The Relative Odds of Sustaining a Sport-Related Concussion: A Study of 12,320 Student-Athletes

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Introduction

Accurately quantifying the risk of sport-related concussion (SRC) can prove valuable in the management of student-athletes. Our objective was to develop and validate an aggregate risk score based on biopsychosocial factors to predict the odds of sustaining a SRC.

Methods

An ambispective study was undertaken of 12,320 middle school, high school and collegiate athletes (Table 1). Neurocognitive testing was completed at preseason (baseline) and post-SRC. Multiple univariate and multivariable logistic regression models were used to determine which pre-injury variables accurately predicted the occurrence of SRC. The score was validated utilizing bootstrapping resampling.

Learning Objectives

To develop a concise risk score to predict the incidence of sustaining a sport-related concussion.

Results

Five variables maintained significance in the multivariable model, with corresponding risk score points: SRC history (21), prior headache treatment (6), contact sport (5), youth level of play (7), and history of ADHD/LD (2) (Table 2) Six groups were formed based on the differentiation of the probability of SRC (Table 3). Classification of odds of SRC by these categories produced an area under the curve (AUC) of 0.71 (95% CI 0.69-0.72, p < 0.001) (Figure 2). The scoring system was a significant predictor of SRC, $X2 = 1,112.75$, $p < 0.001$, df $=7$, although with small effect size.

Conclusions

An aggregate score was developed and internally validated to empirically assess factors associated with increased odds of sustaining a SRC. This summative score can be used as an adjunct to better conceptualize the odds of concussion for student-athletes. However, it is important to note that several other factors were not accounted for in the model and must be considered in the assessment of SRC risk.