THE APPLICATION AND ROBUSTNESS OF THE RATIONAL CHOICE PERSPECTIVE IN THE STUDY OF INTOXICATED AND ANGRY INTENTIONS TO AGGRESS*

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Using a rational choice framework, this study examines the effects of alcohol and anger on violent decision making. Male students of legal drinking age participated in a randomized experiment in which intoxication and anger levels were manipulated. Participants read a "bar fight" scenario and completed a series of questions measuring aggressive intentions and the perceived consequences of violence. Results indicate that alcohol and anger interacted to increase one measure of aggressivity, but the perceived costs and benefits of violence were unaffected. Exploratory analyses call into question the robustness of the rational choice model, suggesting that the perspective may not be the general explanation for crime it is proclaimed to be.

KEYWORDS: Rational choice, alcohol, anger, aggression.

Classical criminology is grounded in the tenets of free will, rationality, and hedonism (Liska and Messner, 1999). Accordingly, human behavior is seen as a choice undertaken after calculating the response that will afford the highest pleasure:pain ratio. Although these perceptions of pains and pleasures may be constrained or "bounded" by factors such as health, intellect, and frame of mind (Bentham, 1789/1970), classical criminology argues that all individuals (regardless of these differences) choose their behavior based on an assessment of the perceived consequences. Theories derived from the Classical School therefore provide a general explanation for crime and delinquency. One such example is rational choice theory (Akers, 2000).

* Support for this research is provided by a grant from the National Consortium on Violence Research (NCOVR), headquartered at the Heinz School of Public Policy and Management at Carnegie Mellon University. NCOVR is supported under Grant SBR 9513040 from the National Science Foundation in partnership with the U.S. Department of Housing and Urban Development and the National Institute of Justice. An earlier version of this paper was presented at the 53rd annual meeting of the American Society of Criminology. I am indebted to Ray Paternoster, Denise Gottfredson, John Laub, Sally Simpson, George Loewenstein, Shawn Bushway, Bob Bursik, and the anonymous reviewers of *Criminology*, whose insightful suggestions have made this a better manuscript. All errors remain my own.

In the tradition of the rational choice perspective, researchers have invoked an expected utility model in order to understand the occurrence of criminal activity in terms of its probabilistic costs and benefits to the offender (Bachman et al., 1992; Nagin and Paternoster, 1993; Piliavin et al., 1986). Although not without exceptions, findings from this literature suggest that crime may be deterred by formal sanctions such as certainty of punishment (e.g., Bachman et al., 1992), may be deterred by informal sanctions such as feelings of shame or embarrassment (e.g., Paternoster and Simpson, 1996), but may also be encouraged by the rewards of crime (tangible or not) such as feelings of excitement (e.g., Nagin and Paternoster, 1993).

While emphasizing the importance of the thought processes that underlie criminal decision making, rational choice theorists have largely ignored the role of psychopharmacological agents that may attenuate cognitive ability. Particularly striking is the lack of study of alcohol. Of the estimated 5.3 million offenders under criminal justice supervision in 1996, approximately 40% were under the influence of alcohol at the time they committed their crimes (Greenfeld, 1998). Although many of these crimes were likely to have been nonserious offenses, there is reason to believe that many more involved acts of violence (Center on Addiction and Substance Abuse, 1998).

Several researchers have examined the prevalence of alcohol intoxication during the commission of violent crime (e.g., Martin and Bachman, 1997; Pernanen, 1991; Wolfgang and Strohm, 1956); however, Roizen's (1997) epidemiological review is perhaps the most thorough. According to Roizen, between 28% and 85% of murderers, 13% and 60% of sex offenders, 7% and 72% of robbers, and 6% and 57% of assailants were under the influence of alcohol at the time of their crimes. Note that because prevalence studies such as these are correlational in nature, their findings do not provide evidence for a causal link between alcohol and violence (see Pernanen, 1991). As a result, many researchers have turned to the use of randomized experiments to examine the impact of alcohol on aggression.

EXPERIMENTAL STUDIES OF ALCOHOL, ANGER, AND AGGRESSION

Although aggressive behavior can take on a variety of forms (see Buss, 1961), the type most commonly studied by alcohol researchers is "physical-direct-active" aggression (Bushman, 1997). In the real world, assaulting another person with fists or weapons would constitute an act of physical-direct-active aggression. In the laboratory, however, this type of aggression must be measured in a safer, more ethical manner. In doing so,

many alcohol researchers rely on the Taylor Aggression Paradigm (TAP; Taylor, 1967), or a modification thereof.

Researchers using the TAP to study intoxicated aggression typically inform participants that the study is designed to examine the effects of alcohol on some (bogus) performance measure such as reaction time (Giancola and Chermack, 1998). Participants are then randomly assigned to consume either an inert or alcoholic beverage, the latter generally designed to increase participants' blood alcohol level (BAL) to 0.08%–0.10%. After consuming the assigned beverage, participants are pitted in a reaction time task against a fictitious opponent who is supposedly playing from an adjoining room. Participants are told that if they win the reaction time trial, they can administer a noxious stimulus (such as an electric shock) of desired intensity to their opponent. The shock intensity selected by participants serves as the measure of physical-direct-active aggression. If the participant loses the trial, however, he receives the noxious stimuli set by his opponent. As the "opponent" in the study is bogus, the order of the wins and losses as well as the intensity of the noxious stimuli administered to participants is predetermined by the experimenter. (For a review of the validity and modifications of the TAP, see Giancola and Chermack, 1998.)

More than 60 experimental studies of alcohol and aggression have been conducted using the TAP or some similar paradigm. In general, these studies report a main effect of drink condition such that those who consume alcohol administer more intense shocks than do those in the control group (Chermack and Giancola, 1997). Additionally, meta-analytic reviews of these experimental studies have found the global mean effect size of alcohol on aggression to be approximately 0.50 standard deviations (Bushman, 1997; Ito et al., 1996; Lipsey et al., 1997), an impressive value consistent with Cohen's (1988) benchmark for a moderate effect. Under conditions of high provocation (i.e., when participants receive intensive electric shocks from their opponent), this effect size estimate rises to 0.72 (Lipsey et al., 1997), a value approaching Cohen's criteria for a large effect (0.80).

Research suggests that the provocation effect uncovered in TAP studies is in fact a function of the participants' anger. For example, when participants (sans alcohol) completing a TAP-like task were provoked by electrical shocks administered by their "opponent," they reported significantly greater anger toward this opponent than did unprovoked participants (Baron, 1971a, 1971b; Muller and Donnerstein, 1977). Additional research has shown that negative personality evaluations (a form of provocation) written by a confederate also serve to increase participants' anger as well as their aggressive behavior (Baron, 1979; Baron and Bell, 1975;

Frodi, 1978). Intuitively, these findings are not surprising. Although typically not regarded as a necessary and sufficient condition for aggression, anger has long been recognized as an impetus for many acts of violence (Agnew, 1992; Averill, 1982, 1983; Berkowitz, 1990; Rule and Nesdale, 1976).

The above findings suggest that provocation leads to anger, which increases the likelihood of aggressive responding. Extrapolating these findings to studies of alcohol and aggression, intoxication would appear to foster violent behavior most clearly when participants are also angered. But exactly how do alcohol and anger act (either alone or in conjunction) to influence aggression? Some researchers have used a social information processing (SIP) model to explain these effects (e.g., Huesmann, 1998; Sayette et al., 1993). According to the SIP perspective, human behavior is determined after interpreting situational cues, retrieving from memory various responses to the cues, evaluating these individual response options, and then deciding which option or "script" is best suited for the situation (Crick and Dodge, 1994; Huesmann, 1998). Each of these processes requires higher order cognitive functioning. However, the pharmacological properties of alcohol (Peterson et al., 1990) and the physiological effects of anger (Huesmann, 1998) impede neural functioning and impair cognition. With diminished cognitive capacity, intoxicated and angry individuals are unable to engage in traditional thought processes and are deficient in their ability to interpret social cues and evaluate behavioral outcomes.

