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Agreeableness and Alcohol-Related Aggression: The Mediating Effect of Trait Aggressivity

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Abstract

This study investigated the mediating effect of trait aggressivity on the relation between agreeableness and alcohol-related aggression in a laboratory setting. Participants were 116 healthy male social drinkers between 21 and 30 years of age. Agreeableness and trait aggressivity were measured using the *Big Five Inventory* and the *Buss-Perry Aggression Questionnaire*, respectively. Following the consumption of an alcohol or no-alcohol control beverage, participants completed a modified version of the *Taylor Aggression Paradigm*, in which electric shocks were received from and administered to a fictitious opponent during a competitive task. Aggression was operationalized as the proportion of the most extreme shocks delivered to the fictitious opponent under conditions of low and high provocation. Results indicated that lower levels of agreeableness were associated with higher levels of trait aggressivity. In turn, higher levels of trait aggressivity predicted extreme aggression in intoxicated, but not sober, participants under low, but not high, provocation. Findings highlight the importance of examining determinants of intoxicated aggression within a broader theoretical framework of personality.

Keywords

Alcohol; Aggressive Behavior; Personality; Agreeableness

Substantial literature has demonstrated that acute alcohol consumption facilitates aggressive behavior (Pridemore, 2004; Wells, Graham, & West, 2000). Correlational studies have indicated that 40%–50% of violent crimes and approximately 78% of assaults involved the perpetrator's use of alcohol at the time of the offense (Murdoch, Pihl, & Ross, 1990; Pernanen, 1991). Relatedly, in laboratory investigations that allow participants to aggress against other individuals under the guise of a competitive task, it has been demonstrated that acute alcohol consumption significantly increases aggression compared with non-alcoholic or placebo beverages (reviewed in Bushman & Cooper, 1990; Chermack & Giancola, 1997; Kelly & Cherek, 1993; Taylor & Chermack, 1993). Finally, the financial costs of the association between alcohol and crime in the United States has been estimated to exceed \$205 billion (Miller, Levy, Cohen, & Cox, 2006). Given the significant social and public health ramifications of the alcohol-aggression association, identification of persons who are most at risk for intoxicated aggression continues to be a chief endeavor.

Research has demonstrated that intoxicated aggression is facilitated primarily by the pharmacological properties of alcohol that serve to decrease behavioral inhibition by diminishing fear responses (Ito, Miller, & Pollack, 1996; Pihl, Peterson, & Lau, 1993), increasing physiological and psychological arousal (Giancola & Zeichner, 1997; Graham, Wells, & West, 1997), and disrupting higher-order cognitive functioning (Giancola, 2004; Steele & Josephs, 1990). Despite these pharmacological effects, alcohol does not increase aggression in all situations or in all persons. For instance, situational factors such as provocation (Giancola et al., 2002), non-aggressive norms (Jeavons & Taylor, 1985), social pressure (Taylor & Sears, 1988), and drinking setting (Tremblay, Graham, & Wells, 2008) have all been shown to moderate the alcohol-aggression link. Moreover, theorists have similarly emphasized the moderating role of individual differences, particularly personality traits, in the alcohol-aggression relation (Chermack & Giancola, 1997). Conceptually, it is thought that alcohol facilitates aggression to a greater extent among individuals who are predisposed to behave aggressively (Collins, Schlenger, & Jordan, 1988; Pernanen, 1991). Consistent with this view, studies indicate that higher levels of trait aggressivity (Bailey & Taylor, 1991; Giancola, 2002a), irritability (Giancola, 2002b), and trait anger (Parrott & Zeichner, 2002) as well as lower levels of dispositional empathy (Giancola, 2003) and anger control (Parrott & Giancola, 2004) all potentiate the expression of intoxicated aggression.

Findings from the above investigations also indicate that aggression tends to increase in response to rising levels of provocation (Giancola et al., 2002; Lau & Pihl, 1994; Taylor & Gammon, 1975). In fact, provocation has been shown to be one of the most powerful potentiators of human aggression both in and out of the laboratory (e.g., Anderson & Bushman, 2002; Bettencourt & Miller, 1996; Geen, 2001). It is therefore noteworthy that a key meta-analysis demonstrated that alcohol has a greater effect on aggression under conditions of low, rather than high, provocation (Ito et al., 1996). Specifically, because high provocation has such a strong impact on aggression, alcohol is unlikely to significantly add to this effect. However, inasmuch as low provocation has a smaller effect on aggression, alcohol has “more room” to make a large impact.

One of the numerous personality traits found to moderate the alcohol-aggression relation is trait aggressivity, which reflects one’s dispositional predilection to engage in aggressive behavior (Buss & Perry, 1992). Compared with others, this variable has arguably received the most empirical attention as a potential risk factor for alcohol-related violent behavior. Specifically, laboratory studies have consistently shown that acute alcohol intoxication increases aggressive behavior to a greater extent among individuals who report higher, relative to lower, levels of trait aggressivity (Bailey & Taylor, 1991; Eckhardt & Crane, 2008; Giancola, 2002a; Giancola, Godlaski, & Parrott, 2006; Giancola & Zeichner, 1995; Moeller, Dougherty, Lane, Steinberg, & Cherek, 1998).

