


The Impact of History of Aggression and Alcohol Use on Aggressive Responding in the Laboratory

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ABSTRACT: The current study examines how different levels of past aggression combined with self-reported levels of alcohol use impacted lab-based aggressive responding. Data were collected from 160 male undergraduate college students. Participants completed online measures of drinking (Alcohol Use Disorders Identification Test) and past aggression (Buss Perry Aggression Questionnaire) prior to a lab session assessing aggressive responding [Point Subtraction Aggression Paradigm (PSAP)]. Regression analyses revealed participants with “high” levels of past alcohol use and a history of “high” aggression were more likely to respond aggressively on the PSAP, a trend primarily driven by those with a history of physical aggression. For proactively aggressive participants, the risk for aggressive responding is greater in individuals with a history of physically aggressive behavior as they report higher alcohol use, relative to those “low” in past aggression. The interaction of alcohol use and past aggression was associated with continued aggressive behavior.

KEYWORDS: physical aggression, alcohol use, point subtraction aggression paradigm, gender

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Introduction

Alcohol use

Recent studies have found that nearly 80% of college students consume alcohol to some degree during their college career.¹ NSDUH data found that within the 60% of full-time college students reporting drinking within the past month, 39% also reported binge drinking during that timeframe.^{1,2} Of particular concern is the increased number of drinks and higher frequencies of drinking male college students report compared to female students.^{3,4} Specifically, male college students tend to consume an average of nine drinks per week, compared to four for female students, and they tend to drink on an average of 9.9 out of 30 days, compared to women who reported drinking on an average of 6.8 out of 30 days.⁵ A similar study found that 1-in-5 male college students reported consuming alcohol on campus, compared to 1-in-10 female students.⁶ Increases in alcohol consumption are often established early in a student’s first year of college and maintained across their tenure.⁷ Pressure to initiate heavy drinking patterns stems from various drinking motives (eg, emotional enhancement or avoidance, social facilitation, sensation seeking, perceived norms⁸). Despite a host of research examining the consequences of frequent alcohol consumption including poorer life satisfaction, college students continue to drink at rates higher than the general population.^{9,10}

Aggression

Also of significant concern is the high rate of aggression perpetration on college campuses. A large national survey found that

in 2014, 27 000 criminal incidents occurred on college campuses within the U.S.; including, 17,441 forcible sexual offenses, 2,100 aggravated assaults, and 13,500 robberies.¹¹ With respect to physical violence within the context of a dating relationship, up to one fifth of college students have experienced at least one incident of physical violence perpetrated by their dating partner.^{12,13} Further, research has shown upwards of 75% of college students reported being both perpetrators and victims of some form of psychological violence within, and outside, the context of a dating relationship.^{14–16} Experiencing aggression, regardless of the context in which it occurs, increases the likelihood of suffering from additional psychological, social, and academic problems.^{17,18} For instance, being the victim of aggression is significantly related to poorer personal-emotional adjustment to college,¹⁹ as well as poorer performance with regard to current academic achievement (GPA) and cumulative academic achievement (CGPA).²⁰ Victimization is also associated with increased alcohol use,²¹ drug use,²¹ mood disorders,²² and somatic complaints.²³

The relationship between alcohol and aggression

The association between drinking and aggressive behavior has long been recognized as a significant problem among college students.^{24,25} Hingson and colleagues reported that at least 646,000 students are assaulted each year by another college student who has consumed alcohol and that approximately 97,000 students experience date-rape or sexual assault related to alcohol use.²⁶ In addition, upwards of 100,000 students ages 18–24 reported having been too intoxicated to know whether



or not they consented to sexual activity.²⁶ In a national survey conducted by the Core Institute, researchers concluded that 43% of college students have experienced some threat of physical violence while consuming alcohol.²⁷ Further, substance use has been found to be common among both the victim and the perpetrator.²⁸ Physical victimization is associated with physical violence perpetration for males, however, for women, it is more strongly related to sexual victimization.²⁸ Higher frequencies of alcohol consumption and drinking larger amounts during each drinking episode are associated with violence for women only.¹³ Because the prevalence of alcohol use, aggression, and the co-occurrence of both behaviors is a significant problem, it is vital to identify and more fully understand the variables that affect these relationships.

Theoretical models of the relationship between alcohol use and aggression suggest that acute alcohol intoxication interacts with other situational and dispositional variables to increase the risk of aggression. A theoretical model developed by Finkel (I³), posits that all risk factors of violence promote aggression through one of three processes: instigation, impellance, and inhibition.²⁹ According to this model, instigating factors are behaviors that trigger aggression (e.g., provocation), and impelling factors are dispositional or situational triggers that lead an individual to experience the need to aggress (e.g., dispositional aggressiveness). These instigating and impelling factors collectively constitute an individual's readiness to aggress and interact such that when both are strong, an individual is most likely to be aggressive.²⁹ Contrarily, inhibiting factors are dispositional or situational factors that increase a person's ability to overcome their urge to be violent (e.g., executive control). As such, violence only occurs when the strength of impelling and instigating factors is stronger than the inhibiting factors that prevent violence, making it vital to understand the relevant impelling, instigating, and inhibiting factors associated with violence.²⁹ This model is consistent with older and more researched biopsychosocial models which posit that alcohol use contributes to aggressive perpetration through its association with both distal and proximal variables, subsequently increasing the risk of violence when in the context of a conflict-oriented interaction.^{30,31} Distal factors related to violence are generally enduring and include childhood aggression, history of aggressive behavior, family history of substance use, individual substance use patterns, gender role expectations, norms regarding aggression, relationship dissatisfaction, and psychopathology. Proximal factors are more immediate conditions within a conflict that may increase risk for violence including intoxication, information processing deficits, and location/setting of the conflict.