In a similar vein, the current study applies a rational choice perspective to the problem of intoxicated/angry violence. Note that the rational choice model is not at odds with an SIP explanation, and in fact, elements of the model can be viewed as nested within the SIP perspective. For example, SIP theorists argue that the response scripts retrieved from memory are evaluated on multiple dimensions, including their probable consequences or "outcome expectations." Individuals then "select the most positively evaluated response for enactment" (Crick and Dodge, 1994:91). This process of evaluating behavior in terms of perceived consequences and then choosing the behavior that is viewed as the most beneficial is entirely consistent with the tenets of the rational choice perspective.

ALCOHOL, ANGER, AND RATIONAL CHOICE

Although several theoretical explanations of the alcohol/aggression relationship have been offered (e.g., see Gustafson, 1994; Parker and Auerhahn, 1998), most contemporary theories of intoxicated aggression emphasize alcohol's ability to disrupt cognitive processing (Bushman,

1997; Chermack and Giancola, 1997). Cognitive disruption theories suggest that "intoxicated individuals are less able to attend to multiple situational cues and are less able to process information regarding the distal consequences of their actions" (Chermack and Giancola, 1997:635). Particularly important in these theories are the executive cognitive functions (ECF).

The ECF govern higher order cognitive abilities such as reasoning, problem solving, attention, planning, self-monitoring, and regulating behavior in accordance with anticipated consequences (Assaad and Exum, 2001; Hoaken, Giancola, and Pihl, 1998). Largely contained within the prefrontal cortex, the ECF are regarded as essential in developing strategies for addressing threats or provocations (Assaad and Exum, 2001; Peterson and Pihl, 1990). For example, research suggests that those with frontal lobe dysfunction respond to provocation more aggressively than those with no such dysfunction (Lau et al., 1995). Furthermore, alcohol has been found to impair cognitive functioning, including that in the frontal lobe (Chermack and Giancola, 1997; Hoaken, Giancola, and Pihl, 1998). The effect of alcohol on ECF is so great that Peterson and Pihl (1990) likened the diminished cognitive abilities of highly intoxicated individuals to those of patients suffering from prefrontal cortex damage.

There is research evidence, albeit indirect, to suggest that alcohol impairs the drinker's ability to understand the consequences of aggression. For example, Weisman and Taylor (1994) recruited participants to complete a TAP in which only the participant (and never the confederate) determined the shock intensity levels to be administered to the player who lost the reaction time task. Additionally, half of the participants were led to believe that their opponent was their competitive equal, whereas the remaining half were led to believe the opponent was superior on the task. As expected, results revealed a main effect of alcohol. However, the study also found that the opponent's skill level had no impact on shocks selected by sober participants or by intoxicated participants. This latter finding is especially important and suggests that despite playing against a superior opponent (and being at great risk of receiving the shock they previously selected), intoxicated participants appeared unable to attend to risky situations and continued to choose highly aggressive responses. These findings confirmed prior research by Zeichner and Pihl (1979), who found that unlike their sober counterparts, intoxicated participants behaved in an aggressive manner despite the negative consequences they experienced as a result of their aggression.

Similarly, Schmutte and Taylor (1980) examined the effect of victim feedback on intoxicated aggression. During a TAP task, participants were allowed to "overhear" their opponent vocalize either low- or high-level groans whenever shocks were administered. Among sober participants,

high victim feedback curbed aggressive responding. However, intoxicated participants were equally aggressive regardless of the victim's cries, suggesting they discounted the social ramifications of their aggression. Moreover, this aggression in the presence of victim feedback was driven by those participants who had the highest BALs. That is, intoxicated participants with higher BALs actually increased their aggressivity in response to the cries, apparently finding the pain they inflicted to be rewarding. Collectively, these findings suggest that alcohol diminishes individuals' perceptions of the costs associated with aggression and, in some instances, actually increases the perceived benefits.

Like alcohol, anger also impacts the ECF. Emotions such as fear and anger are concomitant with high levels of arousal (Power and Dalgleish, 1997). Additionally, high arousal levels are thought to disrupt neural activity and impair cognitive functioning (Hebb, 1955; Royce and Diamond, 1980). This suggests that emotional states characterized by high affective arousal can disrupt cognitive performance. In support of this claim, negative affective arousal and/or anger has been argued to impair working memory (Huesmann, 1998), decrease information processing capacity (Eysenck, 1982), reduce the amount of time attending to detail and reduce accuracy in complex tasks (Stone and Kadous, 1997), encourage a reliance on simple rather than elaborate heuristic strategies when making social judgments (Bodenhausen et al., 1994), and affect risk/reward assessments (Dunegan et al., 1992; Lerner and Keltner, 2000). Illustratively, Zillman (1979:279) argues that under high arousal:

> The individual's capacity to anticipate gratification and aversion, success and failure, and cost is diminished. As a consequence, response guidance through the anticipation of the consequences of a course of hostile or aggressive action is impaired. At extremely high levels of excitation, the individual disregards the nonimmediate consequences of his or her actions altogether. . .It seems that extremely annoyed and angry persons 'don't give a damn' about what happens to them after their attack.

These anger-based cognitive effects seem to parallel those produced by intoxication. Furthermore, as with alcohol, there is indirect evidence to support this idea that the anger/aggression relationship is mediated by perceived consequences. For example, Baron (1973) examined the effect of anger and risk of retaliation on aggressive behavior. After anger had been manipulated, participants completed a variation of the TAP in which the participant served as a "Teacher" and used electric shocks to punish the "Learner" (the confederate) when errors were made on a learning task. To manipulate the risks associated with aggression, participants were told that (1) the study would end immediately after the task (low risk); (2) if

time permitted, the participant and confederate would later switch places and complete the task for a second time (moderate risk); or (3) the participant and confederate would definitely switch places and complete the task for a second time (high risk). Results revealed that non-angered participants decreased their level of aggressivity as risk of retaliation increased. Angered participants, however, were equally (and highly) aggressive across all three risk conditions. Thus, whereas non-angered participants were sensitive to the risks associated with aggression, angered participants responded as if the risks were inconsequential.

Baron (1971c) examined the effect of anger and victim's pain cues on aggressive behavior. Participants were either angered or not by a confederate and then participated in a similar "Teacher-Learner" paradigm. Atop the participant's aggression machine control panel was a "psycho autonomic pain meter," which the experimenter explained would integrate physiological indicators of the Learner's pain. In actuality, the device was bogus and its readings were controlled by the experimenter according to the participant's randomization to one of three pain cue conditions. Based on the pain meter's readings, participants were led to believe their shocks caused the confederate either low, moderate, or intense pain.

Results revealed that increasing pain cues decreased participants' aggression regardless of the anger condition. At the same time, however, there was a main effect of anger such that the angered participants delivered shocks of greater intensity than did non-angered participants. Additional research by Baron (1971b) confirms this pattern of results. Interestingly, in a third study, Baron (1974) found that although victim pain cues curbed aggressive responding among non-angry participants, the cries actually increased aggressive responding among angered participants. Here, pain cues seemingly reinforced aggressive behavior among angry participants, thereby suggesting aggression may in fact be rewarding (see also Baron, 1979). Therefore, in addition to minimizing the perceived risk associated with aggressive acts, anger may also serve to enhance the perceived pleasure.

SUMMARY

Research using valid experimental paradigms designed to measure physical-direct-active aggression indicates that alcohol intoxication in the presence of provocation produces an increase in aggressive behavior. Both intoxication and anger appear to influence aggression by bounding rationality through similar cognitive pathways (i.e., altering risk/reward assessments).[1] If true, then the relationship among alcohol, anger, and violence can easily be explained within an expected utility model such as that

1. As noted by one reviewer, although the behavioral effects of alcohol and anger

adopted by the rational choice perspective. The current study was undertaken to examine this possibility in greater detail.