Studies that employed survey methodologies on this topic have reported similar results as the laboratory studies reviewed above (e.g., Barnwell, Borders, & Earleywine, 2006; Fishbein, Jaffe, Snyder, Haertzen, & Hickey, 1993; Trembley, Graham, & Wells, 2008). This pattern of findings has also been demonstrated in barroom settings (Trembley et al., 2008; Wells, Mihic, Tremblay, Graham, & Demers, 2008) as well as in the confines of intimate partner relationships (Heyman, O’Leary, & Jouriles, 1995; O’Farrell, Murphy, Stephan, Fals-Stewart, & Murphy, 2004; Stuart et al., 2006). To explain this consistent constellation of results, contemporary theorists suggest that alcohol increases violent behavior in persons with high trait aggressivity by virtue of disinhibiting pre-existing characterological and/or biological sensitivities toward angry and hostile cognitions, particularly when provoked (Anderson & Bushman, 2002; Giancola, 2002a).

While a number of studies have focused on the link between specific individual difference traits, particularly trait aggressivity, and intoxicated aggression, there are virtually no *a priori* investigations of the link between dispositional traits and intoxicated aggression within the framework of a well-established theoretical model of personality. Such efforts will advance theory and provide a more parsimonious understanding of how personality contributes to intoxicated aggression. To this end, numerous researchers have argued that the five-factor model of personality (Costa & McCrae, 1992) is useful for furthering our understanding of the link between personality and aggression (Bettencourt, Talley, Benjamin, & Valentine, 2006; Miller, Lynam, & Leukefeld, 2003). The five-factor model posits that personality is comprised of five trait dimensions: extraversion, agreeableness, conscientiousness, neuroticism and openness to experience (Costa & McCrae, 1992). In contrast to other dimensions of personality that have been associated with aggressive behavior, such as neuroticism (e.g., Burton, Hafetz, & Henninger, 2007), extraversion (e.g., Smits & De Boeck, 2007), or openness to experience (e.g., Leonard, Quigley, & Collins, 2003), evidence suggests that agreeableness may be the most robust predictor of sober aggression across a variety of situations (e.g., Bettencourt et al., 2006; Miller et al., 2003; Sharpe & Desai, 2001).

Agreeableness reflects the degree to which individuals differ in the development and maintenance of prosocial relationships (Costa & McCrae, 1992; Digman, 1997; Graziano & Eisenberg, 1997). Most pertinent to the study of aggressive behavior, persons who are low in agreeableness are antagonistic, hostile, irritable, and mistrustful of others; they also seem to have a need to punish people they perceive to have provoked them as well as a lack of adaptive emotional expression and attachment (Costa, McCrae, & Dembroski, 1989; John & Srivastava, 1999; Miller & Lynam, 2001; Widiger & Lynam, 1998). Not surprisingly, low agreeableness has been associated with non-intoxicated aggression (reviewed in Bettencourt et al., 2006; Costa et al., 1989) as well as intoxicated aggression (Leonard et al., 2003; Grekin, Sher, & Larkins, 2004). To explain this robust link, researchers have suggested that persons low in agreeableness exhibit aggression-facilitating biases in their processing of threat-related information that can lead to a greater sensitivity toward angry affect and hostile cognitions (Graziano, Jensen-Campbell, & Hair, 1996; Leonard et al., 2003). Recent empirical evidence appears to support this view among sober men (Meier, Robison, & Wilkowski, 2006). In addition, research suggests that low agreeable persons' processing of threat-related information may be particularly effortful, and therefore less effective, relative to high agreeable individuals (Haas, Omura, Constable, & Canli, 2007). Interestingly, it is well established that acute alcohol intoxication interferes with the processing of threat-related cues/information (Pihl, Peterson, & Lau, 1993; Steele & Josephs, 1990; Zeichner, Allen, Petrie, Rasmussen, & Giancola, 1993). Taken together, these findings provide reasonable support to argue the position that alcohol is more likely to facilitate physical aggression in persons with low agreeableness by disinhibiting a pre-existing sensitivity toward angry affect and hostile cognitions that is fueled by their faulty processing of threat-related cues (Leonard et al., 2003; Giancola, 2002a; Graziano et al., 1996; Grekin et al., 2004).

The five-factor theory posits that each dimension of personality, together with environmental influences, leads to the development of more specific behavioral tendencies (John & Srivastava, 1999; McCrae & Costa, 1996; 1999; 2008; Wiggins & Trapnell, 1997). For example, low levels of agreeableness are posited to give rise to a variety of behavioral tendencies, including an increased likelihood of being uncooperative, distrustful, and antagonistic (McCrae & Costa, 1996; 1999; 2008). In addition, research indicates that low agreeableness is related to high trait aggressivity (Caprara, Barbaranelli, & Zimbardo, 1996; Sharpe & Desai, 2001). As such, it can be argued that low agreeableness also gives rise to higher levels of trait aggressivity which, in turn, is a more specific risk factor for intoxicated aggression (Eckhardt & Crane, 2008; Giancola, 2002a; Parrott & Zeichner, 2002). To date, this hypothesis has not been empirically tested. Thus, a logical next step in this line of research

is to elucidate a pathway linking agreeableness, trait aggressivity, and intoxicated aggression within the well-established theoretical framework of the five-factor model.

