

FOOTBALL PLAYERS MAY EXPERIENCE LESS SEVERE HEAD IMPACT EXPOSURE DURING BYE WEEKS

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ABSTRACT

Sports-related concussions are a major issue in American football and other contact sports. One of the proposed mechanisms contributing to incident concussion is head impact exposure (HIE). This mechanism has been studied but is difficult to get a handle on due to the variability between players. The goal of this analysis was to explore differences in HIE for bye week practices. NCAA Division I football teams enrolled in the NCAA-DoD Grand Alliance Concussion Assessment, Research and Education Consortium Advanced Research Core. These teams were involved in a range of seasons from 2015-2019. The players on these teams were instrumented with Head Impact Telemetry (HIT) Systems which consisted of six accelerometers that collected head impact data above an acceleration threshold. After data collection was complete, data from players who participated in 80% or more of their team's regular season practices were analyzed. Analysis showed that the type of contact activity (preseason practice, regular season practice, bye week practice, game) significantly changed an athlete's HIE. Normalized data showed that players experience fewer head impacts per day and lower magnitudes of linear and rotational acceleration during bye week practices. These metrics also differed based on player position, with offensive line and defensive line seeing the highest median number of head impacts during bye weeks. This is important because decreased HIE during bye weeks may allow players the chance to recover from previous HIE. Further research is needed in this area to discover how concussion risk changes in relationship to bye week HIE.

Keywords: Concussion, Head Impact Exposure, American Football, Acceleration

INTRODUCTION

Sports-related concussions (SRC) have high incidence in contact sports and can have significant consequences for affected athletes. SRC are more likely to occur in contact sports, such as wrestling, hockey, and football. American football has the highest annual number of reported SRC [1]. Studies estimate that between 1.6 million and 3.8 million sport-related traumatic brain injuries (TBI) occur every year, with over half being attributed to football [2,3]. The actual number of SRC may be underestimated, as many concussions go unreported [4,5]. Studies have suggested that the single-season concussion risk for college football players is 5.54% [6].

One known mechanism of concussion is a high magnitude impact, with greater impact-related head accelerations leading to a greater risk of concussion. Early research on this mechanism involved primates and concluded that concussions were the result of a combination of peak rotational acceleration and acceleration duration [7]. Defining a threshold for concussion was later explored for athletes, specifically football athletes. One study found that concussive impact linear acceleration