Based on the findings from the alcohol/aggression and the provocation/aggression literatures, the following hypotheses are proposed:

Hypothesis 1: Alcohol and anger have independent effects and an even larger interactional effect that increase aggressive intentions.

Hypothesis 2: Alcohol and anger have independent effects and an even larger interactional effect that increase the perceived benefits of aggression.

Hypothesis 3: Alcohol and anger have independent effects and an even larger interactional effect that decrease the perceived costs of aggression.

Based on the rational choice perspective's underlying assumption that criminal behavior is a function of its perceived consequences, the following hypothesis is proposed:

Hypothesis 4: The effects of alcohol and anger on aggressive intentions are mediated through perceptions of benefits and costs.

Finally, an exploratory analysis is performed to examine the robustness of the rational choice model. As previously noted, Bentham (1789/1970:51) recognized individual differences in one's ability to perceive costs/benefits, an ability Bentham referred to as one's "quantum of sensibility." Although not specifically identified by Bentham, alcohol intoxication and anger would also appear to impact the quantum of sensibility. Note, however, that by altering perceptions of pains and pleasures, alcohol and anger do not negate the notion of generality inherent in the rational choice perspective. That is, although intra-individual factors may bias one's perceptions of costs and benefits, the rational choice perspective argues that human behavior remains a function of these perceptions—regardless of their accuracy. Accordingly, the following hypothesis is proposed:

Hypothesis 5: The rational choice model is robust across different states of mind such that the model's explanatory power is comparable and its structural integrity is maintained across participants in different experimental conditions.

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are similar, this is not de facto evidence that the two operate along identical cognitive pathways.

METHODS

The current study makes several contributions to the criminological literature. First, the study is a randomized experiment, a relatively unique approach within the field of criminology to study violence. Second, although previous research has suggested that alcohol and anger affect one's perceptions of the consequences associated with aggression, the evidence supporting these effects is indirect and inferred from participants' aggressive responses. This study, however, directly measures the perceived costs and benefits of violence. Third, aggression-machine paradigms operationalize aggression in a manner (e.g., electric shock) that carries no social or legal sanctions. This study improves on this measure by querying participants' likelihood to engage in physical assault, an act that has both legal and social ramifications. Finally, the study is an interdisciplinary one, integrating methodologies from both the criminological and psychological literatures.

PARTICIPANTS

The sample is composed of 84 male[2] students of legal drinking age from a Mid-Atlantic university. Participants were recruited through classroom announcements and fliers, which described the study as an investigation of the effects of alcohol on cognitive skills, mood, and social behavior. Participants were also informed that they would be paid $25 for completing the study and would have a chance to win an additional $25 based on their performance on one of the study's tasks. The sample is predominately Caucasian (76%), with an average age of 21.9 years. Participants were randomly assigned to experimental conditions before completing the study.

EXPERIMENTAL MANIPULATIONS

Alcohol Manipulation

All participants were randomly assigned to either an "Alcohol" or a "No Alcohol" condition. Those in the Alcohol condition were given 1.5 ounces of 50% ethanol (vodka) per 40 pounds body weight (0.045 L per 18 kg), diluted in a 1:2 solution with orange juice. This recipe was modeled after that used in prior alcohol research (e.g., Taylor and Gammon, 1976)

2. According to the ethical guidelines governing alcohol research established by the National Advisory Council on Alcohol Abuse and Alcoholism, all female participants are to be properly screened for pregnancy using a hormonal test prior to participating in a study that involves the consumption of alcoholic beverages. As such testing is beyond the resources of the current study, women were excluded from participating. Such an exclusion introduces the possibility that the study's findings are not generalizable to the violent decision-making processes of women.

and was capped such that no participant received more than 8 ounces of ethanol regardless of his weight. Pilot testing indicated that the consumption of this mixture within ten minutes (after four hours of fasting) successfully increased participants' BALs to approximately 0.08% after 25 minutes of absorption. Those participants randomized to the No Alcohol condition were given 4.5 ounces of orange juice per 40 pounds of body weight (0.135 L per 18 kg).

Anger Manipulation

Participants were also randomly assigned to either an "Anger" or a "No Anger" condition. To induce anger, the experimenter falsely accused the participant of arriving 30 minutes late to the research laboratory. The experimenter's accusations were crafted such that the participant knew he had arrived at the scheduled time but was nevertheless unable to offer evidence to counter the experimenter's claims. To compound these unjust accusations even further, the experimenter informed the participant that his payment for participation was in jeopardy as a result of his "tardiness." In the "No Anger" condition, the experimenter neither accused participants of being late nor did he challenge their payment for participation.

MATERIALS

Special Equipment

An AlcoSensor III™ (Intoximeters, Inc., St. Louis, Mo.) breath analyzer was used to monitor participants' BALs. The AlcoSensor III is a pocket-sized, evidential quality breath alcohol tester approved by the U.S. Department of Transportation, and has been used in previous studies of alcohol and aggression (e.g., Hoaken, Assaad, and Phil, 1998). To determine the appropriate quantity of fluid participants were to consume, all participants were weighed using a digital bathroom scale and all drinks were prepared in measurement glassware (e.g., 50-ml graduated cylinder, 1000-ml flask). To give the illusion that the study was also examining hand-eye coordination and reaction time, all participants played a video game displayed on a 20-inch color television. As several tasks in the study were timed tasks, two handheld digital stop watches were used to ensure the time periods were systematic across participants.

Alcohol Screening Form

For ethical considerations, all participants were screened for alcoholism prior to participating using the Brief Michigan Alcoholism Screening Test (Brief MAST; Pokorny et al., 1972). The Brief MAST consists of 10 "Yes/No" questions addressing various aspects of problem drinking, with point values assigned to each response. Research indicates that a Brief MAST

score of 6 accurately identifies alcoholics while yielding few false positives (Pokorny et al., 1972). However, following the lead of other researchers (e.g., Hoaken, Assaad, and Phil, 1998), the current study adopted a more conservative cut-off score of 5.

Background Questionnaire

A background questionnaire was created in order to collect information on participants' prior experiences with alcohol (e.g., frequency/quantity of alcohol consumption) as well as their prior experiences with crime and deviance (i.e., lifetime and past-year prevalence of nine criminal/deviant behaviors ranging from disorderly conduct to aggravated assault). The background questionnaire also included basic demographic questions.

Mood Questionnaire

Participants' anger levels were monitored using the ten-item version of the State Anger Scale (SAS; Spielberger et al., 1983). Participants' SAS scores were computed as the sum of their ratings (from 1 to 4) of a series of sentences describing an angry emotional state (e.g., "I am furious," "I feel angry," "I feel like swearing"). The psychometric properties of the SAS have been well established, with scale reliability estimates ranging from 0.88 to 0.97 (Spielberger et al., 1983). The current study introduced two minor alterations to the SAS and its resulting composite score. First, to simplify its interpretation, participants' SAS scores were readjusted to a 0–30 scale such that the complete absence of anger was represented by a score of 0. Secondly, in order to disguise the true purpose of the scale, ten additional (bogus) items were added to make the SAS appear as a more general measure of mood. Note that these bogus items were not included in the calculation of the composite SAS score.

Cognitive Tasks

In order to disguise the true nature of the experiment, participants were told the study examined (in part) the effects of alcohol on cognitive ability. To make this ruse appear more valid, participants completed two bogus "cognitive tasks." Both tasks consisted of a table of letters and numbers, 20 rows long and 10 columns wide. Participants were allotted two minutes per task in which to underline and circle specified numbers and vowels.

