to rate Donald on the dimensions noted previously. The study then ended.

Results and Discussion

Bivariate Associations

Prior to the main analyses, we first examined simple correlations among alcohol variables, expectancy subscale scores, and ratings of Donald’s traits. Interestingly, although alcohol use was not significantly correlated with alcohol-related problems generally ($r = -.04, p > .10$), alcohol use was positively associated with aggression-related alcohol problems ($r = .37, p < .001$). Also, alcohol use and aggression-related alcohol problems were both positively associated with ratings of Donald’s hostility ($r_s = .21, p_s < .05$), but not with ratings of Donald’s overall positive or negative traits ($r_s = .07-.15, p_s > .10$), suggesting the possibility that alcohol use may have a specific influence on perceptions of hostility. Higher scores on the aggression expectancy subscale were associated with more aggression-related alcohol problems, $r = .21, p < .05$.

Regression Analyses Predicting Trait Ratings

Analyses of trait ratings were carried out using a series of hierarchical multiple regression models. All continuous predictor variables were centered at the mean prior to analyses (Aiken & West, 1991). We predicted that participants in the alcohol-prime condition would rate Donald as more hostile than participants in

³Because of the low alpha coefficients associated with the tension-reduction and self-perception subscales, scores on these subscales were not included in any of the analyses reported here.

the neutral-prime condition, and that this effect would be moderated by scores on the CEOA aggression subscale. We also examined the influence of condition on ratings of Donald's overall positive and negative traits, and whether other CEOA subscales moderated the effect of condition on all trait ratings.

In each analysis, main effects (prime condition, CEOA subscale) were entered on Step 1 (alcohol = 0; neutral = 1), and their interaction was entered on Step 2. Participants' sex was included in each of these analyses initially; as no main effects of or interactions with sex were found, this variable was excluded from the final models presented here. Standardized coefficients associated with these analyses are presented in Table 2.

As shown in Table 2, the model predicting hostility ratings from prime condition and aggression-related expectancy scores revealed a main effect of prime condition, indicating that participants in the alcohol-prime condition rated Donald as more hostile ($M = 7.94, SD = 1.23$) than did participants in the neutral-prime condition ($M = 6.95, SD = 1.79$), and a main effect of aggression-related expectancy scores, indicating that participants with higher CEOA aggression scores rated Donald as more hostile than those with lower scores. More pertinent to

our hypotheses, these main effects were qualified by a significant interaction (see Fig. 1). The interaction was probed across values of the moderator variable (i.e., aggressive alcohol expectancies: $-1 SD, M, +1 SD$) according to techniques laid out by Preacher, Curran, and Bauer (2003; see also Aiken & West, 1991). The analysis showed that whereas participants with high and moderate aggression-related expectancies rated Donald more hostile in the alcohol-prime condition than in the neutral-prime condition, $t(123) = -4.10, p < .001$, and $t(123) = -3.94, p < .001$, respectively, individuals with low aggression-related expectancies rated Donald relatively low in hostility regardless of prime condition, $t(123) = -1.02, p = .31$.

We also conducted ancillary regression analyses in which alcohol use and aggression-related alcohol problems were entered as covariates. Neither of these variables changed the nature of the interaction, indicating that the joint effects of alcohol priming and aggression-related expectancies on hostility ratings are not an artifact of drinking levels or history of aggressive problems. We also tested a model in which quantity-frequency of alcohol use was entered as a predictor along with the condition variable and their interaction. This model produced a significant

TABLE 2
Regression Analyses Predicting Trait Ratings From Prime Condition and Expectancy Subscales in Experiment 2

Predictor	Trait rating					
	Hostility		Negative traits		Positive traits	
	Adj. R^2	β	Adj. R^2	β	Adj. R^2	β
Aggression subscale						
Step 1	.13**		.05*		-.006	
Condition		-.33**		-.21*		.09
Expectancy		.22**		.16		-.05
Step 2	.03*		-.01		-.002	
Condition \times Expectancy		-.25*		-.01		-.15
Sex subscale						
Step 1	.11**		.06**		.001	
Condition		-.30**		-.19*		.09
Expectancy		.18*		.18*		.10
Step 2	.02		-.01		-.008	
Condition \times Expectancy		-.18		.05		-.01
Impairment subscale						
Step 1	.08**		.02		.00	
Condition		-.31**		-.20*		.08
Expectancy		.03		-.02		.09
Step 2	.00		-.005		.00	
Condition \times Expectancy		-.13		-.08		-.16
Sociability subscale						
Step 1	.14**		.05*		-.01	
Condition		-.36**		-.23*		.08
Expectancy		.25**		.16		.03
Step 2	.00		-.01		.00	
Condition \times Expectancy		.12		-.07		.07

Note. In Step 1, Adj. R^2 is the adjusted R^2 value for the model. In Step 2, Adj. R^2 is the change in adjusted R^2 associated with adding the interaction term.
* $p < .05$. ** $p < .01$.

