

Alcohol Myopia Revisited: Clarifying Aggression and Other Acts of Disinhibition Through a Distorted Lens

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Abstract

The alcohol myopia model (AMM; Steele & Josephs, 1990) is reviewed in light of its unique ability to account for a variety of alcohol and nonalcohol-related disinhibited behaviors, particularly aggression. The AMM posits that alcohol has a narrowing, or a “myopic,” effect on one’s ability to attend to competing instigatory and inhibitory cues. Disinhibited behavior is presumed to occur when attention is directed toward salient provocative or instigatory cues rather than inhibitory cues. AMM research is reviewed with regard to stress and anxiety, risky sexual behavior, drinking and driving, suicide, disinhibited eating, smoking, and alcohol-related aggression. The AMM is also expanded by proposing five key mechanisms (i.e., negative affect, angry affect, hostile cognitive rumination, self-awareness, and empathy) that are likely to explain how the model is specifically involved in the alcohol-aggression relation. Finally, a number of public health interventions, extrapolated from the AMM, are proposed to stimulate future research directed at reducing the prevalence of alcohol-related violence.

Keywords

alcohol, aggression, alcohol myopia model

When the wine goes in, strange things come out.

—Johann Christoph Friedrich von Schiller,
The Piccolomini, 1799

The notion that alcohol intoxication impairs behavioral inhibition, and, by extension, facilitates aggressive behavior, is well engrained in both the scientific literature and popular culture. Impaired inhibitory control, also referred to as *disinhibition*, can be described as a lack of cognitive and/or behavioral restraint that can result in a number of maladaptive behaviors. In the laboratory, alcohol has been shown to impair performance on a vast number of cognitive and behavioral tasks that measure inhibitory control (Fillmore, 2003; Lyvers, 2000). Although such findings are quite benign in the safe confines of a laboratory setting, they are harbingers of numerous devastating outcomes. When viewed on the stages of interpersonal relationships and public health concerns, these laboratory findings realize their full potential in a multitude of forms including, but not limited to, homicide due to alcohol-related violence (Jones-Webb et al., 2008; Pridemore, 2004), AIDS

due to alcohol-related risky sexual practices (Barta et al., 2008; Hendershot & George, 2007), and fatalities due to driving under the influence of alcohol (Centers for Disease Control and Prevention, 2005; National Highway Traffic Safety Administration, 2008). The impairing effects of alcohol on behavioral inhibition also have economic ramifications. Given that the main focus of this article is the alcohol-aggression relation, it is staggering to realize that the association between alcohol and crime in the United States alone brings with it costs that have been estimated to exceed \$205 billion, with 85% of these costs attributable to violent crime and with alcohol being responsible for more than double the costs of all other drugs combined (T.R. Miller, Levy, Cohen, & Cox, 2006). Research has also determined that

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alcohol's acute effects, rather than its chronic effects, have the greatest impact on violent behavior (e.g., Fals-Stewart, 2003; Murphy, Winters, O'Farrell, Fals-Stewart, & Murphy, 2005).

Although the association between alcohol intoxication and behavioral disinhibition seems obvious, so too is the fact that alcohol does not cause inappropriate dyscontrolled behavior in all people. We are all aware of alcohol's "Jekyll and Hyde" effect in which people who are typically well tempered when sober sometimes transform into violent barbarians when intoxicated. Alternatively, we are also aware of people who simply become more talkative, friendly, and flirtations when equally intoxicated. These conflicting popular accounts help explain why meta-analytic studies have only found a medium effect size ($d = .47$ to $.61$) for the alcohol-aggression relation (Bushman, 1993; Bushman & Cooper, 1990; Ito, Miller, & Pollock, 1996). That is, by not taking into account key moderating factors, this effect size conceals alcohol's true effect on aggressive behavior.

Accordingly, given the range of reactions people experience when intoxicated, it has been hypothesized that alcohol only facilitates aggression for those who are already at risk for such behavior (Collins, 1988; Fishbein, 2003). Specifically, individual difference variables that have been shown to heighten the risk for alcohol-related aggression include dispositional aggressivity (Smucker-Barnwell, Borders, & Earleywine, 2006), irritability (Giancola, 2002), trait anger (Parrott & Zeichner, 2002), hostile rumination (Borders, Smucker-Barnwell, & Earleywine, 2007), hostility, permissive beliefs about aggression (Leonard & Senchak, 1993), deviant attitudes (Zhang, Wiczorek, & Welte, 1997), sensation seeking (Cheong & Nagoshi, 1999), a desired image of power (Quigley, Corbett, & Tedeschi, 2002), as well as low levels of anger control (Parrott & Giancola, 2004), self-awareness (Bailey, Leonard, Cranston, & Taylor, 1983), socialization, self-control (Boyatzis, 1975), dispositional empathy (Giancola, 2003), intelligence (Welte & Wiczorek, 1999), and executive cognitive functioning (Giancola, 2004b). Moreover, alcohol has been found to potentiate aggression for persons who have a difficult temperament (Giancola, 2004a), beliefs that alcohol causes aggression (Dermen & George, 1989; Smucker-Barnwell et al., 2006), and/or high marital conflict (Quigley & Leonard, 1999) and dissatisfaction (Leonard & Senchak, 1993).

Knowing who is most at risk for transforming from Jekyll to Hyde under the influence of alcohol is obviously important. However, it is just as important to understand how alcohol transforms at risk people into aggressive beasts. As such, the purpose of this article is to discuss the application of a well-known model of alcohol's effects on behavior, the alcohol myopia model (AMM; Steele & Josephs, 1990), to the explanation of alcohol-related aggression. Our main objectives are to review empirical data showing how the AMM has been invoked to explain a variety of disinhibited behaviors, present some recent data testing the AMM with respect to alcohol-related aggression, expand the AMM to better explain the alcohol-aggression relation, and discuss some public health

interventions based on the AMM that can be invoked to help prevent intoxicated aggression.