Scenario Packet

A scenario packet containing a cover sheet, a mood questionnaire, a hypothetical scenario, and a set of scenario questions (in that order) was created for the study. The scenario included in the packet was a modified

version of that used previously by Mazerolle and Piquero (1997). The scenario was written in the second person and described an argument at a local bar and grill between "You" (the participant) and "Joe" (another male). Briefly, the participant is described as having returned from the restroom only to find his girlfriend being approached by Joe. When asked to leave, Joe becomes obstinate. In response, the participant reaches for the girlfriend's hand, only to have Joe push his hand away.[3]

The remaining pages of the packet contained a series of questions, including two measures of aggressivity. First, participants were asked to report the probability that they would physically assault Joe (0%–100%) if they were in the situation described ("self-referent" aggression). Secondly, participants were asked to estimate the percentage of male students at the University (0%–100%) whom they believe would physically assault Joe ("other-referent" aggression). Note that this latter measure was included to minimize problems associated with participants' self-enhancing biases.[4]

In addition to these two measures of aggression, participants were asked to report the perceived benefits (e.g., how good would it feel) and the perceived costs (e.g., certainty/severity of arrest) associated with responding to the scenario conditions with violence. These cost/benefit items were modeled after those of previous rational choice studies using college-based samples (e.g., Bachman et al, 1992; Loewenstein et al., 1997; Nagin and Paternoster, 1993).

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3. Those readers approaching the problem of intoxicated/angry aggression from a social information processing perspective may object to the scenario on the grounds that it is extremely leading. In order to assess how participants attend to and encode social cues, SIP researchers commonly provide participants with scenarios that depict a negative outcome while keeping the intent of the instigator ambiguous (e.g., Sayette et al., 1993). As the current study is not concerned with the encoding and interpretation of ambiguous stimuli but rather with how an aggressive script is evaluated, the inclusion of a leading scenario is not regarded here as being problematic.

4. Self-enhancing biases occur when participants explain their own behavior in a more flattering or prosocial manner in order to increase their self-esteem. Research has shown that individuals commonly attach more positive and less negative attributes to themselves than they do to others (Brown, 1986). This self-enhancing bias has been shown to affect participants' perceptions of the effects of alcohol. For example, Paglia and Room (1999) report that participants believed "others" would be more likely to experience potential negative alcohol outcomes (e.g., loss of control, violence) than would the participants themselves (see also Leigh, 1987). Similarly, the current study asks participants about their likelihood to engage in an antisocial act—physical aggression. Given the potential for participants to behave in a self-enhancing manner and deflate their responses to this question, a second question concerning the behavior of a group of similar others (all University males) was therefore included as a measure of aggressive intent.

EXIT QUESTIONNAIRE

At the conclusion of the study, all participants were asked to complete an exit questionnaire. This questionnaire was included to obtain qualitative feedback regarding participants' beliefs about the study and their reaction to participating.

PROCEDURE

Those persons interested in participating in the study contacted the experimenter, who described the study as an examination of the effects of alcohol on cognitive skills, mood, and social behavior. The experimenter also explained the inclusion criteria for the study (e.g., participants must be of legal drinking age, must fast prior to the study, etc.), and screened individuals using the Brief MAST. Those who met all inclusion criteria were scheduled an appointment to complete the study.

All participants completed the study individually. Each participant was greeted upon his arrival by a male research assistant; the experimenter (also male) was not present at this time.[5] The research assistant verified that the participant was of legal drinking age, recorded the participant's height and weight, provided the participant with a manilla envelope in which to place all his completed questionnaires, and administered the Background Questionnaire and Time 1 Mood Questionnaire. As the participant completed this latter task, the research assistant excused himself to retrieve the experimenter. Together the experimenter and research assistant checked the randomization schedule, gathered the necessary beverages, and returned to the laboratory.

Upon meeting the participant, the experimenter introduced himself and positioned a financial ledger book on the table near the participant. Located inside the book but clearly visible to the participant were five, five-dollar bills. The experimenter informed the participant that this money, which he would receive at the conclusion of the study, was his payment for participating. After reviewing the procedures of the study and informing the participant of the beverage he would be asked to consume, the experimenter administered the Time 1 breath test, explained the video game task, and began preparing the participant's drinks as the participant practiced the video game. Once comfortable with the procedures, the participant was instructed to play the game again in order to determine his baseline "reaction-time" score.

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5. The experimenter's absence at the beginning of the study was necessary to help complete the Anger manipulation. Had the experimenter been present upon the participant's arrival, then it would seem only natural for the experimenter to comment on the participants' apparent "tardiness" at this time rather than later in the study when participants are about to complete the Scenario Packet.

The participant then consumed the prescribed beverage. During the absorption period, the experimenter engaged the participant in various tasks to prevent participant boredom. For example, the experimenter administered the first Cognitive Task and the Time 2 Mood Questionnaire, and then explained the instructions for each of the remaining tasks. As he reviewed the instructions for the Scenario Packet, the experimenter casually indicated that the participant could imagine the experimenter as the character "Joe" in the story if it helped to make the scenario more vivid. This interchange was designed so that when reading the story, the participant would ideally envision himself engaged in a potentially violent confrontation with the experimenter. The experimenter next reminded the participant that he would be playing the video game again later in the study, and that the participant could possibly win an additional $25 based on his performance during this task.[6]

At this point in the study, approximately 5 minutes would remain in the absorption period. The experimenter therefore instructed the participant to complete the second Cognitive Task and the Time 2 breath test. The participant was then told to sit for a brief (approximately two-minute) rest period. The anger manipulation occurred during this time.

For those participants assigned to the No-Anger condition, the experimenter casually looked at his watch, indicated he needed to check on another participant in an nearby room, instructed the research assistant to "finish up here," and then left the room. For those participants assigned to the Anger condition, the experimenter casually looked at his watch, appeared puzzled by the time, and asked the research assistant if his watch was correct. The research assistant confirmed the time, to which the experimenter stated under his breath but loud enough to be heard by the participant, "We're running behind."

Appearing confused by this "setback," the experimenter questioned what time the participant arrived at the lab. After the participant responded, the experimenter accused the participant of coming to the study 30-minutes late and conflicting with the next scheduled appointment. To make these accusations appear more unjust and more likely to instill anger, the experimenter argued that the participant had previously phoned to reschedule his appointment. When participants claimed that the experimenter was in error and that they had not rescheduled, the experimenter responded angrily by saying "bullshit!" (Pilot testing

6. The second playing of the video game and the additional prize money were included to test additional hypotheses that are beyond the scope of this paper. The winner of the bonus payment was not announced until all participants completed the study.

revealed that challenging participants' honesty with such an emotionally charged word induced anger more effectively.)

Refusing to hear any additional arguments, the experimenter instructed the research assistant to "finish up here" while he attempted to call and reschedule the next participant. The experimenter left the room, but after taking a few steps returned to the laboratory in an apparent afterthought. He then took the ledger book containing the money off the table, turned to the participant and stated, "I don't think we can pay you the full twenty-five dollars for this," and then left the room again.[7]

With the experimenter out of the room and the 25-minute absorption period now completed, the research assistant administered the Time 3 breath test and the Scenario Packet. The participant then completed the video game, the Time 4 breath test, and the Exit Questionnaire. During this latter task, the research assistant excused himself in order to retrieve the experimenter, who returned to debrief the participant as to the true purpose of the study and to the experimental manipulations. All participants were paid in full. Sober participants were excused immediately, whereas intoxicated participants were escorted to a nearby room to sober up before leaving.

RESULTS

RANDOMIZATION AND MANIPULATION CHECKS

Table 1 summarizes the sample's responses to the Background Questionnaire. These data were analyzed across experimental conditions in order to evaluate the efficacy of the randomization procedure. The alcohol × anger Analysis of Variance (ANOVA) and chi-square procedures uncovered no significant differences across experimental conditions, suggesting that the groups are not statistically different from one another with respect to demographic features, alcohol consumption patterns, and criminal/deviant behavior.

To monitor blood alcohol levels, all participants completed four breath tests during the study; as the Time 3 measure was taken, BALs should have been near their peak. Prior to receiving their beverages, all participants had BALs of 0.00%, with the No Alcohol group continuing to have a

7. An a priori decision was made to exclude from the study any participant who arrived at the laboratory more than 10-minutes late. Although some subjects failed to keep their appointment altogether, none arrived more than 10 minutes past their scheduled time. One participant randomized to the Anger manipulation arrived exceptionally early for the study, well before the research assistant entered the lab. This participant was not excluded from the study, however. The fact that he arrived early and was nevertheless accused of coming late seemed only to make the experimenter's accusations more unjust.

