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NOCSAE®

National Operating Committee on Standards for Athletic Equipment

Commissioning research and establishing standards for athletic equipment, where feasible, and encouraging dissemination of research findings on athletic equipment and sports injuries.

# Youth Helmet Football Standard: Research and Development Update

## NOCSAE Football Standard Helmet Overview

NOCSAE has one football helmet standard that applies to helmets of all sizes, worn by players of all sizes from youth to adult. NOCSAE standards use variable-mass biofidelic headforms to account for different-sized players, and helmets that are small enough to be worn by youth players are required to be tested on a headform that replicates a 50th percentile 10-year-old male. As helmet sizes get larger, headforms with more mass are used in the testing protocol. The NOCSAE small headform was initially developed in 1980 and has been part of NOCSAE standards for over 30 years.

For more than 10 years, NOCSAE has been researching the science necessary to support a separate standard for helmets designed for youth. Today, NOCSAE continues to prioritize this issue and is the only standards organization actively pursuing a youth football helmet standard through research grants and contract funding. At present, there is insufficient data to suggest a specific performance criteria that would provide more injury protection, or would protect against injury risks not already addressed.

## Scientific Advisory Committee

In June 2017, NOCSAE convened a Scientific Advisory Committee (SAC) to identify the scientific issues related to a youth football helmet standard. This is the third time NOCSAE has convened leading experts in science and medicine to explore this issue since 2011. The SAC includes leading scientists, physicians, biomechanical engineers and experts in sports equipment testing organizations.

## Frequently Asked Questions

### Does NOCSAE use an adult football helmet standard for youth players?

No, this is a misperception and misrepresentation of the NOCSAE football helmet standard. NOCSAE does not have an adult or a youth football helmet standard. NOCSAE has **one** football helmet standard that applies to helmets of all sizes, worn by players of all sizes from youth to adult.

### How does one standard apply to youth and adult players?

NOCSAE standards use variable-mass biofidelic headforms to account for different-sized players. Helmets that are small enough to be worn by youth players are required to be tested on a headform that is consistent with a 50th percentile 10-year-old male. As helmet sizes get larger, headforms with more mass are used in the testing protocol. NOCSAE was a pioneer in the use of variable-mass headforms designed to represent different-sized players. The NOCSAE small headform was first developed in 1980. It was tested, evaluated and validated by independent labs and incorporated into NOCSAE standards by 1987.

### Is NOCSAE developing a separate youth helmet standard?

For more than 10 years, NOCSAE has been researching the potential benefits of creating a separate standard for helmets designed for youth. NOCSAE's Scientific Advisory Committee is currently contracting research to explore potential criteria and develop youth player risk and exposure data. At present, there is insufficient data to justify helmet performance requirements for youth. NOCSAE continues to prioritize this issue and is the only standards organization actively pursuing a youth helmet standard through research grants and contract funding. NOCSAE will not develop a standard without solid science from which we can conclude that meeting the performance threshold is feasible and will be effective in addressing injury risks specific to the youth player without increasing the risk of other injuries.

The current objective of the SAC is to evaluate the latest scientific research relevant to youth helmets, identify areas where additional research is needed, and share professional insights on the potential criteria for a youth helmet standard.

Based on recommendations coming out of the June 2017 SAC meeting, NOCSAE authorized funding for two new parallel research initiatives to explore potential performance criteria for a youth helmet football standard. Virginia Tech led one of the research programs to collect biomechanical and clinical data directly from youth football players using helmets instrumented with helmet-mounted accelerometers arrays (HITS) and video capture/analysis. The second research program was conducted by the Neurotrauma Impact Science Laboratory at the University of Ottawa, Ontario, Canada to investigate potential test parameters for a youth football helmet standard based on observed youth football impact dynamics and develop a computer model (FEM) of the youth brain.

The two cooperative research programs were designed to do the following:

### 1 Research initiatives to inform the development of a youth football helmet standard.

**Abstract:** This research aims to inform the development of a youth football helmet standard by quantifying the biomechanics of concussion in youth football players, matching on-field impact velocities with resulting head accelerations, and relating on-field measures to the proposed pneumatic ram test method. Youth football teams are currently being studied at Virginia Tech and this research will develop data from those teams using helmet accelerometers as well as video from multi-camera arrays to calculate and verify player and helmet impact velocities.

(1-SAC-2017)

### 2 Establish test parameters for youth American football helmets informed by injury surveillance.

**Abstract:** Develop data from biomechanical analysis of youth head impacts in American football to inform the development of a youth football helmet standard. Head impact events from 60 youth football games will be analyzed, documented and reconstructed using FEM for concussive and non-concussive impacts to establish youth specific risk curves for peak linear accelerations to develop an impact protocol specific to youth players age 14 and under. Video analysis will identify the most common injury mechanisms, levels of impact parameters (velocity, mass, location, compliance) relevant to causing injury, and quantify head dynamic and brain tissue response associated with injury.

(2-SAC-2017)

## Next Steps

An update on findings from the two research projects described above was shared at the NOCSAE Summer Standards Meeting in July 2019. Virginia Tech is currently completing final tests related to impact velocity to head accelerations on the pneumatic ram to check consistency with on-field measurements. The SAC will reconvene in the fall of 2019 to evaluate the research findings and potentially recommend helmet performance criteria specific to a youth helmet test standard.