

Title: Single or repeated mild concussion during adolescence does not affect alcohol consumption in male or female adolescent rats

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Adolescence is marked by numerous behavioral, biological, and neural changes. In particular, adolescents across a variety of species have been shown to drink more alcohol during this developmental phase when compared to adults. Given their risk-taking behaviors (including alcohol consumption) and involvement with sports, adolescents are also at a higher risk for experiencing concussions during this age period. Importantly, research has shown that individuals that experience concussions may be at risk for developing increases in alcohol intake. Therefore, the current experiment used a rat model of adolescence to investigate whether a single or multiple mild concussions during adolescence might lead to immediate and/or later increases in alcohol drinking behavior. To do this, male and female Sprague-Dawley rats (N = 64) bred at Ithaca College were used beginning in early adolescence (Postnatal day [P]30 ± 2 days). At this time, rats began receiving intermittent access to alcohol. Every Monday, Wednesday, and Friday, rats were given an opportunity to choose between a sweetened alcohol solution or water for 24 hours. During a 2-week period that consisted of a total of 7 alcohol drinking exposures, rats were assigned to 1 of 3 possible injury conditions: single concussion, repeated concussions, or sham controls. After the first two alcohol-drinking days, animals in the head injury groups received their first concussion. Rats in the single injury group continued to intermittently drink ethanol without further injury. Those experiencing multiple concussions, however, went on to experience 3 more mild concussions interspersed with the alcohol drinking days. Sham controls were exposed to all of the same procedures as the rats in the concussion groups, but without injury. Once the adolescent period ended, animals were allowed to mature without further alcohol access or injury. After reaching adulthood, intermittent alcohol drinking exposures resumed for 4 additional weeks to assess any long-term consequences of adolescent concussion on alcohol consumption. Results showed that, during the adolescent period, neither single nor multiple mild concussion(s) changed alcohol intake in either male or female rats. Overall, alcohol drinking significantly declined when animals matured. Once in adulthood, these lower levels of alcohol consumption were still unaffected by earlier concussion(s) during adolescence. Together, these results suggest that, in this model of mild concussion, no immediate or long-term consequences of head injury are observed for alcohol drinking behavior. Current and future experiments are exploring other possible cognitive and psychological behavioral impairments that may be evident after adolescent concussion, as well as alterations in brain function and inflammation.