The AMM

The AMM is a general model of the effects of alcohol on behavior as well as being one of the best accepted theories in this regard (Steele & Josephs, 1990). The model postulates that acute alcohol consumption impairs controlled effortful cognitive processing; in other words, abilities that are heavily dependent on good attentional capacity. This alcohol-induced impairment creates a narrowing effect on attention, also known as an "alcohol myopia," that restricts the range of internal and external cues that can be perceived and processed. As a result, remaining attentional resources are allocated to only the most salient, easy-to-process, immediate, and thus attention-grabbing cues in the environment. In hostile situations, alcohol presumably facilitates aggression by narrowing attention onto salient and immediate provocative cues (e.g., the urge to retaliate against a real or imagined slight), rather than less salient and less immediate nonprovocative cues (e.g., the subsequent consequences of such retaliation). As a consequence of this alcohol myopia, the full meaning of less salient, less immediate, nonprovocative, and possibly inhibitory cues is never fully processed, or possibly even perceived, thus increasing the probability of an aggressive reaction.

Prior to the publication of the AMM, Pernanen (1976) briefly alluded to minor aspects of the model in a large monograph directed solely on alcohol and aggression. Later, Taylor and Leonard (1983) postulated that aggressive behavior is determined by the relative balance of a combination of both instigative and inhibitory cues present in hostile interpersonal situations. They reasoned that the cognitive disruption produced by alcohol reduces the number of information sources that one can attend to in any given situation. Inasmuch as alcohol reduces the amount of information or number of cues to which one can attend, intoxicated individuals will respond only to the most salient and immediate cues in a situation. Therefore, aggressive behavior is most likely to occur in a context in which instigative cues are paramount as opposed to a situation dominated by inhibitory cues. Clearly, there is much in common between Taylor and Leonard's (1983) model and the AMM (Steele & Josephs, 1990).

That said, there are two key differences between the above-mentioned models that are especially pertinent to this article. Taylor and Leonard (1983) aimed their model at explaining solely alcohol-related aggression, whereas the AMM was presented as a more general theory of alcohol's effect on behavior. Another key difference is that the AMM makes the counterintuitive prediction that alcohol consumption can decrease aggression, even below levels observed in sober individuals. In a situation in which nonprovocative cues are most salient, the alcohol myopia effect will focus one's remaining attentional resources on those cues, thus leaving little or no space in working memory to allocate to less salient provocative cues. In such a scenario, alcohol will suppress aggression even below

that exhibited by a sober individual. This prediction was confirmed by Giancola and Corman (2007) in two separate studies.

The reasoning behind this counterintuitive prediction is that attentional capacity is unimpaired in sober persons. As such, they have sufficient attention to simultaneously allocate to both salient inhibitory cues as well as less salient provocative cues. Theoretically, the result will be a more aggressive response than that seen in their intoxicated counterparts who due to their myopic attentional capacity can only attend to the more salient and attention-grabbing inhibitory cues. In the end, the “take home” message of the AMM is simply that alcohol will direct behavior in accordance with the most salient, immediate cues in one’s environment whether they are aggressive (Steele & Southwick, 1985) or altruistic in nature (Steele, Critchlow, & Liu, 1985).

As noted above, the AMM is by all accounts a general model of the effects of alcohol on behavior. It has even been applied to disinhibitory behaviors that do not involve alcohol. Accordingly, prior to launching into a discussion of how the AMM pertains to alcohol-related aggression, we first provide an illustration of its generality by reviewing its application to disinhibited behaviors other than aggression that do and do not involve alcohol.

The AMM and Disinhibited Behaviors

Alcohol’s Effects on Stress and Anxiety

One might wonder how stress and anxiety fall under the rubric of disinhibited behaviors given that they are typically associated with internalizing symptoms that are characterized by “holding things in,” rather than being unable to restrain inappropriate thoughts and behavior. However, anxiety can also be viewed as a manifestation of poor inhibitory control in the sense that one might have difficulty cognitively and/or behaviorally regulating maladaptive reactions to stressful events.

Steele and Josephs (1988) conducted two studies in which subjects were given an alcohol or placebo beverage and were warned about an upcoming stressor. They were told that they would have to give a speech on what they disliked about their physical appearance and that the speech was going to be evaluated on a number of psychological dimensions. Following this, half of the subjects were distracted by having to rate art slides for 7 min and the other half were simply asked to sit and wait for 7 min. Alcohol significantly increased anxiety in persons who were not distracted by the art slides, suggesting that alcohol narrowed attention onto their worries, thus causing a “crying in one’s beer” effect. However, when subjects were distracted from their worries by rating the art slides, alcohol reversed this effect to the extent that anxiety was attenuated even below levels exhibited by the placebo group. Given that the alcohol myopia effect constricts attention to the most salient aspects of the situation, (i.e., rating art slides), there was presumably not enough space in working memory to attend to the worries of giving a stressful speech, resulting in lower anxiety levels in the intoxicated subjects in comparison with the

placebo subjects, who had ample attentional capacity to attend to the art slides and also worry about their upcoming speech.

Josephs and Steele (1990) conducted another two-study investigation to replicate and extend their findings. In these studies, they manipulated the difficulty of rating the art slides used in their previous investigation (Steele & Josephs, 1988). The rationale behind this manipulation was that varying the difficulty of the art-slide-distracter task would differentially tax attentional resources and determine the degree of anxiety subjects would experience. As expected, their results indicated that making the slide-rating procedure too easy did not reduce anxiety under alcohol as subjects still had sufficient cognitive resources to allocate to worrying about their speech. However, when the distracting slide-rating task was moderately, or highly, difficult, it had an equally strong effect on redirecting the inebriate’s attention away from the stressful speech, which had a profound effect on suppressing anxiety.

Alcohol and Risky Sex

When faced with highly sexually arousing cues, it has been suggested that alcohol intoxication causes common sense, as well as the intention to use condoms, to “go out the window” (MacDonald, Zanna, & Fong, 1996). According to the AMM, common sense tends to get lost in the frenzy of sexual desire because sexually aroused persons who are intoxicated focus their attention primarily on the highly salient arousing cues associated with having sex rather than the less salient inhibitory cues associated with such behavior (e.g., sexually transmitted infections, unwanted pregnancies).

This hypothesis was tested in a series of studies by MacDonald and colleagues (1996; reviewed below), who developed a video clip of an attractive male and female couple drinking alcohol and having fun in a university campus bar. The video clip showed them passionately kissing and consensually finding themselves in her apartment where they were faced with the dilemma of a mutual desire to have sex without access to a condom. The video clip was presented to sober and intoxicated college males who were asked to rate their intentions of having sex with the woman in the video and to provide justifications for these intentions. Consistent with predictions of the AMM, intoxicated subjects directed more attention to the salient sexually arousing cues in the video clip than those signaling the dangers of unprotected sex, as evidenced by greater intentions to have sex and providing more justifications to do so (MacDonald et al., 1996). These findings were then supported in a field experiment conducted in a bar where the same video was presented to patrons. Compared with sober patrons, the intoxicated individuals were more likely to endorse engaging in risky sexual practices and agreeing with unwise justifications to do so.