An impelling variable that has received some attention in the literature as impacting the relationship between alcohol use and violence is an individual's history of prior aggression, often studied via a person's dispositional aggression, anger, or hostility.³² For instance, in a series of studies, Giancola consistently found that violence perpetration in men high in aggressiveness

increased with alcohol consumption compared to those low in dispositional aggression.^{33,34} Using a lab paradigm, Bailey and Taylor found that men high in dispositional aggression were more likely to become aggressive when provoked and while intoxicated compared to intoxicated men low in dispositional aggression.³⁵ Research showing a definitive link between past violent behavior, alcohol use patterns, and continued aggression is lacking, especially for college students. Thus, it may be that a more complete explanation requires examination of both intraindividual and interpersonal factors to better understand and prevent interpersonal aggression.³⁶⁻³⁸

The frequency and amount of alcohol consumption may be important factors to investigate in order to more fully understand the relationship between past aggression and continued violence perpetration. In a population study, Room and Rossow found that as alcohol use increases in a given country, so do rates of violence perpetration.³⁷ Furthermore, longitudinal studies show that heavy drinkers are more likely to be aggressive than light to moderate drinkers,^{39,40} and that higher frequency of intoxication is associated with increased rates of violence for those receiving substance use treatment.⁴¹ In a study of the temporal association between alcohol use and aggression, Parks and colleagues found that the odds of experiencing aggression (perpetration and victimization combined) were 2% to 20% higher on heavy drinking days.⁴² Results from these studies support a growing body of research suggesting that frequency and quantity of alcohol use may be causally linked to aggressive behavior. Results also show that this relationship is not always direct, and that impelling factors such as past aggressive behavior may also play an important role in continued violence perpetration. However, extant research has not examined how varying degrees of past aggression interact with varying degrees of past alcohol use concomitantly in maintaining or increasing rates of future aggression, particularly in a college student population. Therefore, the present study addresses this gap by using a highly controlled, lab-based paradigm to examine the association between alcohol use patterns, past violence, and continued aggressive behavior in male college students. To test our hypotheses, we dichotomized past aggression and past alcohol use into "low" and "high" levels. We hypothesize that aggression in the lab will be highest for participants who reported a history of "high" past aggression as well as "high" levels of past alcohol use. In contrast, we hypothesize that for those with a history of "low" past aggression, "high" past alcohol use will not have an effect on aggression on the Point Subtraction Aggression Paradigm (PSAP). We also hypothesize that for participants who have a history of "high" aggression but "low" past alcohol use, provocation in the lab will result in higher rates of aggressive responding than for participants with histories of "low" past alcohol use and "low" past aggression. We also examine whether these hypotheses are true for individuals who respond aggressively on the PSAP before (proactive aggression) or after (reactive aggression) being provoked by the fictitious competitor. We hypothesize that those

with a history of “high” aggression and “high” past alcohol use will be more likely to aggress proactively than those with a history of “high” aggression but “low” alcohol use; and that for those who reported “low” levels of past aggression, alcohol will not have an effect on aggression in the lab. We also hypothesize that there will not be any significant effects for those who only aggressed reactively on the PSAP. In demonstrating the interactive effect of past aggression and alcohol use using a laboratory design, this study provides a valuable heuristic for future research to explore other combinations of impelling and instigating factors and their role in the perpetration of violence.

Methods

Participants

Participants were 160 male undergraduate college students aged 18–24 ($M = 19.74$, $SD = 3.25$) enrolled in an introductory psychology course at a large Southeastern university and recruited through the research pool. The ethnic background of most participants was Caucasian (86.9%) and approximately half of the sample consisted of freshman students (51.9%) with 27.5% in their sophomore year, 12.5% in their junior year and 8.1% in their senior year (see Table 1 for full demographic information).

Measures

Alcohol Use Disorders identification Test (AUDIT). The AUDIT is a 10-item self-report measure that was used to assess alcohol use and related problems in the past 6 months.⁴³ A total score is computed by summing the scores ranging from 0 to 4 for each item. Scores of 8 or more are indicative of hazardous alcohol consumption and were used to define “high” alcohol use; scores of 7 or below defined “low” alcohol use. The AUDIT has been found to be valid and reliable.^{44,45} The present study yielded good internal consistency ($\alpha = .87$).