As such, the current investigation sought to examine the abovenoted theoretically-based pathway using a laboratory measure of physical aggression. We advanced an overarching hypothesis of moderated mediation, such that trait aggressivity would more strongly account for the relationship between agreeableness and intoxicated, relative to sober, physical aggression. Specifically, we hypothesized that agreeableness would be negatively associated with trait aggressivity. In turn, the relation between trait aggressivity and *in vivo* physical aggression would be greater among intoxicated versus sober participants. This particular prediction is based upon research showing that alcohol is more likely to increase aggression in persons with higher, rather than lower, levels of trait aggressivity (Bailey & Taylor, 1991; Barnwell et al., 2006; Eckhardt & Crane, 2008; Giancola, 2002a; Giancola et al., 2006; Giancola & Zeichner, 1995; Moeller et al., 1998; Trembley et al., 2008). Finally, as noted above, given that alcohol has a greater effect on aggression under conditions of low, rather than high, provocation (e.g., Ito et al., 1996) we hypothesized that this model would be more pronounced under conditions of low, relative to high, provocation.

Method

Participants and Recruitment

Male social drinkers ($n = 128$) between 21 and 30 years of age ($M = 24.4$; $SD = 2.7$) were recruited from the Atlanta, GA metropolitan area via advertisements placed in local newspapers. Social drinking was defined as consuming at least three drinks per occasion at least twice per month. While studies have shown that women can be aggressive under certain circumstances (Bettencourt & Miller, 1996), most laboratory research has demonstrated that alcohol does not increase direct physical aggression in women (Giancola et al., 2002; Gussler-Burkhardt & Giancola, 2005; Hoaken & Pihl, 2000) and that men are more likely than women to display extreme levels of aggression (Giancola et al., 2002; Richardson, Vandenberg, & Humphries, 1986). Moreover, crime statistics indicate that compared with women, men are disproportionately more aggressive (Bureau of Justice Statistics, 2001) and more likely to inflict physical injury during violent encounters (Archer, 2000). Thus, although individual differences in women's susceptibility to alcohol's effect on aggression do exist, this initial study of the link between agreeableness, trait aggressivity, and intoxicated aggression examined only men.

Respondents were initially screened by telephone. Those who reported past or present drug- or alcohol-related problems, serious head injuries, learning disabilities, or serious psychotic symptomatology were excluded from participation. Participants were also screened for alcohol use problems with the *Brief Michigan Alcoholism Screening Test (BMAST)* (Pokorny, Miller, & Kaplan, 1972). Any participant who scored a "6" or higher on the BMAST was excluded from the study. Finally, any participant who arrived to the laboratory with a positive breath alcohol concentration (BrAC) was not tested and was given an opportunity to reschedule another appointment.

The racial composition of the final sample consisted of 56% African Americans, 34% Caucasians, 2% Asian Americans, 2% Hispanics/Latinos, and 6% who identified as another race. The sample had an average of 15.8 years of education, earned \$30,468 per year, and 84% had never been married.

Pre-laboratory Procedures

Within one week of completing the telephone screening interview, eligible participants were contacted by phone and scheduled for an appointment to come to the laboratory. They were told to refrain from drinking alcohol for 24 hours prior to testing and also to refrain from recreational drug use from the time of the telephone interview. Additionally, participants were told to refrain from eating four hours prior to testing. Participants were told that they would be compensated at a rate of \$15 per hour upon completion of the study. Ineligible participants were also contacted by phone, informed that they will not be eligible to participate, and thanked for their interest.

Experimental Design

This study had four predictor variables: agreeableness, trait aggressivity, beverage (alcohol; no alcohol control), and provocation (low, high). All participants received both levels of provocation thus making it a repeated measure. Participants were randomly assigned to either the alcohol or no alcohol control group prior to arrival. A no-alcohol control group (i.e., receive no alcohol, told no alcohol) was used to account for the pharmacological effects of alcohol intoxication on aggression. Although many laboratory-based studies of the alcohol-aggression relation have employed placebo groups (i.e., receive no alcohol, told alcohol), only one study has shown that participants in a placebo group displayed higher levels of aggression than participants in a no-alcohol control group (Lang, Goeckner, Adesso, & Marlatt, 1975). Moreover, while placebo groups are sometimes more likely to produce compensatory responses that could reduce aggression relative to no alcohol control groups (Bushman & Cooper, 1990), meta-analytic studies generally demonstrate that placebo and no alcohol control groups do not significantly differ in aggression (Bushman, 1993; Hull & Bond, 1986; Steele & Southwick, 1985). For these reasons, as well as the fact that placebo beverages are typically not consumed in “real world” situations, a no alcohol control group was deemed preferable.

Personality Measures

Big Five Inventory (BFI; John & Srivastava, 1999)—The Big Five Inventory was used to measure personality dimensions based on the five-factor model. This questionnaire included 44 items that were scored on a 5-point Likert scale ranging from 1 (disagree strongly) to 5 (agree strongly). The BFI consisted of five subscales: extraversion, agreeableness, conscientiousness, neuroticism and openness to experience. For the purpose of the current study, only agreeableness was examined. Total scores on this subscale range from 9 to 45, with lower scores corresponding to lower levels of agreeableness. John and Srivastava (1999) reported a coefficient alpha for the agreeableness subscale of .81, which was consistent with the present sample ($\alpha = .75$).