Follow-up laboratory studies from this same research team assessed the effects of alcohol and sexual arousal on engaging in risky sex (MacDonald, MacDonald, Zanna, & Fong, 2000). Intoxicated and sober college-aged males were shown the same video clip described above. Sexual arousal in response to the

video clip moderated the effects of alcohol use on sexual behavior. Intoxicated persons who were more sexually aroused by the video reported greater intentions, justifications, and attitudes toward engaging in risky sex than did intoxicated subjects who were less sexually aroused (MacDonald, MacDonald, et al., 2000). Responses from sober subjects, regardless of sexual arousal, were intermediate to those of intoxicated persons.

In an additional series of four studies, this same research team assessed the competing forces of sexually compelling and sexually inhibiting cues on alcohol's facilitative effect on risky sexual behavior (MacDonald, Fong, Zanna, & Martineau, 2000). Studies were carried out in laboratory and bar settings using a variety of cues that either encouraged or discouraged sexual behavior. Results demonstrated that cue type moderated the effects of alcohol use on risky sexual behavior. Intoxicated persons given compelling cues reported the greatest intentions toward engaging in risky sex compared with intoxicated subjects given inhibiting cues (MacDonald, Fong, et al., 2000). Responses from sober subjects, regardless of cue type, were intermediate to those of intoxicated persons. In other words, when given inhibiting cues, alcohol significantly reversed intentions toward risky sexual behavior (even below levels seen in sober subjects).

Drinking and Driving

According to the AMM, alcohol intoxication heightens the probability of driving because the potential driver is focused on the immediate rewards of driving (e.g., getting home quickly, not having to pay for a taxicab, not having to retrieve one's car the next day) and less on its punitive consequences (e.g., getting arrested, losing one's license, getting into an accident). According to the AMM, inhibitory cues that prohibit driving are less likely to be considered because they lack salience and immediacy, whereas instigatory cues that promote driving grab attention because they are salient (e.g., the car and car keys are in sight) and are easy to process (e.g., driving oneself seems much easier than competing options, such as taking a taxi and leaving one's car to be picked up at a later time). In other words, when the intoxicated myopic is presented with the competing options to drive or not, alcohol directs attention toward the more salient, immediate, and simpler options.

MacDonald, Zanna, and Fong (1995) conducted a three-study investigation that attempted to test these assumptions. Their first study consisted of college males who were asked to complete a questionnaire that assessed their attitudes toward drinking and driving while they were in a sober or an intoxicated state. The questions were phrased in a way that made the decision to drink and drive sound compelling or noncompelling. In their second study, college students were given the same attitude questionnaire and asked to call a predetermined telephone number when they were at a party or a bar where alcohol was consumed. Upon calling the telephone number, they provided answers to the questionnaire while they were either drunk or sober. The third study involved having experimenters approach sober or intoxicated bar patrons (who had

driven to the bar) and ask them to complete the same questionnaire.

Results from all three studies, including an unpublished investigation described in their article (MacDonald et al., 1995), found generally consistent results: When questions were phrased in a manner that compelled drinking and driving, intoxicated persons reported significantly less negative attitudes (Studies 1, 2, and 3), greater intentions to drink and drive (Study 2 and unpublished report), and fewer moral obligations against drinking and driving (Study 2). When questions were phrased in a manner that did not compel drinking and driving, responses from intoxicated subjects were generally in line with the more prudent responses provided by their sober counterparts.

Alcohol and Suicide

In a review of the literature on alcohol use and suicidal behavior, Hufford (2001) noted that even in the sober state, people seriously contemplating a suicide attempt experience a sense of "cognitive constriction," characterized by a narrowing of alternative solutions to their imminent state of distress. This inability to allocate attention to alternative solutions often leaves the person with two options: a) a miraculous resolution to their problem or b) death. This constriction effect occurs even in the absence of alcohol. Given that acute alcohol consumption has been implicated in increasing the risk for suicidal behavior (Bagge & Sher, 2008; R.E. Mann, Zalcman, Rush, Smart, & Rhodes, 2008), Hufford argues that the alcohol myopia effect reduces the likelihood that one will be able to divert attention away from his or her current proximal distress toward more distal, and perhaps more helpful, thoughts and behaviors. To our knowledge, the AMM has never been tested in relation to suicidality.

Disinhibited Eating

Dieters, especially chronic dieters, oftentimes succumb to unrestrained or disinhibited eating. T. Mann and Ward carried out a number of investigations in which the AMM was used to help explain such behavior. Their first two studies (Ward & Mann, 2000) examined the effects of cognitive demand (i.e., distraction) on eating behaviors in restrained eaters (i.e., chronic dieters). Subjects completed tasks that required either low or high cognitive demand in a room containing a variety of appetizing high-calorie foods. The authors' rationale was that restrained eaters would be under conflicting pressures to inhibit eating while desiring the appetizing foods that they typically deny themselves. In keeping with the AMM, the results of the experiments revealed that under high cognitive demand, restrained eaters consumed more food items than they did when under low cognitive demand. In other words, high cognitive demand narrowed attention, thus leading subjects to focus on the highly salient delicious foods, which, in turn, lead them to indulge. However, when cognitive capacity was not highly taxed, subjects were able to inhibit unwanted eating,

presumably because they had sufficient residual cognitive space with which to think about the negative consequences of eating the calorically empty foods (Ward & Mann, 2000).

Follow-up work assessed the effects of dietary information and cognitive demand on eating in chronic dieters (T. Mann & Ward, 2004). As part of a memory study, subjects were told that they would sample a milkshake and then be tested on their memory of the taste of the shake and their ability to hold and recall a number in memory. They were assigned to a diet-salient or a milkshake-salient condition. To create a state of inhibitory conflict, subjects assigned to the diet-salient condition were told that they would be sampling foods with a high fat content. They were also placed in a room with a scale, dieting books, and a highly visible high-calorie milkshake recipe (this latter aspect was presumably added to remind subjects about how consuming the milkshake would violate their diets). Subjects in the milkshake-salient condition were told that they too were in a taste memory study. They were placed in a room devoid of all the diet props used in the diet-salient condition. The only prominent cue in the room was the milkshake. The authors reasoned that the absence of the dieting props would make the milkshake cue more salient than thoughts of dieting.

