

# Football helmet shields can protect against a kick in the face

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Researchers have determined that the two most popular brands of football helmet faceshields can withstand a hit equivalent to a kick in the face and provide that protection without disrupting players' vision.

The eye specialists at Ohio State University used an air cannon to hurl baseballs at the plastic faceshields. The impact was designed to mimic the force of a kick to the face, considered the riskiest way to sustain an eye injury in football.

The shields maintained their structural integrity after baseballs were propelled at the faceshields at velocities of up to 218 feet per second, or nearly 150 miles per hour. Measures of optical quality also showed that the curved, plastic shields do not add any corrections or distortions to players' vision.

The faceshields' protective potential bolsters an argument favoring mandatory use of the shields for college-age football players and younger, said Gregory Good, professor of clinical optometry at Ohio State and a coauthor of the study. Collegiate programs currently do not mandate their use.

"I think this would be a good idea not only from a collegiate standpoint, but all the way down to peewee football, especially for players with good vision in only one eye," Good said. "Players in the pros can make their own decisions, but it would be helpful to have coaches and managers on board to convince kids in high school and younger kids especially to

wear faceshields. At that age, kids typically don't have enough experience to make a decision about safety on their own."

The research is published in a recent issue of the journal *Optometry*.

The study tested the two most popular collegiate and professional football helmet faceshields by manufacturers Oakley, based in Foothills Ranch, Calif., and Nike, based in Beaverton, Oregon. The companies donated faceshields for use in the study. The average cost is \$45 to \$50 per shield.

The researchers conducted the air cannon work at ICS Laboratories in Brunswick, Ohio. Good completed the study with Kathryn Baker, Deborah Grzybowski, William McLaughlin and Steven Katz of Ohio State's Department of Ophthalmology; Aaron Zimmerman of Ohio State's College of Optometry; and Dale Pfriem of ICS Laboratories.

Because no current performance standard exists for football helmet faceshields, the researchers used the air cannon testing method that is already approved to assess face protectors for baseball and lacrosse. The American Society for Testing and Materials sets the requirements for face and eye protection used in numerous sports.

In the study, 10 football visors from each company were struck once at numerous velocities. Two visors from each company were hit three times to evaluate the effects of repeated blows. Other faceshields were struck once in sub-freezing temperatures. None of the faceshields broke under any of the impact conditions.

The highest velocity equated to an impact force of about 2,500 Newtons, or 562 pounds of force. Previous research has reported a maximum kicking motion impact of 2,439 Newtons, or 548 pounds of force, in soccer.

The researchers determined that new football faceshields hold up solidly to high-velocity impact, but whether that strength is maintained over the duration of one or more football seasons is open to debate and is part of continuing research.

The researchers also analyzed various qualities of the curved plastic that might affect vision – such as light distribution, hazing or a prismatic effect that changes the direction of light. The shields exceeded standards related to these measures.

"Both brands are of high optical quality, and both hold up to high-velocity impact," Good said.

Though serious eye injuries in football are relatively rare, the researchers mentioned the case of Orlando Brown of the Cleveland Browns, whose eye was inadvertently hit by a referee's thrown penalty flag during a game in 1999. He missed several seasons after the injury.

A summary of National Electronic Injury Surveillance System data shows that about one-third of football-related eye injuries documented between 2002 and 2006 were caused by the football itself and almost one-fifth were from finger pokes. The data do not specify whether these injuries occurred during organized games or "street" play. Other data also show in 2000, U.S. emergency rooms treated an estimated 40,000 sports-related eye injuries.

And more than 10 years ago, the sports safety committees of the American Academy of Pediatrics and the American Academy of Ophthalmology issued a report recommending that football helmets be equipped with a polycarbonate faceshield for face and eye protection. They were responding to a 1993 report by Prevent Blindness America indicating that football was the fifth-greatest contributor to sports-related eye injuries in patients younger than 25.

Good said that rather than trying to judge players' susceptibility to eye injuries, the researchers focused on outlining the potential benefits that faceshields would provide.

But they know there is more to the story. They are following up by surveying football and equipment managers at about 120 collegiate programs in the United States to gauge player use of and attitudes about helmet faceshields. The researchers also have exposed new faceshields to three hours of sunlight per day this autumn and will retest their impact resistance after a season's worth of exposure to see if the radiation affects the faceshields' durability.

"We noticed the older faceshields we used in a pilot study didn't hold up as well, and we believe it could be because of exposure to radiation, at least in part," Good said.

None of the researchers has any financial arrangement with the companies that donated study materials.

Source: Ohio State University

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