

## Virginia Tech Helmet Ratings Memorandum - July 2025

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### **Subject: Update to Star Rating Thresholds for Bicycle, Varsity Football, Youth Football Helmets**

#### **Purpose of the Virginia Tech Helmet Ratings**

The Virginia Tech Helmet Ratings provide an independent, objective resource to help consumers make informed decisions about helmet performance. Every helmet we test has already passed the relevant certification standards, which ensures a low risk of severe or fatal head injury during the specific impacts defined in those standards. But those standards do not capture the full range of impact performance.

Our testing focuses on how well helmets manage impact energy in scenarios tied to concussion risk. We run sport-specific impact tests and use those data to calculate a helmet's overall impact performance score (STAR value). That performance score is then mapped to a star rating between 0 and 5 stars. The star rating simplifies interpretation and reflects how well a helmet performs in reducing concussion risk.

For consumers, this system highlights performance differences that are not visible from price or marketing claims. For manufacturers, our test protocols and performance thresholds offer a benchmark for innovation and improvement.

#### **Why We Are Updating the Ratings**

The original goal of the helmet ratings was to distinguish between helmets in a way that is easy for consumers to understand. It was also to provide a framework that manufacturers could use to improve. Over time, that has worked. Manufacturers have used our test methods to design better helmets. We applaud that.

But when a majority of helmets earn 5 stars, the top category no longer distinguishes the very best. That's where we are now. Consider bicycle helmets: when we launched the ratings in 2018, only 4 out of 30 tested earned 5 stars. Today, 167 out of 272 bicycle helmets are rated 5 stars. Similarly, in varsity football (first released in 2011 and updated in 2018), 33 out of 35 helmets have earned 5 stars. For youth football (first released in 2019), it's 26 out of 36.

These are positive developments. Helmets today are much better than they were a decade ago. But within the large group of 5-star helmets, meaningful performance differences remain. If all top helmets share the same rating, then consumers are not seeing those differences. The 5-star label has become diluted.

To restore the ability of our system to differentiate, we are updating the thresholds that determine star ratings for bicycle, varsity football, and youth football helmets. Five stars will once again mean a helmet is among the very best. Four stars will still indicate strong performance, and so on down the scale.

As a result of the rescaling, some helmets that previously earned 5 stars may now receive a 4-star rating or lower. This is not because their performance has worsened, but rather the bar for top-tier performance has risen. This shift reflects meaningful progress in helmet design and ensures that the 5-star label continues to signal the highest level of protection available. This rescaling approach is consistent with how the automotive industry updates New Car Assessment Program (NCAP) thresholds over time to maintain meaningful distinctions as vehicle safety improves.

### Updated Rating Thresholds

In general, we recommend any 4- or 5-star rated helmet. When updating the thresholds for bicycle, youth football, and varsity football helmets, we applied the same philosophy across all three categories.

To receive a 4- or 5-star rating, a helmet must perform within the top 50% based on its overall impact performance score. To distinguish between 4- and 5-star helmets, we computed the midpoint between the median-performing helmet and the best-performing helmet. Helmets closer to the top performer received 5 stars; those closer to the median received 4 stars.

We then used the width of the 5-star and 4-star performance ranges to define rating bins for the bottom 50%, which correspond to 3-star, 2-star, 1-star, and 0-star designations. Exact threshold values were rounded to the nearest tenth. These thresholds were set based on the distribution of helmet performance as of July 7, 2025.

The figure below illustrates how the new thresholds for youth football helmets were established based on 36 helmet models.



The following tables summarize how the new thresholds compare to the previous thresholds and the resulting distribution of helmet ratings in each category.

**Bicycle Helmet Star Rating Thresholds**

Rating	Previous Score Threshold	Number of Helmets	Updated Score Threshold	Number of Helmets
5 stars	< 14.0	167	< 10.1	38
4 stars	< 19.0	66	< 13.0	96
3 stars	< 24.0	32	< 16.0	64
2 stars	< 29.0	7	< 19.0	35
1 star	>= 29.0	0	< 21.9	20
0 stars	NA	0	>= 21.9	19

**Varsity Football Star Ratings Thresholds**

Rating	Previous Score Threshold	Number of Helmets	Updated Score Threshold	Number of Helmets
5 stars	< 10.0	33	< 1.8	11
4 stars	< 20.0	1	< 3.2	6
3 stars	< 30.0	1	< 4.6	4
2 stars	< 40.0	0	< 6.0	4
1 star	< 50.0	0	< 7.4	6
0 stars	>= 50.0	0	>= 7.4	4

**Youth Football Star Ratings Thresholds**

Rating	Previous Score Threshold	Number of Helmets	Updated Score Threshold	Number of Helmets
5 stars	< 5.0	26	< 1.7	6
4 stars	< 10.0	7	< 3.3	12
3 stars	< 15.0	3	< 4.9	7
2 stars	< 20.0	0	< 6.4	4
1 star	< 25.0	0	< 8.0	3
0 stars	>= 25.0	0	>= 8.0	4