Buss Perry Aggression Questionnaire (BPAQ). The BPAQ is a 29-item measure of aggression in which participants rated various statements on a 5-point Likert-scale ranging from 1 (*extremely uncharacteristic of me*) to 5 (*extremely characteristic of me*).⁴⁶ The BPAQ provides scores on four dimensions: physical violence, verbal aggression, anger, and hostility. It has shown strong validity and reliability, particularly in alcohol dependent populations.^{47,48} We obtained an internal consistency alpha of 0.85. Median splits were utilized to calculate high and low scores on the BPAQ; scores above the median were defined as “high”, whereas those below the median were defined as “low”.

Point Subtraction Aggression Paradigm (PSAP). The PSAP is a laboratory based behavioral measure of aggression using a 25-minute computer-based task in which the participant ostensibly competes against another participant to earn money.⁴⁹ This operant task uses a 3-button response panel; button A earns money (reinforcement), button B subtracts money from

Table 1. Demographic information for the overall sample.

	M (SD)
Age (years)	19.74 (3.25)
Ethnicity (%)	
Caucasian	86.9
African American	5.6
Other	7.5
Academic level (%)	
Freshman	51.9
Sophomore	27.5
Junior	12.5
Senior	8.1
Family income (%)	
<\$50000	27.0
\$50001–\$100000	27.7
\$100001–\$150000	22.0
\$150001–\$200000	11.3
>\$200001	12.0
Religious views (%)	
Christian	81.9
Jewish	0.6
Muslim	2.5
Buddhist	0.6
Hindi	0.6
Other/None	13.8
Sexual orientation (%)	
Heterosexual	96.2
Gay	2.5
Bisexual	1.3
Marital status (%)	
No current relationship	64.2
Dating	32.7
Married	2.5
Divorced/Widowed	0.6

the opponent (i.e., index of aggression), and button C protects from monetary subtractions by the opponent (escape). Every 100 presses of the A button earns the participant 10 cents (Fixed Reinforcement (FR)-100 schedule); for 10 presses of the B-button, the participant subtracts 10 cents from the opponent (FR-10 schedule); and for every 10 times the C button is

pressed, the participant briefly protects their own earnings (FR-10 schedule). B-button responding is the dependent measure of aggression, an operationalized definition that is congruent with the definition of aggression proposed by Baron and Richardson,⁵⁰ in that the behavior is directed toward hurting the other person by taking money away from them. Subtraction of money from the participant's total at random intervals by the computer served as the provocation. The computer provocation time intervals were randomized at the beginning of the study and were held consistent for each participant.

Using the PSAP as a measure of lab-based aggression has several advantages. First, the PSAP examines aggression in the context of a current situation, rather than employing the use of retrospective self-reports of aggression, which research has shown to be unreliable since many individuals tend to under-report their own aggression.⁵¹ In addition, the PSAP offers participants two ways to respond in a non-aggressive manner (i.e., by earning money, and by protecting their earnings). As a criticism of the PSAP, Tedeschi and Quigley stated that it is difficult to assess whether the operationalized definition of aggression in the PSAP paradigm is in fact measuring aggression as opposed to competitive strategy because there is no measure of participants' intentions or motivations.⁵² Furthermore, prior research demonstrates the PSAP's external validity by highlighting its ability to differentiate violent from nonviolent men, with those who have a history of violence exhibiting increased aggressive responding.⁴⁹ It has also been shown to have strong convergent validity with self-report measures assessing recent aggression and is associated with both past aggression and self-reported alcohol use.^{53,54} Taken together, this research lends support to the study of aggression under highly controlled conditions, and indicates that the PSAP is a valid measure of lab-based aggression.

Procedure

Institutional Review Board approval was obtained through the University prior to initiation of data collection. Eligible participants completed an initial consent, the AUDIT, and BPAQ online using surveymonkey.com, a secure online survey website. The first page of the survey displayed the consent form and presented participants an opportunity to click a button providing initial consent or declining consent and ending the survey. Individuals that consented then completed the AUDIT and BPAQ. Following the completion of online questionnaires, participants were invited via email to attend "Phase 2" of the experiment in the laboratory where they provided written consent. Upon arrival, each participant was introduced to a male or female confederate, whom they were led to believe was their opponent, and told that they would be competing in a button-pressing task in order to earn money; in actuality, money is regulated by the computer program which acts in the same previously-randomized manner regardless of "opponent" behavior. The task lasted for approximately 25 minutes. Participants were debriefed at the con-

clusion of Phase 2 and compensated for their time with \$5 and extra course credit in their general Psychology course. No actual PSAP monies were earned or dispensed in Phase 2.