Table 1. Alcohol, Crime/Deviance, and Demographic Variables, Entire Sample

Variable	Mean/ Percentage	S.D.
Brief MAST score	0.79	1.35
Age at which had first alcohol drink (in years)	16.54	2.03
Number of times intoxicated/past year	39.95	42.13
Number of times too intoxicated to drive/past year	34.02	36.40
Past month drinking frequency		
Every day	0%	
5 or 6 days/week	2%	
3 or 4 days/week	33%	—
1 or 2 days/week	50%	
1 to 3 days/month	14%	
Did not drink during past month	0%	
Typical drinking quantity per drinking episode		
1 standard drink	2%	
2 standard drinks	11%	
3 standard drinks	21%	—
4 standard drinks	24%	
5 or more standard drinks	42%	
Did not drink	0%	
Typical drinking days		
Monday through Thursday	1%	
Friday through Sunday	86%	—
Drink equally throughout the week	13%	
Crime/deviance lifetime versatility score[a]	2.69	2.69
Crime/deviance past year versatility score[a]	1.39	1.18
Current age (in years)	21.85	1.52
Height (in inches)	70.59	3.14
Weight (in pounds)	188.12	38.50
Race		
White	76%	
Black	12%	—
Hispanic	2%	
Asian	10%	

[a]Score reflects the number of different types of criminal/deviant acts participants endorsed (maximum possible number of items = 9).

0.00% reading for the duration of the study. As expected, an ANOVA performed on Time 2 BALs found only a main effect of alcohol, F (1, 80) = 781.60, p = 0.00, with those in the Alcohol condition having a mean BAL of 0.076%. Similarly, only the main effect of Alcohol condition was found to be significant for Time 3 BALs, F (1, 80) = 1950.42, p = 0.00 (mean Alcohol group BAL = 0.079%), as well as for Time 4 BALs, F (1, 80) =

861.73, $p = 0.00$ (mean Alcohol group BAL = 0.076%). When asked, all participants who drank alcohol remarked that they felt "buzzed" or "drunk," and the speech patterns of most were noticeably altered. In sum, the alcohol manipulation appears to have been successful.

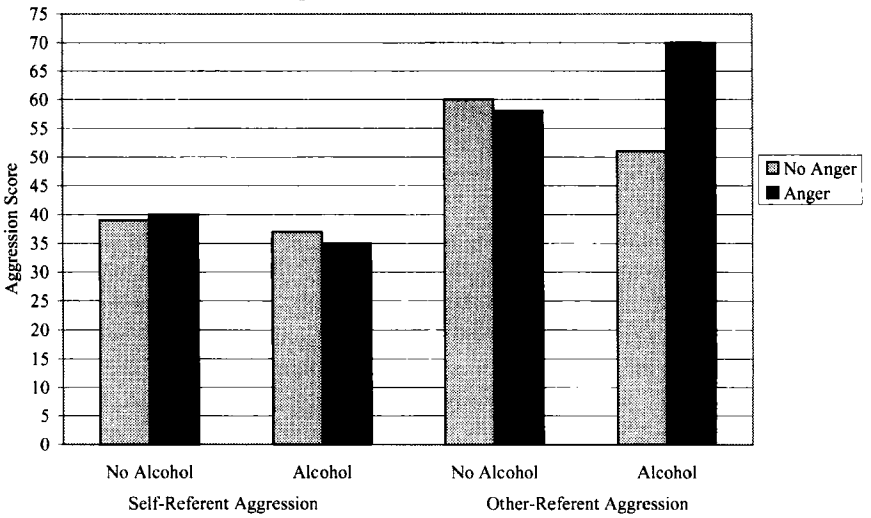
To monitor levels of anger, all participants completed three Mood Questionnaires containing the SAS, with the Time 3 Questionnaire completed immediately following the Anger manipulation. For all participants, Time 1 SAS scores were near the minimum value, indicative of little baseline anger (sample's average score = 0.56). An ANOVA performed on Time 1 SAS measures revealed no significant main effects of alcohol or anger and no significant interaction. Similarly, neither of the main effects nor the interaction were found to be statistically significant with respect to the Time 2 SAS scores (sample's average score = 0.45). However, SAS scores following the Anger manipulation show a significant main effect of anger, F (1, 80) = 23.81, $p < 0.001$, with participants in the Anger condition reporting higher SAS scores on average than those in the No Anger condition (3.38 versus 0.43, respectively). During the debriefing, most participants in the Anger condition described themselves as having felt "irritated" or "ticked off." Overall, these findings suggest the manipulation successfully increased participants' levels of Time 3 anger.

EFFECTS OF ALCOHOL AND ANGER ON MEASURES OF AGGRESSION

Hypothesis 1 predicts that alcohol and anger will have independent and interactional effects that increase aggressive responding. Figure 1 summarizes the self-referent and other-referent aggression scores across the four experimental manipulations. The mean self-referent aggression score for the entire sample was 37.7 (S.D. = 27.6). An ANOVA performed on these scores found no support for Hypothesis 1, with neither of the main effects nor the alcohol × anger interaction proving to be statistically significant (all p values > 0.56).

A possible explanation for the lack of support for Hypothesis 1 may be found in the nature of the aggression measure. Unlike prior research that operationalizes aggression as the application of an electric shock administered during a competitive game, the current study measured the probability of hitting another person. Given the negative stigma associated with engaging in physical assault, those participants with an increased desire to respond to the scenario with aggression may also have been motivated to appear more socially acceptable and, therefore, underreported their own feelings of hostility. In other words, participants with heightened aggressive tendencies may have engaged in a self-enhancement bias.

Figure 1 Measures of Aggression, by Experimental Condition



If a self-enhancement bias was present, then one would expect participants' other-referent aggression scores to be *consistently greater* than their self-referent scores. Such a pattern would suggest that although participants feel the general population of University males would be likely to respond to the scenario with assault, they themselves would not be so quick to act in that manner. The average other-referent score for the entire sample was 59.4 (S.D. = 21.0) and approximately 22 units higher than the self-referent measure. Furthermore, 79% of participants reported an other-referent score that was greater than their self-referent score. Such findings suggest the presence of an enhancement bias.

In order to examine the effects of alcohol and anger on participants' aggressivity absent this bias, other-referent aggression scores were analyzed. An ANOVA revealed no significant main effects, but a significant alcohol × anger interaction was uncovered, $F(1, 80) = 5.38$, $p = 0.023$. An analysis of the simple main effects found no significant difference across the Anger manipulation among those participants who drank only orange juice. However, among those participants who drank alcohol, those randomized to the Anger condition reported significantly greater aggression scores than those randomized to the No Anger condition ($p < 0.05$).[8,9]

8. Note that although the other-referent measure is included here as an indicator of participants' own aggressive intent, some readers may argue for a more parsimonious interpretation. For example, some may argue that alcohol and anger do not lead to violence but instead lead to the belief that others are more likely to become violent.

PERCEIVED BENEFITS OF PHYSICAL ASSAULT

Participants rated three aspects of personal benefit resulting from physically assaulting the scenario character "Joe." These benefit measures were the importance of saving face in response to Joe's actions, how "good" it would feel to assault Joe, and how much pain Joe would likely experience during the assault. Each variable was measured on a 0 to 10 scale, with higher scores representing a greater amount of the queried construct. Table 2 summarizes these benefit measures for the entire sample.

Hypothesis 2 predicts that alcohol and anger have independent and interactional effects that increase the perceived benefits of aggressive responding. ANOVAs performed on the benefit measures found no support for this hypothesis, with no significant main effects or interactions found for any of the measures. Note, however, that for ratings of "saving face" and "how good it would feel," a near significant main effect of anger was uncovered (p-values < 0.10), with those in the Anger condition reporting slightly higher benefits than those in the No Anger condition.

