

Do concussions make college students more impulsive? Neurocognitive impacts of brain injury

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Abstract

Brain injury in young adults is a significant public health concern, with concussions being particularly common in this age group. Even mild brain injuries can have lasting effects on attention, memory, decisionmaking, and impulse control, potentially impacting academic and career success. Despite this, more sensitive and accessible methods are needed to detect, monitor, and treat these injuries.

This study examines how brain injury affects decision-making and brain activity in collegeaged students.

Introduction

- Young adults have a high incidence of brain injury, with 20% of college students sustaining a concussion¹.
- Research shows that Veterans with mTBI² and undergraduates with brain injury³ exhibit greater impulsivity and reduced willingness to wait for delayed rewards.
- This study aims to replicate these findings using an individualized delay discounting task (IDDT) while examining prefrontal neural activity during decision-making after concussion.

We hypothesize that individuals with a history of brain injury will show greater impulsivity and reduced prefrontal cortical activity during decision-making.

<u>References</u>

- Basch CH et al., (2023). Concussion Knowledge, Beliefs, and Behaviors among University Students: Implications for Faculty and Staff
- 2. Allen MT, et al., (Under Review). Self-reported history of head injury is associated with cognitive impulsivity on a delay discounting task.
- Interian A, et al. (2024). Cognitive and motor impulsivity in Veterans with mild traumatic brain injury with and without history of suicide attempt.
- Meade, C. S., et al., (2011). fMRI brain activation during a delay discounting task in HIV-positive adults with and without cocaine dependence.

Methods



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	No Concussion (<i>n</i> = 5)	Concussion (<i>n</i> = 3)
CMCQ - Mean (SD)		
k-value	.012 (.011)	0.010 (.003)
Immediate Reward (%)	41.48 (27.89)	55.56 (3.70)
IDDT – Choose Immediate R	eward (%) – Mean (SD)	
Control	4.17 (7.22)	0.00 (0.00)
Easy SIR	16.67 (32.81)	0.00 (0.00)
Easy LDR	63.33 (50.55)	83.33 (28.87)
Hard	25.83 (37.55)	69.44 (34.94)



(SIR) on hard decision trials between groups. Error bars +/- 1 SEM.

Discussion

- redistribution. Additional participants are needed to clarify these patterns.









conditions for participants reporting a history of *concussion (red)* and those reporting no concussion history (orange).

• Preliminary results show that a history of concussion may increase impulsive choices on difficult delay discounting decisions. • In participants reporting no history of concussion, greater OFC activity during difficult trials aligns with expected patterns of neural engagement. Further, reduced OFC activity in the concussion group is in line with previous research in other populations prone to impulsivity⁴ and could reflect an impaired ability to evaluate delayed rewards, altered metabolic demand, or vascular