This study examined whether the occurrence of a prior brain injury was related to current patterns of alcohol consumption, and whether the existence of a prior brain injury exacerbated the effects of alcohol on cognition. Participants were college students ages 18-22 (N=50; 52% female; 98% Caucasian). Prior brain injury was identified using the HELPS screening tool (Wood, Correll, Dikmen, & Pearlson, 1993). Binge drinkers were identified with the Timeline Follow-Back (TLFB; Sobell et al., 1992). Participants were administered a neuropsychological battery including the Groton Maze Learning Task, the Computerized Continuous Performance Test (PCET), the Mini Neuropsychiatric Interview (WIN), and the Brief Traumatic Brain Injury Questionnaire (BART). Two by two by three analysis of variance (ANOVA) (brain injury, not binge drinking, time) was conducted on each test battery using the General Linear Model. This study examined whether the occurrence of a prior brain injury was related to current patterns of alcohol consumption, and whether the existence of a prior brain injury exacerbated the effects of alcohol on cognition. Participants were college students ages 18-22 (N=50; 52% female; 98% Caucasian). Prior brain injury was identified using the HELPS screening tool (Wood, Correll, Dikmen, & Pearlson, 1993). Binge drinkers were identified with the Timeline Follow-Back (TLFB; Sobell et al., 1992). Participants were administered a neuropsychological battery including the Groton Maze Learning Task, the Computerized Continuous Performance Test (PCET), the Mini Neuropsychiatric Interview (WIN), and the Brief Traumatic Brain Injury Questionnaire (BART). Two by two by three analysis of variance (ANOVA) (brain injury, not binge drinking, time) was conducted on each test battery using the General Linear Model. Participants were originally recruited to the study when they were members of the freshman class at two educational institutions, a small liberal arts college and a large university. Recruiting was accomplished through school email, flyers, and classroom visits. The first year students were required to complete a pre-screen and were excluded from the study if they had: a history of major brain injury with loss of consciousness of more than two hours, multiple sclerosis (MS) or cerebral palsy, a seizure disorder, any concussion with loss of consciousness within the prior thirty days, a current or previous brain tumor, or a DSM-IV-TR Axis I psychiatric disorder. The consent form signed by each of the participants clearly stated that researchers would contact the students in two years, when they are juniors, for a follow up time slot. Recruiting for the follow up time slot consisted of emailing participants individually, dorm room visits, flyers, and an iPad rally.

Materials
The Groton Maze Learning Task (GLOT) is a task that measures complex attention/speed of processing (One Back, Two Back, Digit symbol, and Cardon et al., 1986). The JANSIT included the following tests: the Digit Symbol task, the Verbal Fluency Test, and the Continuous Conditional Exclusion Test (PCET). Cognitive measures were categorized as a priori: (a) those requiring learning or memory (Groton Maze Learning Task, Continuous Paired Associate Learning Task), and those requiring impulse control (BART). Two by two by three analysis of variance (ANOVA) (brain injury, not binge drinking, time) was conducted on each test battery using the General Linear Model. From the animal model, it was hypothesized that binge drinking and brain injury, working alone or in concert, would worsen neurocognitive function. From the data they had: a history of major brain injury with loss of consciousness of more than two hours, multiple sclerosis (MS) or cerebral palsy, a seizure disorder, any concussion with loss of consciousness within the prior thirty days, a current or previous brain tumor, or a DSM-IV-TR Axis I psychiatric disorder. The consent form signed by each of the participants clearly stated that researchers would contact the students in two years, when they are juniors, for a follow up time slot. Recruiting for the follow up time slot consisted of emailing participants individually, dorm room visits, flyers, and an iPad rally.