Consistent with the ostensible study aim to assess the effects of taste on memory, the diet and milkshake conditions were crossed with a low or a high cognitive demand condition. The low and high demand conditions consisted of asking subjects to remember a 1- or 9-digit number while consuming their milkshakes. In the high cognitive-demand groups, subjects in the milkshake-salient condition consumed the most milkshake, whereas those in the diet-salient condition consumed the least. Subjects in the low cognitive-demand groups consumed amounts that were intermediate to these two extremes (presumably, they could attend to both restraining their consumption and to their desire for the milkshake).

Attesting to the explanatory power of the AMM, these studies suggest that cognitive demand can create a myopic effect on attention much like alcohol intoxication does. As predicted by the AMM, when attentional myopia was induced by cognitive demand, eating behavior was dictated by the most immediate and salient cues in the environment.

Smoking and Anxiety

Existing data are mixed as to whether smoking (nicotine) reduces subjective anxiety and stress (reviewed in Kassel, 1997). Kassel and Shiffman (1997) posited that these inconsistent findings might be due to an indirect effect of smoking on stress reduction and that the AMM might play a role in reconciling these data. Accordingly, Kassel and colleagues (Kassel & Shiffman, 1997; Kassel & Unrod, 2000) essentially replicated the exact methodology used in Steele and Josephs original studies (Josephs & Steele, 1990; Steele & Josephs, 1988; see above) while substituting cigarette smoking for alcohol consumption. Their results were similar to those observed by Steele and Josephs. Specifically, smoking only functioned to decrease anxiety when subjects were distracted from worrying

about the ostensible upcoming speech that they had to give about what they disliked about their physical appearance.

Another investigation that assessed the AMM in relation to smoking was conducted by Westling, Mann, and Ward (2006). In this two-study report, the authors assessed smoking while manipulating cognitive demand and the cues that encouraged or discouraged smoking. Consistent with predictions from the AMM, results from their first study indicated that subjects in the high cognitive-demand condition smoked significantly more cigarettes than did those in the low cognitive-demand condition while in the presence of cues that encouraged smoking (cues that discouraged smoking were not used in their first study). Cognitive demand is presumed to act like alcohol to narrow attention onto the most salient and immediate aspects of the situation (i.e., the cues that encouraged smoking). In their second study, cognitive demand was operationalized by having subjects memorize a small or a large set of numbers and letters. During that time, subjects were exposed to either smoking-promoting or smoking-inhibiting cues. As predicted by the AMM, subjects in the high cognitive-demand condition smoked less when exposed to smoking-inhibiting cues, yet they smoked more when exposed to smoking-promoting cues.

Alcohol and Aggression

The studies reviewed above show how the AMM might explain a broad array of intoxicated and nonintoxicated disinhibitory behaviors as disparate as sex, driving, eating, suicide, and smoking. Now we turn to a discussion of the AMM in relation to alcohol-related aggression. Although many researchers have invoked the AMM, in one form or another, to explain alcohol-related aggression (Abbey, 2002; Aviles, Earleywine, Pollock, Stratton, & Miller, 2005; Chermack & Taylor, 1995; George & Norris, 1991; Leonard, 2002; Murphy et al., 2005; Parnanen, 1976; Pihl & Peterson, 1995; Sayette, 1999; Taylor & Leonard, 1983; Testa, Livingston, & Collins, 2000), programmatic efforts aimed at testing the model directly are actually quite rare.

It is interesting to note that two studies provide support for the AMM-aggression link; however, they do not appear to have been designed as a priori tests of the model. The first of these studies measured aggression using a task in which subjects administered and received mild electric shocks to and from a fictitious opponent under the guise of a competitive reaction-time task. Aggression was operationalized as the intensity and duration of shock subjects delivered to their fictitious opponent. Subjects were given an alcoholic or placebo beverage and were randomly assigned to one of three experimental conditions. Those in the distraction group were required to solve arithmetic problems during the aggression task, those in the forced attention group had to focus their attention on the level of pain they expected their opponent to experience as well as the shock level they received, and those in the control group simply competed on the aggression task. The results indicated that alcohol produced the greatest levels of aggression in the forced attention group, the lowest levels (similar to the placebo

groups) in the distraction group, and intermediate levels in the control group (Zeichner, Pihl, Niaura, & Zacchia, 1982).

The next study used a similar task to assess the effects of explicit aggressive and nonaggressive cues on intoxicated aggression. Subjects were primed to behave aggressively or nonaggressively by overhearing their opponent state explicitly that he was going to administer the highest or lowest shock level allowed. In reality, subjects in both conditions always received the lowest shock level. Alcohol increased aggression when subjects overheard their opponent's explicit intention to behave aggressively despite the fact that both cues were always followed by the most mild shock responses. These data suggest that alcohol consumption narrowed subjects' attention to the initial aggressive verbal cues and away from subsequent nonaggressive behavioral cues. Subjects in the sober condition suppressed their aggression after presumably noticing that their opponent was delivering only the lowest intensity shocks (Leonard, 1989).

The findings from these studies are clearly consistent with the AMM. However, as noted above, there has been no programmatic effort aimed directly at testing the AMM as it relates to alcohol-related aggression. So, one of the aims of this article is to review data from three recent experiments from our laboratory that represent the beginning of a systematic research effort aimed at testing the consequences of AMM for alcohol-related aggression (Giancola & Corman, 2007, 2 studies; Phillips & Giancola, 2008).

Our investigations assessed aggression in a laboratory setting using a task similar to the one described above in the study by Zeichner et al. (1982). We tested the AMM by determining whether distraction from the provocative cues of the aggression task (i.e., receiving electric shocks) would decrease aggressive behavior. More specifically, while engaged in the aggression task on one computer screen, subjects in the distraction condition were simultaneously engaged in a computerized task that taxed working memory resources on an adjacent computer screen.