PERCEIVED COSTS OF PHYSICAL ASSAULT

Participants rated several measures of cost associated with assaulting Joe. Measures of personal cost included participants' rating of how immoral the act would be, how much guilt/shame participants would later experience from the act, and how much physical pain Joe would inflict on participants. Each item was measured on a 0 to 10 scale, with higher scores indicating greater cost.

Also included in the study were more traditional deterrence measures, including the certainty and severity of the assault becoming known to family/friends, losing respect of family/friends, being dismissed from school,

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Although such an explanation is plausible, it is in striking contrast with the large and well-developed body of research that suggests alcohol and provocation increase aggressive responding. Given that the current Alcohol and Anger manipulations were successful, null findings with respect to participants' self-referent aggressiveness appear suspect. Furthermore, the effect size estimate of alcohol on other-referent aggression under conditions of provocation (i.e., anger) in the current study was found to be 1.03. This estimate is comparable to that reported by Lipsey et al. (1997) and further suggests that the other-referent measure may in fact be a proxy for participants' own aggressive tendencies. Despite these arguments, the current study cannot resolve which measure of aggression is in fact more valid. Therefore, subsequent analyses will report findings relative to both the self-referent and other-referent aggression scores.

9. In an additional and exploratory attempt to remove the influence of any self-enhancing bias, residual scores were computed after regressing the other-referent measure onto self-referent scores. An ANOVA performed on these residuals continued to find a significant alcohol × anger interaction, F (1, 80) = 7.38, $p < 0.01$, and also a significant main effect of anger, F (1, 80) = 4.67, $p < 0.05$.

Table 2. Descriptive Statistics for Benefit/Cost Items and their Correlations with Aggression Measures, Entire Sample

Variable	Descriptives		Correlations	
	Mean	S.D.	Self-Referent Aggression	Other-Referent Aggression
PERSONAL BENEFITS OF ASSAULT				
Importance of "saving face"	6.01	2.65	0.46**	0.28**
How "good" it would feel	5.17	2.75	0.43**	0.32**
How much physical pain Joe would experience	6.74	1.84	0.23*	0.14
PERSONAL COSTS OF ASSAULT				
How immoral it would be	5.35	2.70	-0.49**	-0.12
How much guilt/shame participant would experience	4.23	3.12	-0.26*	0.10
How much physical pain participant would experience	4.13	1.89	-0.11	0.09
TRADITIONAL DETERRENCE MEASURES				
Certainty of. . .				
Assault becoming known to others	37.14	34.97	-0.03	0.01
Loss of respect from others	30.12	28.73	0.06	0.07
Dismissal from school	23.69	24.09	-0.18	-0.06
Arrest	50.00	26.09	0.11	0.01
Severity of. . .				
Assault becoming known to others	2.70	2.67	0.03	0.03
Loss of respect from others	7.99	2.52	0.001	0.07
Dismissal from school	9.21	1.79	0.04	0.003
Arrest	7.73	2.41	0.03	0.10
Certainty × Severity of. . .				
Assault becoming known to others	80.36	126.94	-0.08	-0.09
Loss of respect from others	246.07	263.60	0.07	0.07
Dismissal from school	212.62	229.61	-0.15	-0.05
Arrest	392.38	248.13	0.09	0.06
Aggregate Certainty × Severity Score	931.43	648.06	-0.01	0.02

* $p < 0.05$; ** $p < 0.01$.

and being arrested. Each certainty item was measured in terms of perceived probability using a 0% to 100% scale, with higher scores indicative of greater certainty of punishment. Each severity item was measured on a 0 to 10 scale, with higher scores indicative of greater severity of punishment. Individual certainty measures were multiplied by their corresponding severity measure to derive a certainty × severity score for each of the four types of sanctions. Finally, an aggregate certainty × severity score was computed as the sum of these individual certainty × severity measures (scale reliability = 0.70).[10] Table 2 summarizes these cost measures for the

10. Because their scale reliabilities were unacceptably low, aggregate scores are not included for the benefit items, personal cost items, certainty items, or severity items.

entire sample.

Hypothesis 3 predicts that alcohol and anger have independent and interactional effects that decrease the perceived costs of aggressive responding. ANOVAs performed on these cost measures found no support for this hypothesis. Although there was a significant effect of anger on immorality ratings, F (1, 80) = 5.77, p = 0.02, participants in the Anger condition found the idea of assault to be *more* immoral than did those in the No Anger condition (means = 6.03 versus 4.67, respectively), a finding that perhaps offers additional support for the presence of a self-enhancing bias. No significant main effects or interactions were found for any of the remaining personal cost or deterrence measures.

THE MEDIATING EFFECTS OF COSTS AND BENEFITS

Hypothesis 4 predicts that the effects of alcohol and anger on aggressive responding are mediated through perceptions of benefits and costs, such that after controlling for these perceived consequences, the effects of alcohol and anger become insignificant. Recall that no significant effects of alcohol or anger on self-referent aggression were uncovered; therefore, self-referent scores are not well suited in examining the mediating properties of costs/benefits. However, a significant alcohol × anger interaction was uncovered when examining participants' other-referent aggression scores. Thus, the analysis of Hypothesis 4 will focus solely on this measure.

The presence of a mediated model was examined using the procedures outlined by Baron and Kenny (1986). Results failed to offer support for the conclusion that the interactive effect of alcohol and anger on aggression operates by altering perceived costs/benefits. As noted above, neither alcohol, anger, nor their interaction had an effect on any of the perceived consequences of aggression except for immorality ratings, and the direction of this effect was counterintuitive. Furthermore, few of the proposed mediators had significant effects on other-referent aggression (as expected given the bivariate correlations shown in Table 2). Not surprisingly then, after controlling for the perceived costs and benefits listed in Table 2, the alcohol × anger effect remained a significant predictor of other-referent aggression (b = 23.3, p = 0.02), and the overall magnitude of this relationship was not reduced. In contrast to Hypothesis 4, these findings suggest that alcohol and anger interact to exert a direct effect on aggression responding.

EVALUATION OF THE RATIONAL CHOICE MODEL

Hypothesis 5 states that the rational choice model should have comparable predictive power across all four experimental groups. That is, regardless of the participants' intoxication and anger states, aggressive behavior should be governed by its perceived consequences. The above findings suggest that alcohol and anger interact to influence aggressive responding independent of perceived costs/benefits, casting doubt on the validity of Hypothesis 5. However, this hypothesis was examined further in a set of exploratory analyses described below.

Correlations between cost/benefit items and measures of aggression were computed individually for each experimental group. A review of these correlations revealed that the number of significant correlations in the theoretically predicted direction varied across experimental condition, suggesting that perceived costs/benefits are of differential importance depending on the participant's state of mind. To determine the predictive power of the rational choice model across experimental conditions, aggression scores were regressed onto selected cost/benefit items for each group of participants. (For simplicity, the aggregate certainty × severity measure was included in the model in place of all individual certainty, severity, and certainty × severity scores.) Table 3 summarizes these ordinary least-squares (OLS) results.

Note that multicolinearity between the independent variables exists. As a result, the cost/benefit coefficients have larger variances that increase the likelihood of Type II errors (and smaller t-values). The lack of statistically significant predictors should therefore be interpreted cautiously, although the coefficients are still the best linear unbiased estimates (Gujarati, 1995). Fortunately, this analysis is not concerned with Fisherian tests of the individual coefficients, but instead is concerned with the model's overall fit as evidenced by the R^2 values. As seen in the table, there is considerable variability in the predictive power of these models. Interestingly, the pattern of variability appears to be linked to the measure of aggression used in the model. For self-referent aggression, the rational choice model has weakest explanatory power among the Alcohol/Anger participants; for other-referent aggression, the model has greatest explanatory power among Alcohol/Anger participants (although the contrast is not as striking). Regardless of the pattern, these results suggest that the model does not uniformly explain aggression across experimental conditions, questioning the model's robustness.