Results

Self-reported alcohol use and past aggression main effects

Effects of past alcohol use on individuals with histories of "High" aggression. Regression analyses were used to examine the main effects of self-reported alcohol use patterns (AUDIT) and self-reported past aggressive behaviors (BPAQ) on aggressive (B-button) responding on the PSAP. Consistent with our hypotheses, results revealed that individuals with a history of "high" past aggression were more likely to push the 'B-button' during the procedure, reflecting an aggressive response (regardless of whether this action was reactive or proactive to provocation), if they also reported a history of "high" alcohol use. This finding was primarily driven by a significant interaction between alcohol use patterns and the *physical aggression* subscale of the BPAQ ($F(3,154) = 5.68, P = .018$). No other forms of past aggression (psychological, emotional) resulted in significant effects in this study. As can be seen in Figure 1, those with a history of "high" physical aggression and a history of "high" alcohol use were more likely to aggress on the PSAP than individuals reporting a history of "high" physical aggression but histories of "low" alcohol use ($\beta = .381, P < .001$).

Effects of past alcohol use on individuals with histories of "Low" aggression. Results of the main effect for individuals reporting "low" levels of past physical aggression showed that alcohol use habits did not significantly impact aggressive responding on the PSAP ($\beta = -.003, P = .98$). This is also consistent with our hypothesis that histories of alcohol use are only linked to higher rates of aggression on the PSAP when a participant already has a history of "high" aggression. These results suggest that the risk for aggressive responding is greater in individuals with a history of "high" past aggressive behavior, especially past physical aggression, as they report a history of "high" alcohol use, relative to those "low" in past aggression.

Effects of past aggression on "Low" versus "High" past alcohol use. Teasing apart the main effects revealed that the association between "low" versus "high" past alcohol use, aggression, and aggressive responding on the PSAP was significant for those with "low" past alcohol use ($\beta = -.22, P < .05$), but not for those with "high" past alcohol use ($\beta = .18, P = .13$), such that those with a history of "low" past alcohol use and "low" past aggression responded more aggressively on the PSAP than those with "low" alcohol use and a "high" aggression history. This finding was surprising given that we hypothesized that individuals with "low" past alcohol use would be more aggressive if they had a history of "high" aggression. Instead, those

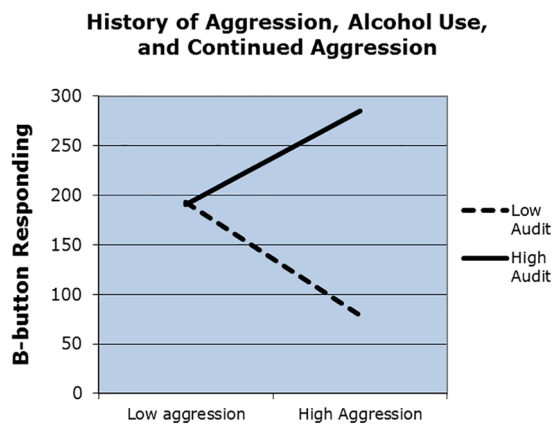


Figure 1. The effects of history of aggression and current alcohol use on continued aggression for the overall sample.

with “low” past alcohol use *and* “low” past aggression tended to respond more aggressively on the PSAP.

Reactive versus proactive aggression

We also analyzed how the levels of past alcohol use and past aggression resulted in proactive aggression (i.e., pressing the B-button any number of times prior to being provoked), or reactive aggression (i.e., pressing the B-button any number of times after being provoked). Individuals who did not press the B-button were excluded from analyses examining proactive and reactive aggression. The analysis revealed that the above findings held true only for individuals who aggressed proactively on the PSAP ($N=98$). For those who aggressed proactively, individuals reporting “high” levels of past aggression and “high” past alcohol use were more likely to aggress on the PSAP than individuals reporting a history of “high” aggression but “low” alcohol use ($\beta = .546, P < .01$). For those who aggressed proactively and reported “low” levels of past aggression, alcohol use did not significantly impact aggressive B-button responding ($\beta = .095, P = .57$), such that a report of more considerable alcohol use did not predict more aggressive responding (see Figure 2). No significant interactions were found for participants who aggressed reactively (i.e., after they were provoked). Taken together, these findings suggest that alcohol use habits are associated with an increase in an individual’s tendency to be aggressive without provocation if that individual already has a history of aggressive behavior, and that this tendency becomes stronger as the individual’s self-reported drinking increases.

Discussion

This study furthers the body of literature regarding the impact of past aggression and alcohol use patterns on aggressive behavior by using a highly controlled, lab-based paradigm to examine the real-time association between alcohol use history, past aggression, and continued aggressive behavior in male college students. Based on Finkle’s I^3 model of instigating, impelling, and inhibiting processes,²⁹ we hypothesized that 1.)