Buss-Perry Aggression Questionnaire (BAQ; Buss & Perry, 1992)—This 29-item self-report measure assessed trait/dispositional tendencies toward physical aggression, verbal aggression, anger, and hostility. For the purpose of the present study, the physical aggression subscale was used to index trait aggressivity as this particular scale has been shown to be an effective moderator of the alcohol-aggression relation in other studies (Bailey & Taylor, 1991; Eckhardt & Crane, 2008; Giancola, 2002a). Items are scored on a 5-point Likert scale, ranging from 1 (extremely uncharacteristic of me) to 5 (extremely characteristic of me). Total scores range from 9 to 45, with higher scores corresponding to higher levels of trait aggressivity. For the physical aggression subscale, Buss and Perry (1992) report an alpha coefficient of .85. In the present sample, the alpha reliability coefficient for the subscale was .76.

Beverage Administration

Men who received alcohol ($n = 56$) were administered a dose of 1g/kg of 95% alcohol USP mixed at a 1:5 ratio with Tropicana orange juice. Beverages were poured into the requisite number of glasses in equal quantities. The dosing procedure was also calculated for participants in the no alcohol control group, however, they received an isovolemic beverage consisting of only orange juice (i.e., the missing alcohol portion was replaced with orange juice). Participants in the alcohol group were not given any information regarding what to expect from their beverages other than they would receive the equivalent of “about three or four mixed drinks.” During beverage administration, two participants reported that their continued alcohol consumption would result in an undesirable level of intoxication. Subsequently, they voluntarily discontinued participation. Participants in the no alcohol control group ($n = 60$) were explicitly told that their beverage did not contain any alcohol.

Aggression Task

A modified version of the *Taylor Aggression Paradigm* (TAP; Taylor, 1967) was used to measure physical aggression. The hardware for the task was developed by Coulbourn Instruments (Allentown, PA) and the computer software was developed by Vibranz Creative Group (Lexington, KY). Participants were seated at a table in a small room. On the table facing the participant was a computer screen and a keyboard. Red adhesive labels marked “1” through “10” were attached to the number keys running across the top of the keyboard. The labels “low” and “high” were placed above keys “1” and “10,” respectively, to indicate the subjective levels of shock corresponding to the number keys. The keyboard and monitor were connected to a computer located in an adjacent control room out of the participant’s view. The task was presented as a reaction-time competition, in which the participant competes against a fictitious participant who is ostensibly “seated in an adjacent room.” As a part of the competition, electrical shocks are received from, and ostensibly administered to, the fictitious opponent. The TAP and other similar laboratory paradigms have consistently been shown to be safe and valid measures of aggressive behavior (Anderson & Bushman, 1997; Giancola & Chermack, 1998; Giancola & Parrott, 2008).

Although average shock intensity is the more traditional measure of aggression when using the TAP, for this particular investigation we added the variable of extreme aggression in response to rising levels of provocation. It has been argued that the extreme shock option is a more severe and unequivocal index of aggression (Berman, McCloskey, Fanning, Schumacher, & Coccaro, 2009; Taylor, Schmutte, Leonard, & Cranston, 1979). Indeed, as a measure of aggression, average shock intensity may obscure the use of the one clearly aggressive response (i.e., number of “10s” selected) among a range of other less intense shock selections. Moreover, intent to harm (a key aspect of aggression; Baron & Richardson, 1994) has been argued to be better captured by an index of extreme aggression rather than a more general measure of overall aggression such as average shock intensity (Berman et al., 2009). Additionally, it has been argued that aggression across species occurs in sporadic bursts (Miezek, Fish, de Bold, & de Almeida, 2002), which are more congruent with the use of an extreme shock option. For these reasons, participants’ use of extreme shock, as opposed to average shock intensity, better mirrors aggression that occurs in naturalistic settings. In this study, extreme aggression on the TAP was operationalized as the proportion of trials that the participant selected the highest available shock intensity (i.e., a “10”) within each provocation condition. The selection of “10’s” has been argued to reflect one’s tendency to exhibit extreme levels of aggression (Chermack & Taylor, 1995; Giancola, 2002a).

Procedure

Upon arrival to the laboratory, the procedures of the study were explained to participants and informed consent was obtained. Participants’ BrACs were then assessed using the Alco-Sensor

IV breath analyzer (Intoximeters Inc, St-Louis, MO) to ensure sobriety. Demographic data and alcohol consumption patterns during the past year were collected and then participants completed the BFI and the BAQ on a computer using MediaLab 2000 software (Empirisoft Research Software, Philadelphia, PA). This procedure did not result in any missing data for demographic, drinking, or personality measures.