To further examine the robustness of the rational choice model, an interactional OLS regression model was run for each measure of aggression. This interactional model included the cost/benefit items, dummy variables to represent the experimental groups, and the interaction of the

Table 3. Unstandardized Beta Coefficients for Selected Measures of Costs/Benefits Predicting Participants' Self-Referent and Other-Referent Aggression, by Experimental Condition

	Source							
	No Alcohol No Anger		No Alcohol/ Anger		Alcohol/ No Anger		Alcohol Anger	
Variable	Self-Referent	Other-Referent	Self-Referent	Other-Referent	Self-Referent	Other-Referent	Self-Referent	Other-Referent
Constant	-29.95	2.98	12.52	42.23	-0.26	44.34	27.60	60.22
(*t*-value)	(-0.60)	(0.07)	(0.49)	(1.36)	(-0.01)	(1.18)	(0.95)	(4.15)**
Saving Face	7.99	3.72	1.40	3.14	2.87	-1.41	-0.53	-1.38
(*t*-value)	(2.44)*	(1.32)	(0.51)	(0.94)	(1.37)	(-0.60)	(-0.17)	(-0.88)
Feel Good	1.61	1.96	1.41	-1.34	4.51	3.58	1.22	0.40
(*t*-value)	(0.51)	(0.72)	(0.74)	(-0.57)	(2.01)	(1.42)	(0.38)	(0.25)
Joe's Pain	4.54	3.66	2.66	1.68	3.28	-1.41	2.00	3.70
(*t*-value)	(1.28)	(1.21)	(0.86)	(0.44)	(1.19)	(-0.45)	(0.51)	(1.88)
Immorality	-1.63	2.04	-6.59	-5.68	-1.95	-0.75	-3.24	-3.03
(*t*-value)	(-0.60)	(0.87)	(-2.54)*	(-1.79)	(-0.78)	(-0.27)	(-0.92)	(-1.73)
Guilt/Shame	0.95	0.58	0.09	1.83	-1.99	-0.05	-0.16	2.79
(*t*-value)	(0.32)	(0.23)	(0.05)	(0.79)	(-0.79)	(-0.02)	(-0.06)	(2.10)
Participant's Pain	-3.36	-1.21	1.95	1.36	1.30	1.37	3.05	1.68
(*t*-value)	(-8.13)	(-0.34)	(692)	(0.39)	(-0.43)	(0.40)	(0.88)	(0.97)
Aggregate Certainty/Severity	0.01	-0.003	0.02	0.01	0.00	0.01	0.001	-0.01
(*t*-value)	(0.49)	(-0.34)	(2.56)*	(0.85)	(0.05)	(0.57)	(0.11)	(-1.96)
R^2	0.58	0.31	0.74	0.43	0.70	0.29	0.26	0.52

* Significant at $p < .05$; **Significant at $p < .01$

dummy variables and cost/benefit measures. Because the dummy variables were coded so that the No Alcohol/No Anger group was the excluded condition, this interactional model allows for comparisons of slope coefficients to be contrasted against those of the No Alcohol/No Anger condition. In other words, this model will indicate what changes (if any) in the rational choice model occur as a result of alcohol and/or anger.

Table 4 summarizes the results after regressing participants' self-referent aggression scores on this interactional model. As with the earlier models, multicolinearity among the independent variables is high, resulting in an increased Type II error rate. Unfortunately in this analysis, the Fisherian tests of the individual coefficients are of more importance to the understanding of the robustness of the rational choice model. However, to offer some additional insight as to the practical significance of alcohol and anger's impact on the rational choice model, standardized beta coefficients are also reported in Table 4. For this exploratory analysis, independent variables for which a one standard deviation change results in a change of ±0.50 standard deviation units or higher in the dependent variable will be considered important and to have practical significance, regardless of its statistical significance. As an alternative indicator of practical significance, elasticities were computed for each of the rational choice variables. Those cost/benefit items for which a one percentage change results in a change of ±0.50% or higher in the dependent variable are denoted in Table 4, and they are also considered here to be important.

The constant and the first set of coefficients in Table 4 correspond to the intercept and slope coefficients for the No Alcohol/No Anger group. The remainder of the table summarizes how participants in other experimental conditions deviate from participants in this condition. A review of the signs of the coefficients suggest that when participants are intoxicated and/or angered, most benefits appear to be of lesser influence in the decision to assault. With respect to the costs of aggression, results appear more mixed, such that some costs (e.g., immorality) are of lesser influence under these states of mind, whereas others (e.g., participants' pain) appear to be of greater influence. As expected, few of these differences are statistically significant; however, several have relatively large and important standardized effects or elasticities (e.g., saving face, immorality).

Although clearly exploratory, these analyses suggest that the inner structure of the rational choice model may be compromised by states of intoxication and anger. That is, drunk and angry participants may perceive the costs and benefits of aggression no differently than others, but they may instead assign them differential weights, suggesting there is no uniform hedonic calculus in the decision to engage in physical assault. These findings, in conjunction with the varying R^2s reported in Table 3, offer no support for Hypothesis 5.

Table 4. Summary of OLS Regression Analysis for Selected Cost/Benefit Items Predicting Self-Referent and Other-Referent Aggression within Dummy Coded Experimental Groups

Variable	Self-Referent Aggression		Other-Referent Aggression	
	b	BETA	*b*	BETA
(Constant)	-29.95	—	2.98	—
Saving Face	7.99**[a]	0.47	3.72	0.77
How Good	1.61	0.26	1.96	0.16
Joe's Pain	4.54[a]	0.32	3.66	0.30
Immoral	-1.63	0.26	2.04	-0.16
Guilt/Shame	0.95	0.09	0.58	0.11
Participant's Pain	-3.36	-0.11	-1.21	-0.23
Aggregate Certainty/Severity	0.01	-0.10	-0.003	0.13
No Alcohol/Anger Group (Dummy Variable)	42.47	0.82	39.25	0.67
Group × Saving Face	-6.59[a]	-0.09	-0.57	-0.75
Group × How Good	-0.19	-0.44	-3.30	-0.02
Group × Joe's Pain	-1.87	-0.31	-1.98	-0.22
Group × Immoral	-4.95[a]	-0.94	-7.72*[a]	-0.46
Group × Guilt/Shame	-0.86	0.13	1.24	-0.07
Group × Participant's Pain	5.31[a]	0.23	2.57	0.37
Group × Aggregate Certainty/Severity	0.02	0.26	0.01	0.26
Alcohol/No Anger Group (Dummy Variable)	29.69	0.86	41.36	0.47
Group × Saving Face	-5.12[a]	-0.65	-5.13[a]	-0.50
Group × How Good	2.90	0.19	1.62	0.26
Group × Joe's Pain	-1.26	-0.76	-5.07[a]	-0.14
Group × Immoral	-0.32	-0.33	-2.79	-0.28
Group × Guilt/Shame	-2.95	-0.07	-0.63	-0.23
Group × Participant's Pain	2.06	0.26	2.58	0.16
Group × Aggregate Certainty/Severity	-0.01	0.22	0.01	0.09
Alcohol/Anger Group (Dummy Variable)	57.56	1.19	57.25	0.91
Group × Saving Face	-8.52*[a]	-0.77	-5.09	-0.97
Group × How Good	-0.38	-0.22	-1.56	-0.04
Group × Joe's Pain	-2.54	0.00	0.03	-0.27
Group × Immoral	-1.60	-0.78	-5.06[a]	-0.19
Group × Guilt/Shame	-1.11	0.30	2.20	-0.11
Group × Participant's Pain	6.41[a]	0.27	2.89	0.46
Group × Aggregate Certainty/Severity	-0.004	-0.15	-0.01	-0.09

* $p < 0.05$; ** Significant at $p < 0.01$.
[a] Indicates an elasticity of ± 0.50 or greater.