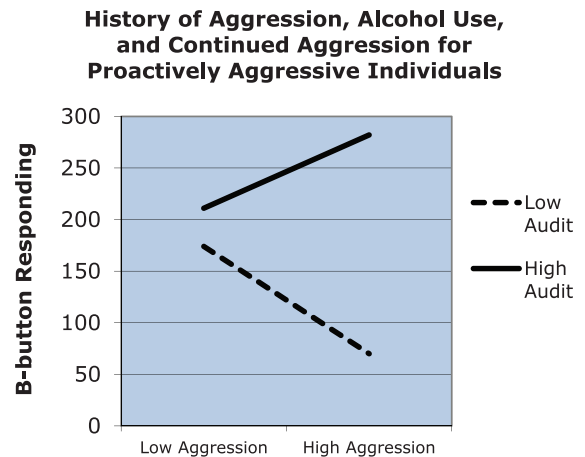


Figure 2. The effects of history of aggression and current alcohol use on continued aggression for individuals who are proactively aggressive.

aggression in the lab will be highest for participants who reported a history of “high” past aggression as well as “high” levels of past alcohol use; 2.) that for those with a history of “low” past aggression, “high” past alcohol use will not have an effect on aggression on the PSAP; 3.) that for participants who have a history of “high” aggression but “low” past alcohol use, provocation in the lab will result in higher rates of aggressive responding than for participants with histories of “low” past alcohol use and “low” past aggression; and 4.) that the findings will hold true for individual who aggressed proactively but not reactively on the PSAP.

Analyzing the entire college sample revealed that the interaction of alcohol use habits and past *physical* aggression was associated with continued aggressive behavior. The relationship between self-reported alcohol use patterns and past physical aggression was also impacted by varying intensities of each behavior, whereby at “high” levels of past aggression, history of alcohol use significantly impacted aggressive responding, such that those with a history of “high” aggression and “high” alcohol use habits were more likely to aggress on the PSAP compared to those reporting other combinations of these two variables. This finding supports our hypothesis in that those reporting a history of “high” aggression indeed exhibited more aggressive responding in the lab if they also reported “high” levels of past alcohol use, compared to those who reported “high” past aggression but “low” past alcohol use. For individuals reporting “low” levels of past physical aggression, patterns of alcohol use did not significantly impact aggression in the lab indicating that for these individuals, alcohol use does not lead to increased and/or continued aggression. Prior research has found links between alcohol and both physical and nonviolent aggression, with increased amounts of alcohol consumption associated only with physical aggression.⁵⁵ These findings are mirrored in our study whereby only past physical aggression seemed to interact with alcohol use history to promote continued aggression. Taken together and in conjunction with the I^3 model, our results suggest that for individuals with a history of

high physical aggression and high alcohol use, alcohol consumption patterns likely have a *disinhibiting* function, which makes continued aggression more likely, including in a laboratory setting. This interpretation is consistent with prior research demonstrating that alcohol contributes to outward aggressive expression.⁵⁶ Further for individuals low on past aggression, alcohol consumption habits may not significantly impact aggressive behavior. In other words, if a person is not aggressive, alcohol consumption may not make him/her more likely to be aggressive.

A surprising finding that warrants additional study is that those with a history of “low” past alcohol use and “low” past aggression responded *more* aggressively on the PSAP than those with “low” alcohol use and a “high” aggression history. This finding runs counter to our hypothesis that individuals with “low” past alcohol use would be more aggressive if they had a history of “high” aggression. Instead, those with “low” past alcohol use *and* “low” past aggression tended to respond more aggressively on the PSAP. It is not entirely clear why individuals “low” in both past alcohol use and past aggression would be more aggressive on the PSAP than those with “low” alcohol use but “high” past aggression. It is possible that for individuals “high” in aggression, alcohol is the trigger for continued aggression, and that they are less likely to aggress if an alcohol use history is not present. For those with “low” alcohol use histories, perhaps provocation on the PSAP is enough to bring about an aggressive response, as their aggression is not dependent on the past use of alcohol.

Analyzing only those individuals who aggressed prior to being provoked revealed that individuals reporting both a history of “high” aggressive behavior and a history of “high” alcohol use were most likely to behave aggressively on the PSAP. However, these findings were not significant for individuals who aggressed reactively. According to Finkel’s I3 model of aggression, instigating factors are situational or contextual experiences leading to aggressive responding, whereas impelling factors are dispositional factors that predispose individuals to behave aggressively in response to instigation.^{57,29} Given past research linking provocation with subsequent aggressive behavior,⁵⁸ provocation thus instigates aggressive responding regardless of preexisting impelling forces and in spite of inhibiting forces. However, it may be that those individuals who responded aggressively prior to provocation differ in some way compared to those who aggressed in response to provocation. Researchers have identified a myriad of risk factors (ie, antisocial traits, temperament, aggressive norms) that serve as impelling forces, linked to both aggression and alcohol use independently and predictively.^{54,59,60} Though other potential correlates of alcohol and aggression were not assessed in the current study, these findings suggest that past aggression and alcohol use habits appear to be uniquely associated with unprovoked aggression.

Several strengths of the present study suggest that these findings make a substantial contribution to the empirical understanding of the relationship between alcohol use patterns and

aggression in college students. Much of the extant research in this area has examined the association between alcohol use and intimate partner violence, as well as male-to-female perpetrated aggression.^{61,62} However, it is unclear if the results of such studies generalize to aggression more broadly. Importantly, our findings speak to the impact of alcohol use and previous aggressive behaviors on general aggression within a college sample. Additionally, research indicates that individuals underreport perpetration of aggression via self-report measures and that statistical adjustments utilizing participants’ self-reported social desirability cannot attenuate the impact of underreporting on violence related outcomes.^{61–63} As such, the use of laboratory based aggression paradigms, such as the PSAP, are especially important to help elucidate patterns of aggressive behavior that may otherwise be obscured by social desirability effects.