For the distraction task, subjects were asked to attend very carefully to a 3×3 matrix of $2 \text{ cm} \times 2 \text{ cm}$ black squares on a white computer screen. A particular number of these squares were illuminated in a different random sequential order for a given block of trials. Immediately after the trial block terminated, subjects had to use a computer mouse to click on the squares in the order in which they had been illuminated. The trial blocks were presented continuously, and subjects were engaged in this task for the duration of the aggression task. They were not given performance feedback during the task to avoid generating emotional reactions.

Giancola and Corman's (2007) first study revealed that alcohol suppressed aggression (even below levels exhibited by a placebo group) when subjects were distracted from the provocative cues of the aggression task by having to remember a four-light illumination sequence (see Fig. 1). Their second study was designed to ascertain the magnitude of task difficulty (i.e., cognitive work load) that resulted in the most suppression of aggression. Subjects were assigned to an alcohol or a placebo condition and were placed into one of five distraction

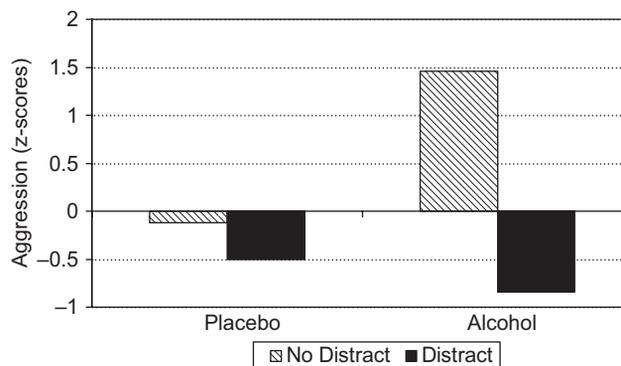


Fig. 1. The effects of alcohol and distraction on aggression. Figure reprinted with permission from Giancola and Corman (2007).

groups within each of these conditions that differed in difficulty. Difficulty of the distraction task was operationalized by varying the number of illuminated squares in the sequence: no illuminations (i.e., no distraction; D0), two illuminations (D2), four illuminations (D4, as in Study 1), six illuminations (D6), and eight illuminations (D8). As can be seen in Figure 2, subjects who received alcohol demonstrated a V-shaped aggression pattern in which Groups D0 and D8 exhibited the highest levels of aggression, Groups D2 and D6 demonstrated intermediate levels, and Group D4 showed the least amount of aggression (even lower than all five placebo groups). The placebo groups were not affected by the distraction manipulation (see Figs. 1 and 2).

These findings are generally consistent with predictions from the AMM. However, one might wonder why the difficult (D6 and D8) alcohol conditions increased aggression. We argue that when a person's attentional capacity is overtaxed, especially under alcohol, increased aggression might ensue due to stress, frustration, or even attentionally disengaging from the distracter task and focusing attention onto the more "simple" and provoking aggression task. Recent research in cognitive psychology supports our data by demonstrating that four is the maximum capacity of unrelated elements that can be correctly held in working memory (Cowan, 1999, 2000). Finally, adding even greater support to the notion that the AMM helps explain the alcohol-aggression relation is our finding that reaction times on the aggression task were slower during the distraction task and that they were significantly related to decreased aggression when subjects were intoxicated (Giancola & Corman, 2007). In essence, our data indicate that the distraction task was effective in directing attention away from the aggression task and, in turn, having an effect on suppressing aggression in intoxicated subjects. We then conducted a follow-up study in which an emotional distracter (an anxiety induction) was used in place of a cognitive distracter (Phillips & Giancola, 2008). Before drinks were consumed, subjects in the anxiety induction group were informed that upon completion of the aggression task they would be videotaped while giving a short speech on what they disliked about their bodies. During a 6-min waiting period, anxiety induction subjects were given time to

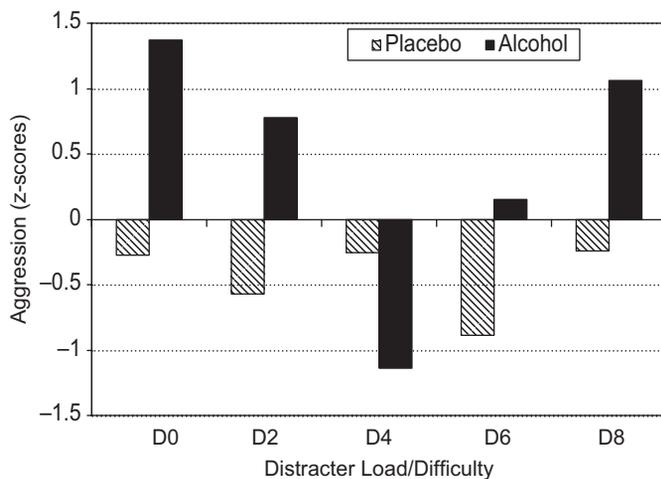


Fig. 2. The effects of alcohol and variations in cognitive load on aggression. Figure reprinted with permission from Giancola and Corman (2007).

mentally prepare for their speech. Subjects then completed the aggression task after consuming either an alcoholic or placebo beverage. Finally, the anxiety induction subjects were told that the video session would not take place due to supposed “equipment failure.” The results of the study were consistent with the AMM—the anxiety induction manipulation eliminated alcohol’s effect on aggression. Presumably, the worry elicited by the anxiety induction distracted subjects from the provocative cues of the aggression task that subsequently attenuated aggression.

Although alcohol was not administered, it is important to review the findings of a recent study demonstrating that, just like alcohol or increased cognitive demand, physiological arousal can also create a myopic effect on attention (Ward et al., 2008). Subjects were assigned to a low or a high physiological-arousal condition that was achieved via physical exercise. Aggression was then assessed using a laboratory task similar to the one used by Giancola and Corman (2007). However, during the aggression task, subjects were exposed to either aggression-promoting or aggression-inhibiting cues. The highest levels of aggression were observed in persons in the high arousal group who were exposed to aggression-promoting cues, whereas the lowest levels were observed in the high arousal group who were exposed to the aggression-inhibiting cues. Persons in the low arousal groups evinced levels of aggression that were intermediate to these two extremes. In other words, increased physiological arousal helped subjects to focus their attention onto the most salient aspects of their environment (i.e., aggression-promoting or aggression-inhibiting cues), which then had a profound effect on directing their behavior.