Participants were then taken to the testing room where they were provided with instructions for the TAP and received their beverages. They were allowed 20 minutes for beverage consumption. After beverage consumption, their pain thresholds and tolerances (described below) were assessed to determine the intensity parameters for the shocks they would receive during the task. In order to allow the alcohol to be sufficiently absorbed into the bloodstream, those in the alcohol group had their pain thresholds and tolerances tested approximately 15 minutes after they finished their drinks. Additionally, those in the no-alcohol condition waited 15 minutes to have their pain thresholds and tolerances tested after they finished their drinks. BrACs were measured immediately following the pain threshold and tolerance testing. Inasmuch as it has been found that the aggression-potentiating effects of alcohol are more likely to occur on the ascending limb of the BrAC curve (Giancola & Zeichner, 1997) and also because a BrAC of .08% is effective in producing robust levels of aggression (Giancola & Zeichner, 1997; Gustafson, 1992) the alcohol group began the task shortly after they reached an ascending BrAC of at least .08%.

Assessment of participants' pain thresholds and tolerances was accomplished via the administration of short-duration shocks (1 sec) presented in an incremental stepwise intensity method from the lowest available shock setting, which is imperceptible, until the shocks reached a reportedly painful level. All shocks were administered through two electrodes that were attached to the index and middle fingers of the non-dominant hand. Participants were instructed to inform the experimenter when the shocks were "first detectable" and then when they reached a "painful" level. This threshold and tolerance determination was conducted while participants were seated in the testing room and the experimenter was in an adjacent control room. They communicated through the use of an intercom and video camera.

Following the pain threshold and tolerance testing, participants were again provided with instructions for the TAP. They were informed that shortly after the words "Get Ready" appeared on the screen, the words "Press the Spacebar" would appear during which they were to press, and hold down, the spacebar. Following this, the words "Release the Spacebar" appeared at which time they had to lift their fingers off the spacebar as quickly as possible. One of two possible outcomes existed. If participants "won," they saw the words "You Won. You Get to Give a Shock." If they "lost," the words "You Lost. You Get a Shock" appeared. A winning trial allowed participants to deliver a shock to their opponent and a losing trial resulted in receiving a shock from their "opponent." As mentioned previously, participants had the option of choosing from 10 different shock intensities to administer at the end of each winning trial. Participants were required to shock their opponent. That is, following a winning trial, the task paused until a shock was selected. However, participants were informed that selecting a shock intensity of "1" delivered a very low intensity shock that was best characterized as "very mild" and "definitely not painful." The computer screen displayed participants' shock selections via a specially designed "volt meter" and by the illumination of one of 10 "shock lights" ranging from 1 (*low*) to 10 (*high*). This feedback was used to help reinforce the belief that they were actually administering shocks and to inform them of the level of shock that their "opponent" selected. Regardless of beverage group assignment, all participants were told that their opponent was intoxicated. This was done to ensure that the "drinking status" of the opponent did not have a confounding effect on potential beverage group differences in aggression.

The entire procedure consisted of two successive blocks of trials. During the first block (i.e., low provocation), participants received shock intensities between “1” and “2” after they lost a trial. During the next block (i.e., high provocation), they received shock intensities between “9” and “10” after they lost a trial. Each block consisted of 16 trials (8 wins and 8 losses). There were two transition trials between the blocks. Participants “lost” both of these transition trials and received shock intensities of “5” and “6,” respectively. These two trials were added to provide a smooth transition between the low and high provocation blocks. In all, there were a total of 34 trials. Provocation conditions were not counterbalanced, as all participants experienced the low provocation condition first. It has been argued that utilizing this low-high sequence adds external validity to the task as it best reflects an escalating aggressive interaction between individuals in “real-life” situations (Taylor & Chermack, 1993). All shocks delivered to participants were of a 1 second duration.

In actuality, reaction-times were not measured and the purpose of the competitive task was to convince participants that they were engaging in an adversarial interaction with another individual. The win/loss sequence was predetermined and controlled by the computer program that executed the task. All participants received the same sequence of wins and losses even though the sequence was presented in a randomized order. The computer program controlled the initiation of trials, the administration of shocks to participants, and recorded all their responses. The trials were interspersed by 5 second intervals. The experimenter, other electronic equipment, and the computer that controlled the task were located in an adjacent control room out of the participants’ view.

Immediately before beginning the TAP, BrACs were measured for all participants. They were also asked a variety of questions to indirectly assess the credibility of the experimental manipulation (see below). Participants were then debriefed and compensated. All individuals who received alcohol were required to remain in the laboratory until their BrAC dropped to .03%.

Deception manipulation

In order to disguise the task as a measure of aggression, participants were given a fictitious cover story. They were informed that the study was aimed at “understanding the relationship between alcohol and reaction-time under competitive conditions.” To convince participants that they were actually competing against another person, a male confederate was seated in a chair in the hallway near the participants testing room. As the experimenter led participants into the testing room, he identified the confederate as the “opponent.” There was no opportunity for any interaction between participants and the confederate. Also, immediately prior to testing the participants’ pain thresholds and tolerances, they were informed that their competitor would undergo the same threshold/tolerance testing procedure first. They were also informed that they could hear their opponent’s responses over an intercom that ostensibly served the two testing rooms and the control room. In actuality, the confederate’s answers to the experimenter’s questions regarding the testing of his pain threshold and tolerance were pre-recorded. All participants heard the same experimenter-confederate verbal exchange. In actuality, there was no real opponent.