Limitations and recommendations

Prior research has demonstrated the construct validity of the PSAP as a measure of aggression, yet its ecological validity and predictive power remain unclear. Although individuals with a history of violence and alcohol use behave more aggressively in the lab, it is unclear whether these individuals will aggress in the future and against whom. Furthermore, the present research used a single self-report measure of alcohol use in the past 6 months. Prior research indicates that individuals may underreport their own alcohol use behaviors particularly when they are asked to report about use over long periods of time.^{64,65} Thus replications of these findings would benefit from the use of ecological, collateral, and interviewer facilitated assessments of alcohol use (eg, Timeline Followback^{66,67}). Additionally, the relatively small sample size used in the study remains a limitation. Future studies would benefit from using a larger and more diverse sample size in order to increase the generalizability of the findings. Finally, the present study focused on alcohol use habits and aggression history as impelling factors for aggressive behavior in college populations. Finkel’s I3 model could be further validated by the simultaneous evaluation of the relationship between impelling, instigating, and inhibitory factors on aggression. For instance, future research utilizing the PSAP paradigm could examine instigating factors such as in-vivo alcohol administration, or negative mood induction, and inhibitory factors such as inducing negative alcohol use expectancies. Additionally, prospective data could elucidate the degree to which the interaction of these factors predicts risk for violence in naturalistic settings.

Conclusion


These findings have important clinical implications. Collegiate alcohol use and violence intervention and prevention programs may prove more effective when they incorporate information about an individual’s histories of violence and alcohol use. Research also suggests that the impact and cost-effectiveness of reducing college student drinking can be

maximized when individuals are matched to interventions based on the severity of their alcohol use and related problems.⁶⁸ The current findings suggest that a person's violence history interacts with alcohol use habits to produce risk for future violence. Thus, college student drinking interventions, particularly those aimed at harm reduction, may be able to reduce the incidence of drinking-related violence by assigning students to treatment according to both their alcohol use and violence histories.

Author Contributions

Study conceived and designed by KR, SJL, MRS, and TMM. Data analyzed by KR. First draft manuscript written by KR, SJL, MRS, and TMM. Revisions and final approval made by KR, MRS, and TMM.