Finally, a recent study that examined alcohol’s effects on the acceptance of sexual aggression reported results that did not support the AMM (Noel, Maisto, Johnson, & Jackson, 2009). Sober and intoxicated men viewed a videotape of a young heterosexual couple in a scenario in which the woman enticed

the man into a sexual situation whereby the man acted on her cues to have sex; however, upon his attempt to engage in intercourse, she made it clear that she was not interested in going any further (at which time the video ended). In one version, the video had cues built into it that conveyed the inappropriateness of forced sex (e.g., feminist posters on the wall of her apartment, a book for a women’s studies course, and the emblem of a rape crisis center on the back of her T-shirt), whereas the other version did not have these cues. Results indicated that alcohol promoted the acceptability of sexual aggression regardless of the presence of the antiforce sex cues. These data are not in keeping with the AMM as the model would predict that the presence of antiforce sex cues would have suppressed the acceptability of the use of forced sex, particularly in the alcohol condition. Given that the preponderance of data supports the AMM, these contradictory findings are curious. For instance, relative to the aforementioned studies that included highly salient aggression-promoting cues (e.g., a provocateur verbally communicating an intent to harm the subject), the antiforce sex cues used by Noel and colleagues (2009) may not have been sufficiently salient to capture the subjects’ attention (a women’s studies book might not have been a highly salient antiforce cue; the emblem of the rape crisis center on the back of her T-shirt might have gone unnoticed, etc.). Nevertheless, further research is required to improve our understanding of the underlying mechanisms and viability of the AMM as an explanatory framework for alcohol-related aggression.

Hypothetical Mechanisms by Which Distraction Reduces Aggression

The research literature reviewed above provides compelling evidence in support of the AMM’s account of the alcohol-aggression relation. Simply put, distraction from provocation reduces aggression in intoxicated persons. However, there is a bit of a black-box feeling about this putative process. Scientists agree that distraction from provocation can redirect attention. But this seems overly simplistic. What is it that occurs during the process of distraction that leads to a reduction in aggression? In this section, we discuss five mechanisms that are hypothesized to account for the relation between distraction from provocation and aggressive behavior.

Negative Affect

Berkowitz (1990, 1993) proposed a cognitive neoassociationistic theory to explain, in part, the etiology of aggression. The theory maintains that aversive stimuli (e.g., provocation, irritation, pain) produce a state of negative affect that leads to aggression via an associative network of aggression-related thoughts, feelings, memories, expressive motor reactions, and physiological responses. Accordingly, distraction’s effect on attentional capacity might directly influence this associative network, reducing the ability of negative affect to activate the aggression-related network, thus attenuating the likelihood of

aggressive behavior. As such, distraction can reduce aggression by diverting attention away from one's negative affect.

Angry Affect

Related to Berkowitz's negative affect hypothesis is the idea that distraction from provocation reduces aggression by diverting attention away from *anger*, which can be conceptualized as an emotional state that can vary from mild annoyance to unfocused rage that lacks a specific goal (Berkowitz, 1993; Spielberger, Jacobs, Russell, & Crane, 1983). This definition differs from that of *aggression*, which is a goal-directed behavior motivated by the desire to injure another person (e.g., Baron & Richardson, 1994). Thus, a more specific prediction based on the above negative affect hypothesis is that distraction reduces aggression by diverting attention away from "emotionally hot" anger-provoking cues toward "cooler" nonprovocative cerebral matters. Thus, distraction from provocation can reduce aggression by diverting attention away from angry affect.

Hostile Cognitive Rumination

Hostile rumination involves perseverating on negative affect, expectations, and intentions associated with seeking revenge based on a perceived or a real provocation (Caprara, Paciello, Gerbino, & Cugini, 2007). Bushman and colleagues conducted several investigations designed to test this hypothesis (Bushman, 2002; Bushman, Bonacci, Pedersen, Vasquez, & Miller, 2005). In these experiments, subjects were provoked by a confederate and then placed in a condition where they were allowed to ruminate about the event or placed in a condition in which they were distracted from the provocation. Results indicated that ruminating about the provocative event increased aggression compared with being distracted from the event. Rusting and Nolen-Hoeksema (1998) conducted similar work in which angry affect was found to be significantly increased by rumination and decreased by distraction. In light of these results, people should be less able to ruminate when they are charged with an assignment that tasks their mental resources. Therefore, distraction might reduce aggression by decreasing the extent to which persons are able to ruminate about prior provocations.

Self-Awareness

Increased self-awareness has an attenuating effect on aggression (Berman, Bradley, Fanning, & McCloskey, 2009; Carver, 1975; Scheier, Fenigstein, & Buss, 1974). Self-awareness is a trait of internal reflection in which persons focus on their conception of themselves, including their thoughts, feelings, and values (Carver & Scheier, 1981; Duval & Wicklund, 1972). Theorists have argued that self-awareness increases self-control and reduces aggression because one's inclination to aggress is compared with personal norms and standards as to what action is desirable under the given circumstances, and

aggression is often judged to be "wrong" or otherwise undesirable (Carver & Scheier, 1981; Hull, 1981; T. Mann & Ward, 2007). Therefore, distraction from provocation can reduce aggression by allowing one's freed-up attention to be focused on preexisting self-relevant thoughts about appropriate social behavior.

Empathy

The construct of empathy contains both cognitive and affective components (Davis, 1983; P. Miller & Eisenberg, 1988). From a cognitive perspective, *empathy* has been defined as the ability to take another person's psychological point of view (Davis, 1983) and the ability to comprehend their situation, as well as their cognitive and affective status (Hoffman, 1984). From an affective perspective, empathy has been defined as an emotional reaction congruent with, but not identical to, another person's perceived welfare (Batson & Coke, 1981). Put very simply, by virtue of its inherent cognitive and affective components such as one's ability to take another's perspective and understand their misfortune or to simply have feelings of compassion, sympathy, and caring for the well-being of others, empathy has been found to be inversely related to aggression (reviewed in Bjorkqvist, Osterman, & Kaukiainen, 2000; P. Miller & Eisenberg, 1988). As with self-awareness, distraction from provocation can reduce aggression by allowing subjects' freed-up attention to be focused on preexisting empathetic thoughts and feelings toward their provocateur. In fact, Denson et al. (2008) hypothesized that alcohol might increase aggression within the context of the AMM via a reduction in the ability to empathize with a provocateur.