Results

Manipulation Checks

To determine the integrity of the TAP data, participants were administered a brief interview before debriefing in which they were asked to describe their impression of their opponent and whether they believed that the task was a good measure of reaction-time. Criteria for exclusion were the participant’s belief that the “opponent” was fictitious and that the task was a measure

of aggression. The deception manipulation appeared successful. All participants indicated that the task was a good measure of reaction-time. Typical responses regarding the opponent included “he was fast,” “he was fair,” “he was ok,” and so on. Ten individuals (8%) reported that they did not believe that they competed against another person and were thus removed from subsequent analyses. This resulted in a final sample of 116 participants. Otherwise, no participant raised any suspicion about the credibility of the task.

Preliminary Analysis

Demographic data—Random group assignment was expected to ensure that the experimental groups did not differ on demographic or dispositional variables. Nonetheless, prior to hypothesis testing, it was necessary to confirm this assumption. As such, a series of one-way analyses of variance (ANOVA) were conducted with pertinent demographic characteristics, drinking variables, trait aggressivity, and agreeableness as the dependent variables. No significant group differences were found for age, years of education, income, frequency of alcohol consumption, drinks per drinking day in past 12 months, frequency of heavy consumption (5+ drinks) in the past 12 months, B-MAST, trait aggressivity, or agreeableness. A chi-square analysis did not detect a significant difference in the racial composition of the two beverage groups. Additionally, mean agreeableness and trait aggressivity scores were 36.12 ($SD = 5.24$) and 19.42 ($SD = 6.07$), respectively. A significant negative correlation between these variables was detected ($r = -.38, p < .01$). Computation of the variance inflation factor (VIF) and tolerance confirmed that multicollinearity was not an issue in these data (i.e., $VIF < 10$; tolerance $> .10$).

BrAC Levels—All participants presented with an initial BrAC of 0%. A repeated measures ANOVA indicated that participants' in the alcohol group had significantly higher post-TAP ($M = .11, SD = .02$) than pre-TAP ($M = .093, SD = .02$) BrACs, $F(1, 55) = 109.95, p < .001$. Means indicated that participants were on the ascending limb of the BrAC curve.

Regression Analysis

The current investigation sought to test a theoretically-based model of alcohol-related aggression. It was hypothesized that agreeableness would be negatively associated with trait aggressivity. In turn, higher levels of trait aggressivity were expected to predict increased aggression on the TAP among intoxicated, but not sober, participants. Moreover, this effect was predicted to be stronger under conditions of low versus high provocation.

We tested our hypothesis using the techniques described in Muller, Judd, and Yzerbyt (2005) for moderated mediation. Specifically, we computed three separate regression models for the TAP dependent measure at both levels of provocation. Prior to computing the regression models, raw scores for agreeableness and trait aggressivity were first converted into z -scores. To standardize the categorical variable (i.e., beverage group), dummy coding was employed. Standardizing these first-order variables automatically centers the values (i.e., deviation scores with a mean of zero) which reduces multicollinearity between interaction terms and their constituent lower-order terms (Aiken & West, 1991). Interaction terms were then calculated by obtaining cross-products of pertinent first order variables. The parameter estimates for interaction terms are reported as unstandardized bs , whereas those for main effects and simple slopes are reported as standardized β s. According to the procedures put forth in Aiken and West (1991), significant interaction terms were interpreted by plotting the effect and testing to determine whether the slopes of the simple regression lines differed significantly from zero.

Separate linear regression models were computed in accordance with guidelines put forth by Muller et al., (2005). In the first model, the dependent variable (aggression on the TAP) was regressed onto the predictor (i.e., agreeableness), the moderator (i.e., beverage condition), and

the agreeableness X beverage condition interaction. In the second model, the proposed mediating variable (i.e., trait aggressivity) was regressed onto agreeableness, beverage condition, and the agreeableness X beverage condition interaction. In the third model, the dependent variable was regressed onto agreeableness, trait aggressivity, beverage condition, the Agreeableness X Beverage condition interaction, and the Trait Aggressivity X Beverage condition interaction. In order to demonstrate the occurrence of moderated mediation, the effect of agreeableness must be significant (Model 1), the Agreeableness X Beverage interaction must not be significant (Model 1), and agreeableness (Model 2) as well as the Trait Aggressivity X Beverage interaction (Model 3) must also be significant.

Effects of Agreeableness, Trait Aggressivity, and Beverage on TAP Aggression Following Low Provocation

In the first model, Step 1 was significant, $F(2, 113) = 4.76, p < .01, R^2 = .078$. Agreeableness ($\beta = -.16, p < .05$) and beverage ($\beta = -.22, p < .05$) were the both significant. This indicated that lower agreeableness and alcohol intoxication were independently associated with higher levels of extreme aggression under low provocation. Step 2 was also significant, $F(3, 112) = 3.16, p < .05, R^2 = .078$. In this step, the Agreeableness X Beverage condition interaction term was not significant, indicating that the relation between agreeableness and extreme aggression was not moderated by beverage condition.