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REFERENCES

- Galbicesk C. College Alcoholism. *Alcohol Rehab Guide* 2019.
- Substance Abuse and Mental Health Services Administration (SAMHSA). *Key Substance Use and Mental Health Indicators in the United States: Results from the 2016 National Survey on Drug Use and Health*. Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. 2017. Available at: <https://www.samhsa.gov/data/>
- Bewick BM, Mulhern B, Barkham M, Trusler K, Hill AJ, Stiles WB. Changes in undergraduate student alcohol consumption as they progress through university. *BMC Public Health*. 2008;8:163.
- Harrell ZA, Karim NM. Is gender relevant only for problem alcohol behaviors? An examination of correlates of alcohol use among college students. *Addict Behav*. 2008;33:359–365.
- White A, Castle I, Chen C, Shirley M, Roach D, Hingson R. Converging patterns of alcohol use and related outcomes among females and males in the United States, 2002–2012. *Alcohol Clin Exp Res*. 2015;39:1712–1726.
- White H, McMorris BJ, Catalano R, Shirley M, Roach D, Hingson R. Increases in alcohol and marijuana use during the transition out of high school into emerging adulthood: the effects of leaving home, going to college, and high school protective factors. *J Stud Alcohol*. 2006;67:810–813.
- Borsari B, Murphy JG, Barnett NP. Predictors of alcohol use during the first year of college: implications for prevention. *Addict Behav*. 2007;32:2062–2086.
- Read JP, Wood MD, Kahler CW, Maddock JE, Palfai TP. Examining the role of drinking motives in college student alcohol use and problems. *Psychol Addict Behav*. 2003;17:13–23.
- Blanco C, Okuda M, Wright C, et al. Mental health of college students and their non-college-attending peers: results from the national epidemiologic study on alcohol and related conditions. *Arch Gen Psychiatry*. 2008;65:1429–1437.
- Murphy JG, McDevitt-Murphy ME, Barnett NP. Drink and be merry? Gender, life satisfaction, and alcohol consumption among college students. *Psychol Addict Behav*. 2005;19:184–191.
- Musu-Gillette L, Zhang A, Wang K, et al. *Indicators of School Crime and Safety: 2017* (NCES 2018036). Washington, DC: National Center for Education Statistics, U.S. Department of Education, and Bureau of Justice Statistics, Office of Justice Programs, U.S. Department of Justice; 2017.
- Iconis R. Dating violence among college students. *Contemp Issues Educ Res*. 2013;6:111–114.
- Saewyc EM, Brown D, Plane MB, et al. Gender differences in violence exposure among university students attending campus health clinics in the US and Canada. *J Adolesc Health*. 2009;45:587–594.
- DeKeseredy W, Kelly K. The incidence and prevalence of woman abuse in Canadian university and college dating relationships. *Canad J Sociol*. 1993;18:137–159.
- Neufeld J, McNamara JR, Ertl M. Incidence and prevalence of dating partner abuse and its relationship to dating practices. *J Interpersonal Violence*. 1999;14:125–137.
- Shorey RC, Cornelius TL, Bell KM. A critical review of theoretical frameworks for dating violence: comparing the dating and marital fields. *Aggress Violent Behav*. 2008;13:185–194.
- Clements C, Ogle R, Sabourin C. Perceived control and emotional status in abusive college student relationships: an exploration of gender differences. *J Interpers Violence*. 2005;20:1058–1077.
- Eshelman L, Levendosky AA. Dating violence: mental health consequences based on type of abuse. *Violence and Victims*. 2012;27:215–228. doi:10.1891/0886-6708.27.2.215
- Klem J. The impact of indirect aggression on college student adjustment. *Dissertation Abstracts* 2008.
- Uludag O. The influence of aggression on students' achievement: evidence from higher education. *Procedia Soc Behav Sci*. 2013;89:954–958.
- Shorey RC, Rhatigan DL, Fite PJ, Stuart GL. Dating violence victimization and alcohol problems: an examination of the stress-buffering hypothesis for perceived support. *Partner Abuse*. 2011;2:31–45.
- Shorey R, Sherman A, Kivisto A, Elkins S, Rhatigan DL, Moore TM. Gender differences in depression and anxiety among victims of intimate partner violence: the moderating effect of shame proneness. *J Interpers Violence*. 2011;26:1834–1850.
- Eberhard-Gran M, Schei B, Eskild A. Somatic symptoms and diseases are more common in women exposed to violence. *J Gen Intern Med*. 2007;22:1668–1673.
- Kaura SA, Lohman BJ. Dating violence victimization, relationship satisfaction, mental health problems, and acceptability of violence: a comparison of men and women. *J Fam Violence*. 2007;22:367–381.
- Curtin JJ, Fairchild BA. Alcohol and cognitive control: implications for regulation of behavior during response conflict. *J Abnorm Psychol*. 2003;112:424–436.
- Hingson R, Zha W, Smyth D. Magnitude and trends in heavy episodic drinking, alcohol-impaired driving, and alcohol-related mortality and overdose hospitalizations among emerging adults of college ages 18–24 in the United States, 1998–2014. *J Stud Alcohol*. 2017;78:540–548.
- Hingson RW, Edwards EM, Heeren T, Rosenbloom D. Age of drinking onset and injuries, motor vehicle crashes, and physical fights after drinking and when not drinking. *Alcohol Clin Exper Res*. 2009;33:783–790.
- Core Institute. 2011–2013 national results of the core alcohol and drug survey-long form. 2014. https://core.siu.edu/_common/documents/2011-2013.pdf
- Reed E, Amaro H, Matsumoto A, Kaysen D. The relation between interpersonal violence and substance use among a sample of University Students: examination of the role of victim and perpetrator substance use. *Addict Behav*. 2009;34:316–318.
- Finkel EJ. Impelling and inhibiting forces in the perpetration of intimate partner violence. *Rev Gen Psychol*. 2007;11:193–207.
- Leonard KE. Domestic violence and alcohol: what is known and what do we need to know to encourage environmental interventions? *J Subst Use*. 2001;6:235–245.
- Moore TM, Stuart GL. A review of the literature on marijuana and interpersonal violence. *Aggress Violent Behav*. 2005;10:171–192.
- Fishbein D, Jaffe J, Snyder F, Haertzen C, Hickey J. Drug users' self-reports of behaviors and affective states under the influence of alcohol. *Int J Addict*. 1993;28:1565–1585.
- Giancola PR. Alcohol-related aggression in men and women: the influence of dispositional aggressivity. *J Stud Alcohol*. 2002a;63:696–708.
- Giancola PR. Irritability, acute alcohol consumption and aggressive behavior in men and women. *Drug Alcohol Depend*. 2002b;68:263–274.
- Bailey DS, Taylor SP. Effects of alcohol and aggressive disposition on human physical aggression. *J Res Personal*. 1991;25:334–342.
- O'Neil JM, Harway M. Revised multivariate model explaining men's risk factors for violence against women: Theoretical propositions, new hypotheses, and proactive recommendations. In: Harway M, O'Neil JM (eds) *What Causes Men's Violence against Women?* Thousand Oaks, CA: Sage; 1999.
- Room R, Rossow I. The share of violence attributable to drinking. *J Subst Use*. 2001;4:218.
- Terian L. *Gender Differences in College Student Drinking: The Relations of Social and Cognitive Constructs*. Wayne State University Dissertations; 2013.
- Baskin-Sommers A, Sommers I. The co-occurrence of substance use and high-risk behaviours. *J Adolesc Health*. 2006;38:609–611.
- Fergusson DM, Horwood LJ. Alcohol abuse and crime: a fixed-effects regression analysis. *Addiction*. 2000;95:1525–1536.
- Macdonald S, Erickson P, Wells S, Hathaway A, Pakula B. Predicting violence among cocaine, cannabis, and alcohol treatment clients. *Addict Behav*. 2008;33:201–205.
- Parks KA, Hseih Y, Bradizza CM, Romosz AM. Factors influencing the temporal relationship between alcohol consumption and experiences with aggression among college women. *Psychol Addict Behav*. 2008;22:210–218.
- Saunders JB, Aasland OG, Babor TF, De La Fuente JR, Grant M. Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful consumption-II. *Addiction*. 1993;88:791–804.
- Bohn MJ, Babor TF, Kranzler HR. The alcohol use disorders identification test (AUDIT): validation of a screening instrument for use in medical settings. *J Stud Alcohol*. 1995;56:423–432.
- Fleming MF, Barry KL, Macdonald R. The alcohol use disorders identification test (AUDIT) in a college sample. *Subst Use Misuse*. 1991;26:1173–1185.
- Buss AH, Perry MP. The aggression questionnaire. *J Personal Soc Psychol*. 1992;63:452–459.
- Harris JA. A further evaluation of the aggression questionnaire: issues of validity and reliability. *Behav Res Ther*. 1997;35:1047–1053.