Procedure
Each participant participated in a total of two time slots. Each of the two time slots asked the same questions about alcohol and drug use and contained the same cognitive tasks. During the follow up testing session, participants were asked to fill out a number of forms: a consent form, an Attention-Spontaneous Questionnaire, the HELPS brain imaging screening tool, and a demographics form. Following this, individuals were asked to complete a battery of computerized cognitive tasks. The first test administered was the Groton Maze Learning Task, taking approximately 10 minutes to complete. Second, participants were administered the n-back test, consisting of the one back and two back tests. Each of these tests was approximately 10 minutes in length. Next, participants completed the Continuous Paired Associate Learning Task (CPAL), about 10 minutes in length. As a final measure, participants were administered a trial of the Groton Maze Learning Task as a test of recall. The next set of cognitive tests was part of the BART testing platform. Participants were instructed to focus on the instructions and complete the tests at their own pace. First, participants were administered alcohol (the Digit Symbol, then the Groton Maze Learning Test (PCET), and finally, the BART). Each of these tests was about 10 minutes in length, for a total of 30 minutes. There was an interval of approximately 5 minutes in between the testing platforms for participants to rest. Participants were also asked to fill out a self-report survey regarding their alcohol and drug use throughout their lifetime. After these computer-based assessments, each individual participated in a Mini Neuropsychiatric Interview, in order to diagnose current and past psychiatric disorders as a brief measure of psychopathology. The COGSTATE platform includes two memory and learning tasks, the Groton Maze Learning Task and the Continuous Paired Associate Learning Task as well as n-back test, which measures executive function and attention.

Results
Participants who reported brain injury performed significantly worse than those who reported no brain injury on measures of attention and impulse control. Participants who binge consumed in all cognitive domains such as attention, executive function, and impulsivity compared to those who do not binge. Binge drinking students who had a previous brain injury demonstrated poorer performance on tests of attention compared to those who only binge drank and those without brain injury. Similarly, binge drinking students with a previous brain injury demonstrated more impulsivity on the BART measure compared to those who only binge drank and those without brain injury. There was no evidence to suggest that binge drinking students with a previous brain injury demonstrated more impulsivity on the BART. This study examined whether the occurrence of a prior brain injury was related to current patterns of alcohol consumption, and whether the existence of a prior brain injury exacerbated the effects of alcohol on cognition. Participants were college students ages 18-22 (N=50; 52% female; 98% Caucasian). Prior brain injury was identified using the HELPS screening tool (Wood, Correll, Dikmen, & Pearlson, 1993). Binge drinkers were identified with the Timeline Follow-Back (TLFB; Sobell et al., 1992). Participants were administered a neuropsychological battery including the Groton Maze Learning Task, the Computerized Continuous Performance Test (PCET), the Mini Neuropsychiatric Interview (WIN), and the Brief Traumatic Brain Injury Questionnaire (BART). Two by two by three analysis of variance (ANOVA) (brain injury, not binge drinking, time) was conducted on each test battery using the General Linear Model. From the animal model, it was hypothesized that binge drinking and brain injury, working alone or in concert, would worsen neurocognitive function. From the data they had: a history of major brain injury with loss of consciousness of more than two hours, multiple sclerosis (MS) or cerebral palsy, a seizure disorder, any concussion with loss of consciousness within the prior thirty days, a current or previous brain tumor, or a DSM-IV-TR Axis I psychiatric disorder. The consent form signed by each of the participants clearly stated that researchers would contact the students in two years, when they are juniors, for a follow up time slot. Recruiting for the follow up time slot consisted of emailing participants individually, dorm room visits, flyers, and an iPad rally.

Figure 1: Accuracy on the One Back Test across categories.

Discussion
• Students who reported brain injury performed significantly worse than those who reported no brain injury on measures of attention and impulse control. Students who binge consumed in all cognitive domains such as attention, executive function, and impulsivity compared to those who do not binge.
• Binge drinking students who had a previous brain injury demonstrated poorer performance on tests of attention compared to those who only binge drank and those without brain injury.
• Similarly, binge drinking students with a previous brain injury demonstrated more impulsivity on the BART measure compared to those who only binge drank and those without brain injury.
• There was no evidence to suggest that binge drinking students with a previous brain injury demonstrated more impulsivity on the BART.
• This data suggests that individuals with a history of brain injury may be at particular risk for increased cognitive impairment if they also binge.
• The synergistic effects of brain injury and binge drinking on cognitive function has received relatively little attention in college age samples (Graham and Carlson, 2008). The relationship among prior brain injury, impulsivity, and binge drinking are worthy of further investigation, along with documentation of the natural history of their temporal ordering.

References

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