In the second model, Step 1 was significant, $F(2, 113) = 9.51, p < .001, R^2 = .14$. Agreeableness ($\beta = -.37, p < .001$) was the only significant effect in this model. Step 2 was also significant, $F(3, 112) = 7.68, p < .001, R^2 = .17$. In this step, the Agreeableness X Beverage interaction term was not significant. These findings indicated that lower levels of agreeableness were associated with higher levels of trait aggressivity and that this relation was not moderated by beverage group.

The third model was significant, $F(5, 110) = 3.35, p < .01, R^2 = .132$. The Trait Aggressivity X Beverage condition interaction term was significant ($b = -.10, p < .05$) and the previously significant effect of agreeableness was rendered non-significant ($\beta = .02, p = .876$). A plot of this interaction revealed that the relation between trait aggressivity and extreme aggression was significant among intoxicated ($\beta = .30, p < .05$) but not sober ($\beta = -.19, p = .170$) participants who were minimally provoked (see Figure 1). Collectively, these results indicated that trait aggressivity mediated the effect of agreeableness on extreme aggression among intoxicated, but not sober, participants.¹

Although the reviewed theoretical and empirical literature supported this moderated mediational pathway, an alternative pathway with trait aggressivity as the predictor and agreeableness as the mediator is also plausible. To evaluate this possibility, the aforementioned regression models were recomputed. Results did not support this alternative path.

Effects of Agreeableness, Trait Aggressivity, and Beverage on Aggression Following High Provocation

In the first model, Step 1 was significant, $F(2, 113) = 3.28, p < .05, R^2 = .055$. Beverage condition ($\beta = -.24, p < .01$) was the only significant effect in the model, indicating that alcohol intoxication was associated with higher levels of extreme aggression under high provocation. Step 2 was also significant, $F(3, 112) = 3.02, p < .05, R^2 = .075$. In this step, the Agreeableness X Beverage condition interaction term was not significant. Because the relation between

¹Average shock intensity was computed by summing the total value of each shock selection and dividing by the number of shocks selected. When we repeated these analyses with average shock intensity as the dependent variable, the Trait Aggressivity X Beverage interaction was not significant. However, the pattern of associations between trait aggressivity and average shock intensity among intoxicated and sober men was similar to the pattern observed for extreme aggression.

agreeableness and extreme aggression was not significant, the first criterion for moderated mediation was not met. As such, subsequent regression models are not reported.

Discussion

Recent studies indicate that agreeableness and trait aggressivity independently predict alcohol-related physical aggression (e.g., Ekhardt & Crane, 2008; Giancola, 2002a; Leonard et al., 2003). Building on this research, the aim of the present investigation was to examine simultaneously these risk factors within a theoretically-based, multivariate pathway toward alcohol-related aggression. Specifically, we evaluated the extent to which trait aggressivity mediated the relation between agreeableness and intoxicated and non-intoxicated extreme physical aggression under conditions of low and high provocation.

The data supported our hypothesis. Consistent with previous literature examining determinants of non-intoxicated and intoxicated aggression (Bettencourt et al., 2006; Leonard et al., 2003), results indicated that low agreeableness was associated with higher trait aggressivity as well as extreme aggression under conditions of low, but not high, provocation. Additionally, it was found that alcohol intoxication moderated the relation between trait aggressivity and extreme aggression under low, but not high, provocation. This finding is also consistent with previous literature (e.g., Bailey & Taylor, 1991; Giancola, 2002a) and suggests that alcohol may facilitate aggression in high trait aggressive individuals by impairing the drinker's inhibition of pre-existing hostile cognitions and/or negative affect. It has been posited that alcohol impairs behavioral inhibition via the mechanisms of diminishing fear responses (e.g., Ito et al., 1996), increasing arousal (e.g., Giancola & Zeichner, 1997), and/or disrupting cognitive functioning (e.g., Steele & Josephs, 1990). Pertinently, it has been argued that certain dispositional traits (e.g., trait aggressivity) may increase the likelihood of individuals' susceptibility to alcohol's effects on these processes (Parrott & Giancola, 2004). Finally, and of greatest import, results indicated that trait aggressivity mediated the relation between agreeableness and extreme aggression among intoxicated, but not sober, participants under low provocation. As expected, this pattern of associations was not found in the high provocation condition.

One interpretation of the present findings involves the potential link between agreeableness and men's adherence to social norms that prohibit aggression. Specifically, it has been suggested that there are greater social constraints against engaging in extreme forms of aggressive behavior and, more generally, expressing clear intentions to harm others (Giancola et al., 2002). It has convincingly been argued, that by its very nature, extreme aggression on the TAP is an unequivocal form of aggression with an inherent intent to harm one's opponent (Berman et al., 2009). These arguments suggest that the multivariate pathway examined in the present study encompassed traits (i.e., agreeableness, trait aggressivity) that are strongly linked to men's willingness to harm others despite social norms which discourage such behavior. Indeed, low agreeableness is associated with feeling a need to punish others, callousness, a disregard for others, and antagonism (Costa et al., 1989). All of these descriptors are consistent with participants' desire to administer an extreme form of aggression. Moreover, empirical evidence supports the contention that persons low in agreeableness exhibit aggression-facilitating biases in their processing of threat-related information, which can lead to a greater sensitivity toward angry affect and hostile cognitions (e.g., Graziano et al., 1996; Leonard et al., 2003; Meier et al., 2006). Inasmuch as acute alcohol intoxication further interferes with these individuals' processing of threat-related cues/information (Pihl et al., 1993; Steele & Josephs, 1990) and facilitates the activation of aggression-promoting internal states, the likelihood of adhering to social norms that prohibit extreme forms of aggression is greatly reduced. More research is needed to directly examine this possibility.