DISCUSSION

The rational choice perspective states that all crime is a function of its perceived pains and pleasures. As a statistical model, the perspective can be written as:

$$Y_i = \alpha + \beta_1 (X_{Bi}) + \beta_2 (X_{Ci}) + \varepsilon_i,$$

where i is the index for persons, Y is the measure of criminal participation, α is the model's intercept, X_B is the measure of the perceived benefits of the crime, X_C is the measure of the perceived costs of the crime, β_1 and β_2 are the weights or the relative importance assigned to the benefits and costs measures (respectively), and ε is any remaining (unexplained) variance. Note that in accordance with the perspective, β_1 is predicted to be positive whereas β_2 is predicted to be negative.

The purpose of the current study was threefold. First, the study examined the impact of alcohol intoxication and anger on intentions to engage in physical assault (Y). Second, the study examined if the decision to engage in physical assault is mediated in accordance with the rational choice perspective. Finally, the study examined how alcohol intoxication and anger influences the underlying structure of the rational choice model. For example, if alcohol and anger were found to impact the perceived benefits and costs of violence (X_B and X_C), then this would suggest that intoxication and mood may alter an individual's "quantum of sensibility," potentially leading to bounded rationality. However, if alcohol and anger were found to impact the relative weights assigned to these benefits and costs (β_1 and β_2), then this would indicate that intoxication and mood compromise the integrity of the rational choice model. As a result, the rational choice model would appear to break down under certain states of mind, diminishing its robustness.

Mixed support was found for the hypothesis that alcohol and anger increase violent decision making (Hypothesis 1). Despite having successfully induced intoxication and anger, the study was unable to find either independent or interactive effects on participants' self-referent aggression scores. However, alcohol and anger did interact to influence participants' other-referent aggression scores, suggesting the two do come together to increase violent responding. How should the disparate findings across self-referent and other-referent scores be interpreted? As previously noted, one possibility is that participants may have engaged in a self-serving bias and thus under-reported their aggressivity in the self-referent aggression scores. However, other explanations remain.

For example, the discrepant self-referent and other-referent results may merely be an artifact of the study's methodology. The potential for methodological artifacts to influence alcohol/aggression results has been previously documented. Lipsey and his colleagues (1997) found differential effect size estimates for the alcohol/aggression relationship across various methodological features (e.g., use of provocation, type of aggression paradigm used). Note that because of the homogeneity in the operationalization of aggression, Lipsey et al. were unable to examine how variations in the measurement of dependent variable might impact the outcome of the study. Ultimately, then, the differences in the self-referent aggression and

other-referent aggression findings reported here are reduced to a methodological issue that requires further study.

Findings with respect to Hypothesis 2 and 3 are more clear. Alcohol and anger were predicted to have independent and interactive effects on participants' perceived benefits and costs of physical assault. In general, no support was found for these hypotheses. Findings from the current study indicate that alcohol and anger have little power to make aggressive responding appear more pleasurable (increasing X_B) and less painful (decreasing X_C). Why this study failed to support—and in some instances contradict—prior research is not immediately clear. However, one possibility may lie in the nature of the sample. Research suggests that participants with above-average cognitive abilities are insulated from alcohol's ability to minimize the negative outcomes associated with aggression, and they are less likely to be aggressive (Hoaken, Assaad, and Pihl, 1998; Lau et al., 1995; Lau and Pihl, 1996). Thus, perhaps this study's college-based sample had cortical functioning levels that were sufficiently high, allowing them to continue to accurately perceive the consequences of aggression. Such an explanation is speculative, however, in that no data were collected that allow for a comparison of participants' cognitive abilities relative to those of the general population.

The test of Hypothesis 4, which states that the effects of alcohol and anger on aggression are mediated by perceptions of costs and benefits, was limited to an analysis of participants' other-referent aggression scores. After controlling for participants' perceived costs and benefits of physical assault, alcohol and anger continued to interact to influence other-referent aggression scores—an effect that would appear to be direct. Such a finding runs contrary to the cognitive disruption theories commonly thought to explain the alcohol/aggression relationship, and to the founding assumptions of the rational choice model. This leads to two possible conclusions, one methodological and one theoretical.

First, perhaps the rational choice model examined here was misspecified. Although the benefits of violence (such as preserving one's dignity and feelings of domination) as well as the costs of violence (such as social censure, arrest, expulsion) were modeled after those used in previous tests of rational choice, perhaps the study omitted a cost/benefit item that is of great importance to this sample's decision-making processes. If such an omitted variable bias was present, the possibility remains that the rational choice perspective does indeed explain intoxicated/angry violence accurately, but that this study was unable to document the model's true explanatory power.

A second (and more theoretical) explanation is that intoxicated/angry violence is not rational as defined by the rational choice perspective. Perhaps when intoxicated and angry, rationality is compromised such that

mankind is in fact no longer "under the governance of two sovereign masters, pain and pleasure" (Bentham, 1789:11). In other words, the relative importance placed on the perceived benefits and costs of violence (β_1 and β_2) when intoxicated and angry may be fully different from that placed on these perceptions while sober and calm.

Hypothesis 5 further examined the robustness of the rational choice model across experimental conditions. Across levels of intoxication and anger, the rational choice variables explained differential proportions of the variance in participants' aggression scores. This pattern was seen most clearly with self-referent aggression measures, in which the cost/benefit items explained only 26% of the variance among Alcohol/Anger participants, but approximately two to three times more variance among participants in the remaining conditions. Furthermore, the structural integrity of the models was found to vary across experimental conditions such that although certain costs and benefits mattered greatly to sober/calm participants, these same costs and benefits were of lesser importance to other participants.

These findings suggest there is no single rational choice model that underlies the decision to engage in physical assault. Within the hedonic calculus, perceived costs and benefits do not carry the same relative weight across "hot" and "cold" cognitive states. Among those in the intoxicated and/or angry conditions, costs and benefits were of lesser importance in the decision to aggress than to those in a sober/calm frame of mind.

IMPLICATIONS

Because this study is one of the first designed specifically to test a cognitive disruption explanation of intoxicated aggression, the lack of support for this model is noteworthy. Alcohol and anger interacted to increase (other-referent) aggressive intentions above and beyond the impact of selected cognitive mediators. Future alcohol/aggression research should therefore seek to assess the impact of alcohol on cognitive functioning and any resulting impact on aggressive behavior within the same study. Such a design would allow for a more formal test of the cognitive disruption model, as opposed to the post-hoc and circumstantial support commonly found in the literature. If this future research replicates the findings of the current study, researchers will need to rethink the alcohol/aggression relationship. Perhaps—as suggested here—alcohol does indeed have a direct effect on aggression, but only under conditions of high provocation.

Furthermore, additional research is needed to examine the intra-individual level factors that may affect the assumptions of the rational choice model. For example, the current study suggests that emotional states such as anger may impact the perceived consequences of a violent, criminal act

($p < 0.10$). Future researchers should therefore consider expanding tests of the rational choice perspective to include the role of emotions, an area of study that has been commonly omitted from choice-based theories of offending (Bouffard et al., 2000). At the same time, however, future tests of rational choice should also recognize the potential impact psychopharmacological agents such as alcohol may play in decision-making processes. The inclusion of these types of intra-individual factors will allow researchers to identify those states of mind that may bound rationality and increase the likelihood of criminal behavior.

Finally, future research is necessary to examine the rational choice model's assumption of generality. Perhaps the rational choice model does not explain violent behavior equally well across different states of mind. Instead, as suggested by the analysis of self-referent aggression scores, perhaps the model may only explain "cool-headed" behavior but then breaks down when individuals are in an emotionally charged state. Results from the current study indicate that the relative weights assigned to participants' perceptions of costs/benefits are differentially affected across experimental conditions. Such a finding suggests that the structural integrity of the rational choice model is compromised by the individual's level of intoxication and anger. Furthermore, in both the bivariate and multivariate analyses, the traditional deterrence variables had no sizeable impact in the current study. Clearly, more research in this area is necessary, but these findings suggest that increasing formal legal sanctions will have little impact on deterring the intoxicated, violent offender.

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