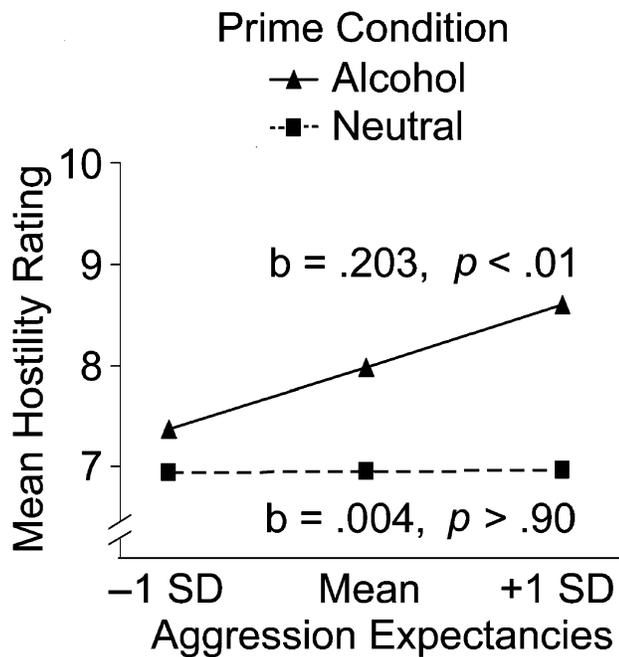


Fig. 1. Hostility rating as a function of prime condition and aggression-related alcohol outcome expectancies in Experiment 2. Unstandardized regression coefficients (*bs*) represent the slopes of the regression lines for the alcohol-prime condition and neutral-prime condition.

main effect of quantity-frequency on hostility ratings, $\beta = .23$, $p < .01$, but the interaction with prime condition was not significant, $\beta = .03$, $p > .80$.

To the extent that alcohol-related primes activate constructs associated with aggression, only hostility ratings should have been significantly influenced by the interaction between prime condition and aggression-related expectancies. As shown in Table 2, neither the main effect of aggression-related expectancies nor the interaction with condition significantly predicted Donald's other (positive and negative) traits. Moreover, scores on other CEOA subscales did not significantly moderate the main effect of condition on hostility ratings, suggesting that those ratings depended on the specific memory association between alcohol and aggression-related concepts.

These findings provide further support for the notion that alcohol can significantly influence aggression-related outcomes in the absence of alcohol or placebo consumption. Specifically, exposure to print advertisements for alcohol appears to have activated knowledge structures associating alcohol and aggression, which resulted in higher ratings of the hostility of ambiguous behaviors. Moreover, individuals whose aggression-related alcohol expectancies were strongest showed significantly more hostile perception bias when primed with alcohol-related images than did individuals whose aggression-related alcohol expectancies were weaker. This finding suggests that memory links known to facilitate alcohol use (e.g., Goldman, 1999) also influence other behaviors associated with drinking, such as aggressiveness. That sex and sociability expectancies

also predicted hostility ratings (see Table 2), although unpredicted, likely reflects some overlap in these constructs as measured by the CEOA.

GENERAL DISCUSSION

Alcohol and aggression have been linked in popular culture for decades (Critchlow, 1986). Although the expected and psychopharmacological properties of alcohol are known to increase aggressive responses following consumption (see Giancola, 2000), and alcohol consumption may produce classically conditioned physiological arousal that then increases aggression (Graham, 2004; but see Hoaken, Campbell, Stewart, & Pihl, 2003), the current experiments indicate that automatic associations in long-term memory provide another route by which alcohol may produce aggression (also see Lange, 2002). The current findings have implications for aggressive behavior that occurs in venues where alcohol is served (e.g., parties, bars), suggesting that patrons could be at risk for experiencing aggression even if they do not drink. To the extent that alcohol-related images are present and increase the accessibility of aggressive thoughts (and aggressive interpretations of behavior), the likelihood of aggressive behavioral responses is increased (Anderson & Bushman, 2002; Huesmann, 1998).

The current findings also have implications for issues pertaining to media content and social learning. The research literature strongly suggests that children and young adults learn a great deal about alcohol expectancies, as well as normal consumption patterns, via the mass media (e.g., Connolly, Casswell, Zhang, & Silva, 1994; Grube & Wallack, 1994). Our results suggest that the media's portrayal of alcohol as a disinhibitor could unintentionally increase aggressive tendencies among media consumers.

LIMITATIONS AND FUTURE DIRECTIONS

These experiments provide evidence that the semantic association between alcohol and aggression is automatically activated upon exposure to alcohol-related images, and that activation of this link has consequences for social perception. Whether this automatic activation translates directly into increased aggressive behavior, however, has yet to be demonstrated. Experiments designed to test this assumption currently are ongoing in our laboratory.

The design of this research was limited in some respects. For example, although our participants did not express any suspicion concerning the link between the questionnaire measures and the experimental task, assessment of alcohol-related expectancies and alcohol involvement at the beginning of the session in Experiment 2 was less than optimal. Ideally, researchers would want to measure alcohol expectancies and alcohol use and problems on a separate occasion. Also, the current data did not permit examination of how life experiences con-

tribute to the formation of aggression-related expectancies (Grube & Wallack, 1994). Interestingly, some research suggests that although people expect alcohol to increase their risky and aggressive behavior, their subjective intoxicated experiences are inconsistent with this expectation (Wall, Thrussell, & Lalonde, 2003). This research suggests that aggression-related expectancies develop primarily from indirect sources. In the future, researchers should consider ways to examine potential links between life experience, development of aggression-related expectancies, and aggressive behavioral outcomes in the presence of alcohol cues.

In conclusion, these and similar experiments (Friedman et al., 2005) demonstrate that the mere presence of alcohol-related cues in the environment has implications for social behavior that often is attributed to intoxication. Models of intoxicated behavior would therefore benefit from consideration of such findings, including those involving the influence of specific alcohol expectancies, when predicting specific behavioral outcomes.

Acknowledgments—We wish to thank Denis McCarthy for helpful comments on a previous version of this article.

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(RECEIVED 11/17/04; REVISION ACCEPTED 3/7/05;
FINAL MATERIALS RECEIVED 3/10/05)