49. McPherson A, Martin CR. A contemporary review of the alcohol/aggression relationship and the Buss-Perry aggression questionnaire for use in an alcohol dependent population. *J Aggress Confl Peace Res.* 2010;2:45–56.
50. Cherek DR, Moeller FG, Schnapp W, Dougherty DM. Studies of violent and nonviolent male parolees: Laboratory and psychometric measurements of aggression. *Biol Psychiatry.* 1997;41:514–522.
51. Baron R, Richardson D. *Human Aggression.* 2nd ed. New York, NY: Plenum Press; 1994.
52. Gregoski M, Malone W, Richardson D. Measuring direct and indirect aggression: is there a response bias? *Psychol Rep* 2005;97:563–566.
53. Tedeschi J, Quigley B. Limitations of laboratory paradigms for studying aggression. *Aggress Violent Behav.* 1996;1:163–177.
54. Golomb BA, Cortez-Perez M, Jaworski BA, Mednick S, Dimsdale J. Point subtraction aggression paradigm: validity of a brief schedule of use. *Violence Vict.* 2007;22:95–103.
55. Moeller FG, Dougherty DM. Antisocial personality disorder, alcohol, and aggression. *Alcohol Res Health.* 2001;25:5–11.
56. Murphy CM, Winters J, O'Farrell TJ, Fals-Stewart W, Murphy M. Alcohol consumption and intimate partner violence by alcoholic men: comparing violent and nonviolent conflicts. *Psychol Addict Behav.* 2005;19:35–42.
57. Leonard KE. The role of drinking patterns and acute intoxication in violent interpersonal behaviors. In *Alcohol and violence: Exploring patterns and responses.* Washington, DC: International Center for Alcohol Policies; 2008:29–55.
58. Eckhardt CI, Parrott DJ, Sprunger JG. Mechanisms of alcohol-facilitated intimate partner violence. *Violence Against Women.* 2015;8:939–957.
59. Bettencourt BA, Miller N. Gender differences in aggression as a function of provocation: a meta-analysis. *Psychol Bull.* 1996;119:422–447.
60. Cloninger CR, Svrakie DM, Svrakie NM. A multidimensional psychobiological model of violence. In: Raine A, Brennan P, Farrington DP, Mednick SA (eds) *Biosocial Bases of Violence.* New York, NY: Plenum Press; 1997.
61. Lisco CG, Leone RM, Gallagher KE, Parrott DJ. “Demonstrating masculinity” via intimate partner aggression: the moderating effect of heavy episodic drinking. *Sex Roles.* 2015;73:58–69.
62. Cafferky BM, Mendez M, Anderson JR, Stith SM. Substance use and intimate partner violence: a meta-analytic review. *Psychol Violence.* 2018;8:110–131.
63. Hotaling GT, Sugarman DB. An analysis of correlates in husband to wife violence: the current state of knowledge. *Violence Vict.* 1986;1:101–124.
64. Fernandez-Gonzalez L, O'Leary KD, Munoz-Rivas MJ. We are not joking: need for controls in reports of dating violence. *J Interpers Violence.* 2012;28:602–620.
65. O'Leary KD, Williams MC. Agreement about acts of aggression in marriage. *J Family Psychol.* 2006;20:656–662.
66. Szinovacz ME, Egley LC. Comparing one-partner and couple data on sensitive marital behaviors. *J Marriage Family.* 1995;57:995–1010.
67. Sobell LC, Sobell MB. Timeline follow-back: a technique for assessing self-reported ethanol consumption. In: Allen J, Litten RZ (eds) *Measuring Alcohol Consumption: Psychosocial and Biological Methods.* Totowa, NJ: Humana Press; 1992.
68. Borsari B, Hustad JTP, Mastroleo NR, et al. Addressing alcohol use and problems in mandated college students: a randomized clinical trial using stepped care. *J Consult Clin Psychol.* 2012;80:1062–1074.