It is important to note that, with regard to self-awareness and empathy, we are not arguing that distraction will increase or activate these processes. Obviously, there are individual differences in these traits. It is our hypothesis that provocative cues will direct attention away from considering and acting on the cognitions and affect brought about by self-awareness and empathy in persons who already possess these traits. Thus, distraction from provocation will afford these individuals the capability to focus their freed-up attention onto preexisting response tendencies, and perhaps consider and act on them, to reduce aggression.

Can the AMM Inform About Prevention Interventions for Alcohol-Related Aggression?

In addition to its theoretical value, the AMM is well suited as an intervention in the prevention of alcohol-related aggression. The model calls for highly salient, frequent, and easy-to-process antiviolence cues that will redirect the inebriate's attention away from hostile provocative cues to more salient nonprovocative, or even inhibitory, cues in situations in which violence often accompanies alcohol intoxication (e.g., bars, sports venues, college campus parties). Using the AMM as a model for violence prevention requires distraction techniques

that must break the link between provocative cues and aggressive reactions. Presumably, distracters that are easier to process and are more engaging will more effectively reduce aggressive behavior. It is also important to note that one of the aims of this article is to expand upon the AMM in its original format (Steele & Josephs, 1990). As noted above, Steele and Josephs proposed that distraction from provocation reduces aggression. However, they did not indicate exactly how distraction is instrumental in suppressing aggression. As such, we proposed five mechanisms through which we believe that distraction may, in part, have its mitigating effect on aggression (i.e., reducing negative affect, anger, and hostile rumination, as well as increasing self-awareness and empathy among those high in self-awareness and empathy). As such, although all of the interventions described below are intended to break the link between provocative cues and a violent response via distraction, we attempt to highlight how they do so through one or more of the proposed mechanisms.

There are a variety of settings that might lend themselves to AMM-inspired interventions for alcohol-related aggression. In some cases, these would include public venues where alcohol-related violence often occurs. In cases of domestic violence, the home might be more suitable. For those persons willing to attend, or are mandated to attend psychotherapy sessions, a clinical setting might prove most appropriate. Given the nature of the AMM and its proposed underlying mechanisms, many of these intervention strategies will share some overlap; however, given the setting, they will be presented in different ways.

Prevention in Public Settings

A successful public health initiative against alcohol-related aggression should target settings where alcohol and violence most readily mix. A recent analysis of three U.S. National alcohol surveys found that bars are consistently a preferred drinking context and people who drink at bars are more likely to engage in arguments and fighting than those who drink the equivalent amount of alcohol at home (Nyaronga, Greenfield, & McDaniel, 2009). Consider a bar fight that is about to erupt; staff members, friends, or other trained personnel might intervene by escorting an intoxicated, provoked person outside or to a specially designated "cool-down" room where he or she can be distracted through any number of means. One technique would be to provide an assortment of relaxation tools in the room such as a massage chair, soft music playing in the background, and someone to guide the inebriate in deep-breathing exercises. It is interesting to note that a study of licensed drinking venues in two Australian cities found the "comfort level" of the establishment to be inversely related to nonphysical aggression (Homel, Carvolth, Hauritz, McIlwain, & Teague, 2004). Alternatively, a cool-down room could contain popular games or activities that are engaging, but not aggressive or arousing in content. Incentives to perform well on the games, such as the possibility of winning a no-cover-charge voucher, could be given to help distract the provoked individual.

Angered patrons might also be distracted from the provocative incident through the use of simple exercises designed to increase their level of mindfulness, which refers to intentionally attending to current experiences in a nonjudgmental and accepting manner (Kabat-Zinn, 2003). Mindfulness practices have a long history in a variety of world religions and were originally intended to reduce suffering and to improve awareness and insight, as well as compassion and empathy for others. If implemented correctly, mindfulness allows intoxicated individuals to refocus attention away from provocative cues toward more salient cues that encourage reflection upon personal standards (i.e., self-awareness) and empathetic feelings toward others. Although such techniques might seem complicated and effective only if administered by a mental health professional, there are many mindfulness techniques that are quite simple. For example, Heppner et al. (2008) employed an effective technique of reducing aggression by distracting individuals from provocation by focusing them on the very simple details of eating a raisin!

The interventions described above are designed to distract one's attention away from provocative cues. If effective, they would reduce negative affect, anger, and hostile rumination toward the provocateur. In some individuals, spare attentional space that was previously occupied by hostile thoughts and affect might be replaced by empathetic thoughts and feelings. However, as noted earlier, increased self-awareness has been found to be significantly involved in the attenuation of aggressive behavior. With this in mind, trained bar or nightclub staff can add to their catalog of distraction techniques the ability to initiate conversations with provoked intoxicated patrons that are aimed at increasing their self-awareness and self-monitoring skills. Specifically, Hull, Levenson, Young, and Sher (1983) suggested that inappropriate alcohol-related behaviors, including aggression, can be lowered by providing "... the individual with a cognitive repertoire of self-relevant encoding schemes to employ when he or she has been drinking" (e.g., "what is my behavior saying about the kind of person I am?" or "how would I react if someone were behaving this way toward me?") (p. 471).

Self-awareness can be further enhanced for intoxicated and belligerent patrons by scattering mirrors around the drinking establishment painted with prison-like vertical bars, not-so-subtly suggesting the consequences of alcohol and aggression. Above these mirrors could be a slogan that reads: "Drink, Fight, See Yourself Behind Bars." This particularly salient intervention (i.e., jail bars and slogan) can exploit the patron's alcohol myopia and hopefully focus his or her attention onto the possible negative consequences of aggression. These salient "jail mirrors" can also be placed in key locations throughout bars with the same slogan printed above them along with obvious video cameras mounted even further above (and out of reach) to draw intoxicated persons' limited attentional resources toward these objects so that the alcohol myopia effect can be used to make patrons even more self-aware of themselves and of proper standards of behavior.

The rationale behind the use of such mirrors comes from laboratory studies that have found that a momentary

manipulation designed to increase self-awareness by virtue of adding mirrors and video cameras to a room was effective in suppressing aggression toward others (Bailey et al., 1983) and toward one's self (Berman et al., 2009). The implication is that boosting self-awareness distracts the inebriate from the provocative situation because the person is forced to compare his or her initial impulse to aggress with personal and social norms that admonish such inappropriate behavior. Bolstering this research are other empirical findings showing that an effective means of increasing self-awareness is to place people in front of a mirror (Carver & Scheier, 1978; Silvia, 2002; Wicklund & Duval, 1971). Therefore, mounting mirrors and video cameras in bars and nightclubs, especially those establishments where alcohol-related aggression is most prevalent, would be an easy and effective means of providing patrons with a salient reminder of their self-concept.