Collectively, the present findings are consistent with the reviewed literature and suggest that low agreeableness contributes to the development of trait aggressivity which, in turn, is a more specific risk factor for intoxicated aggression. These results provide new evidence to suggest that trait aggressivity may be placed within a broader theoretical framework of personality in predicting intoxicated aggression. Given that the past twenty years has witnessed a proliferation of studies focusing on personality-based risk factors for alcohol-related aggression (e.g., Bailey & Taylor, 1991; Cheong & Nagoshi, 1999; Eckhardt & Crane, 2008; Parrott & Zeichner, 2002), this is a potentially important theoretical development. Specifically, these data suggest that previously identified risk factors for intoxicated aggression may be linked to one or more dimensions within the five-factor model. For instance, lower-level risk factors for intoxicated aggression that are associated with angry affect (e.g., anger control: Parrott & Giancola, 2004; trait anger: Parrott & Zeichner, 2002) may be chiefly associated with neuroticism, whereas those risk factors that are associated with aggression proneness (e.g., trait aggressivity: Giancola, 2002a; trait irritability: Giancola, 2002b) may be strongly related to agreeableness (reviewed in Bettencourt et al., 2006). Of course, this study did not aim to examine links between multiple determinants of intoxicated aggression and all dimensions of the five factor model. Nevertheless, others have noted that aggression research, including studies on the alcohol-aggression link, have studied personality-based determinants without reference to these fundamental dimensions of personality (e.g., Bettencourt et al., 2006). The present findings suggest that linking the multitude of identified risk factors for intoxicated aggression to the five-factor model can bridge this gap. Conducting such an exercise will help bring parsimony to the alcohol-aggression literature, in that it will clarify current findings, provide a rich personality literature to inform future research, and improve causal theories of alcohol-related aggression.

Linking risk factors, such as trait aggressivity, to the five factor model will also inform interventions for alcohol-related aggression. For instance, research suggests that individuals who are high in agreeableness tend to self-activate prosocial thoughts in hostile situations (Meier, Robinson, & Wilkowski, 2006), which in turn have been causally linked to the reduction of aggressive behavior in the laboratory (Meier, Wilkowski, & Robinson, 2008). Of course, while interventions that increase prosocial thinking are unlikely to “convert a disagreeable grouch into an agreeable saint, it might be possible to lessen the problematic consequences of aggression” (pp. 1387, Meier et al., 2008). Indeed, these data, coupled with the findings of the present study, suggest that similar approaches may help to attenuate the link between trait aggressivity and intoxicated aggression.

Several limitations of the present study merit discussion. First, a placebo group was not incorporated, which may have been beneficial in examining expectancy effects on alcohol-related aggression. However, while important for measuring the effects of alcohol expectancies on a variety of other behaviors, several meta-analytic studies have demonstrated that placebo groups do not differ from no-alcohol control groups in the expression of aggression (Bushman, 1993; Hull & Bond, 1986). Thus, it is unlikely that addition of a placebo group would have changed the present findings. Second, there is still debate concerning the ecological validity of laboratory aggression paradigms (Tedeschi & Quigley, 1996). However, along that same vein, it is important to note that several reviews have demonstrated that aggression assessed via these laboratory paradigms, including the TAP, does indeed generalize to naturalistic settings (Giancola & Chermack, 1998; Giancola & Parrott, 2008). Third, in accordance with the five-factor model (e.g., McCrae & Costa, 1999), this study presumed that broad personality dimensions (e.g., agreeableness) play a part in the development of lower-level personality characteristics (e.g., trait aggressivity). However, the present findings only reflect a cross-sectional glimpse into the posited dynamic, longitudinal association between these traits. Future longitudinal research is needed to address this limitation. Fourth, the current study did not examine lower level facets of agreeableness. Examination of these specific components of

agreeableness may provide more detailed evidence of the link between agreeableness and alcohol-related aggression. Finally, the present study did not examine simultaneously other dimensions of the five-factor model (e.g., neuroticism, extraversion) or associated traits (e.g., irritability, trait anger) that may have a role in predicting alcohol-related aggression. Indeed, use of more sophisticated multivariate models (e.g., structural equation modeling) would permit examination of all dimensions of the five-factor model and pertinent traits. Such investigations are likely to provide more definitive evidence of how these various aspects of personality contribute to men's risk for alcohol-related aggression.

In conclusion, the present findings, obtained from a diverse community sample, provide new evidence of the link between personality and alcohol-related aggression. Specifically, lower levels of agreeableness were associated with higher levels of trait aggressivity, which in turn predicted extreme aggression among intoxicated, but not sober, men. These findings demonstrate the importance of studying multivariate models of the alcohol-aggression link as well as placing existing findings within broader theories of personality.

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Figure 1.

Plot of regression lines depicting the relation between trait aggressivity and extreme aggression for intoxicated and sober participants under low provocation.