Antiviolence messages designed to increase self-awareness in bars could be presented through a number of different mediums such as televisions (most bars and taverns have several televisions; some even have them above male urinals). Brief 15- to 30-s public service announcement broadcasts could be designed to depict the negative consequences of drinking and fighting. However, care should be taken to make such announcements both captivating and unambiguous in content to maximize the amount of cognitive resources people divert away from provocative stimuli. Messages without sound in a noisy environment might be optimal to increase ease of comprehension.

Antiviolence messages in bars and nightclubs need not be restricted to television broadcasts. In most bars, there is ample of room for signs or posters upon which to place slogans. One such slogan could be a simple five word phrase, such as "Drink, Fight, Go to Jail," that might be flashed on a screen at periodic intervals, echoing the state of Texas's highly successful anti-drunk-driving billboard campaign featuring the liberal use of large billboards with the words "Drink. Drive. Go to Jail." Even coasters, menus, server apparel, and drinking glasses could display such messages. On this latter point, large, graphic warnings could be placed on glasses that contain alcoholic beverages with content that includes the consequences of violent behavior while intoxicated. These manipulations might also be particularly effective in increasing self-awareness by highlighting the potential negative consequences of engaging in violent behavior.

A less subtle method to highlight self-awareness would be to implement a "fight alarm" in drinking establishments that is activated when a physical altercation erupts. This intervention could be as simple as turning on all the lights, stopping the music, and calling out over a loud speaker that a fight has broken out followed by a loud announcement that the police will now be called. In theory, these dramatic events, especially the police announcement, might distract the combatants, thus decreasing the chances of further violence by increasing self-awareness.

Although many of the above interventions apply to smaller drinking establishments, there are also larger venues where alcohol-related aggression can be a substantial problem.

Professional sports venues are a good example of this. Several of the above-mentioned interventions would be equally applicable on larger scales. An example of an AMM derived intervention specific to a sports venue would be the random and frequent interjection of the previously mentioned slogan, "Drink, Fight, Go to Jail," on a large screen or JumboTron. Additional methods of communicating these simple nonviolent messages might also prove useful. Vendors and other stadium workers who travel throughout the venue could wear T-shirts that have aggression-consequence slogans such as the one mentioned above. Large signs with similar messages could also be placed next to concession stands where alcohol is sold.

Prevention in Domestic Settings

Outside of public settings, the most likely location for alcohol-related intimate partner violence or child abuse is in the home (Leonard, Quigley, & Collins, 2002). AMM-informed prevention strategies could be adapted from those used in the public settings, although this approach presents several challenges, most notably the implausibility of displaying antiviolence cues (e.g., mirrors, video cameras, signs) throughout the home, as well as the lack of independent bystanders to help redirect the inebriate's attention toward nonprovoking or inhibitory cues. Thus, AMM-informed interventions designed for domestic settings may be most effective to the extent that they incorporate a two-part approach. First, individual, couple, or family therapy could be used to build an internal reservoir of aggression-reducing skills that would capitalize on our previously proposed mechanisms (i.e., decreasing negative affect, anger, and hostile rumination, as well as increasing self-awareness and empathy). Second, individualized plans could be developed that would employ physical cues of nonviolence as well as partners or other family members as agents of attentional redirection.

The psychotherapy literature is rich with evidenced-based interventions for individuals, couples, and families to modify hostile thoughts and regulate negative affect. Of particular relevance to the AMM, however, are therapeutic techniques such as acceptance and commitment therapy that have been shown to increase dispositional mindfulness (Hayes, Strosahl, & Wilson, 2003). As noted above, enhancing mindfulness should increase the likelihood that the intoxicated myopic can redirect his or her attention toward nonaggressive cues. A recent study found that heavy episodic drinking increased perpetration of sexual aggression toward one's partner among men with lower levels of dispositional mindfulness, but it did not do so among men with higher levels of mindfulness (Gallagher, Hudepohl, & Parrott, 2009). Consistent with the AMM, researchers reasoned that heavy episodic drinking did not increase sexual aggression in highly mindful men because they were better able to shift attentional focus away from sexually aggressive cues (e.g., desire to have sex) and toward nonaggressive cues (e.g., social proscriptions against aggression, resistance from one's partner to have sex).

Despite the acquisition of these skills, it will likely still be necessary to develop individualized methods to redirect the inebriate's attention toward nonaggressive cues in the home. To maximize the likelihood of implementation, these methods will need to be discreet but still sufficiently salient for the at-risk individual. For instance, one could wear a nondescript wristband that has personal meaning (i.e., a nonaggressive message) only to the person wearing it. Likewise, a decorative item in the house could also hold a symbolic nonaggressive meaning. Similar to the chips used in Alcoholics Anonymous to mark recovery goals, chips could be carried or worn to remind the person of his or her commitment to nonviolence. Finally, a therapist could work to develop cool-down statements that partners or family members could use in a conflict situation. Similar to the cool-down room in public settings, such statements would function to remind individuals to consider nonaggressive options or move to a different setting in the house where distraction is more likely.

Conclusions and Directions for Future Research

The preceding review demonstrates that the AMM is an influential theoretical framework that can account for a variety of alcohol- and non-alcohol-related disinhibited behaviors. We expanded the AMM by proposing five putative mechanisms (i.e., negative affect, angry affect, hostile cognitive rumination, self-awareness, and empathy) to explain how the model is specifically involved in the alcohol-aggression relation. Furthermore, a number of public health and domestic interventions extrapolated from the AMM were also proposed to stimulate future research directed at reducing the prevalence of alcohol-related violence. These interventions are not comprehensive by any means. However, they represent a useful starting point for the development and dissemination of easy to implement and cost-effective approaches that highlight distraction as the primary means of preventing violence by breaking the link between provocative cues and aggressive responses. Given this, research is clearly needed to extend the aggression-reducing effect of distraction from the confines of the laboratory to real-world settings. Moreover, future work might be aimed at developing and testing distraction techniques that target the five intermediary mechanisms proposed above. Finally, given that acute alcohol consumption appears to only facilitate aggression in a subset of individuals, research should also be directed at identifying which individual difference variables create the greatest liability for alcohol-related violence within the context of the AMM.

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