

Ryan Kohler – concussion and prevention/equipment literature search.

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[Head injuries, heading, and the use of headgear in soccer.](#)

By Niedfeldt MW, Current Sports Medicine Reports [Curr Sports Med Rep], ISSN: 1537-8918, 2011 Nov; Vol. 10 (6), pp. 324-9; PMID: 22071392;

Soccer has more than 265 million players around the world and is the only contact sport with purposeful use of the head for controlling and advancing the ball. Head contact in soccer has the potential to cause acute traumatic brain injury including concussion or, potentially, a pattern of chronic brain injury. Although early retrospective research on the effects of soccer heading seemed to suggest that purposeful heading may contribute to long-term cognitive impairment, prospective controlled studies do not support this and, in fact, suggest that purposeful heading may not be a risk factor for cognitive impairment. Headgear has not been shown to be effective in reducing ball impact but may be helpful in reducing the force of non-ball-related impacts to the head. There are concerns that universal use of headgear may cause more aggressive heading and head challenges, leading to increased risk of injury.

Database: MEDLINE with Full Text

[Protective Equipment and the Prevention of Concussion - What Is the Evidence?](#)

Navarro, Rodolfo R., Current Sports Medicine Reports Jan/Feb2011, Vol. 10 Issue 1, p27

Abstract: The complex nature of the evaluation and management of concussion lends to controversy, and the immediate and long-term implications still are being investigated. Various types of protective equipment have been used as a means to prevent concussions, and protective equipment is being used more frequently in different sports. Recent investigations have suggested that a protective, but not preventive, effect may be afforded by mouthguard use in rugby players, headgear use in soccer players, and customized mandibular orthotic use in football players. The use of faceshields has not shown a proven benefit in preventing the incidence of sport-related concussion in ice hockey or field hockey participants. Further studies are needed to clarify the role of protective equipment in the prevention of sport-related concussion.

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[PDF Full Text](#) (565KB)

Notes: National Sport Information Centre holds this title

[Helmets and Mouth Guards: The Role of Personal Equipment in Preventing Sport-Related Concussions.](#)

Daneshvar, Daniel H.; Baugh, Christine M.; Nowinski, Christopher J.; McKee, Ann C.; Stern, Robert A.; Cantu, Robert C., Clinics in Sports Medicine Jan2011, Vol. 30 Issue 1, p145

Abstract: The article describes the role of personal equipment, such as helmet and mouth guards in preventing sport-related concussions. Helmets have been shown to prevent skull fracture and severe traumatic brain injury (TBI), while mouth guards have been known to protect against oral and dental

injury. A description of the use of personal equipment and mechanism of concussion in different sports is presented, including American football, ice hockey and rugby is also presented.

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Notes: National Sport Information Centre holds this title

[Is protective equipment useful in preventing concussion? A systematic review of the literature.](#)

By Benson BW, Hamilton GM, Meeuwisse WH, McCrory P, Dvorak J, British Journal Of Sports Medicine [Br J Sports Med], ISSN: 1473-0480, 2009 May; Vol. 43 Suppl 1, pp. i56-67; PMID: 19433427; To determine if there is evidence that equipment use reduces sport concussion risk and/or severity.

Database: MEDLINE with Full Text

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Notes: National Sport Information Centre holds this title

[Protective Headgear for Soccer Players: An Overview.](#)

Gray, Michael; Bain, Jennifer; Willis, Lindsay, Sport Journal Jan2009, Vol. 12 Issue 1, p1 (English Abstract Available) Abstract: Protective headgear has been worn by thousands of American soccer players in youth leagues, high schools, colleges, and even professional leagues. While some current studies indicate that concussions occur among soccer players at a rate similar to that among football players, other studies contradict such results and the issue remains disputed. Moreover, studies disagree on whether heading the ball can cause concussions or long-term brain impairment. This article examines the causes and occurrence of head injuries in soccer and the possible role of protective headgear in preventing those injuries.

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[Sex Differences in Head Acceleration During Heading While Wearing Soccer Headgear.](#)

Tierney, Ryan T.; Higgins, Michael; Caswell, Shane V.; Brady, Jessica; McHard, Krista; Driban, Jeffrey B.; Darvish, Kurosh, Journal of Athletic Training Nov/Dec2008, Vol. 43 Issue 6, p578

Abstract: Context: Researchers have indicated that female soccer players may be at greater risk of concussion compared with their male counterparts. Soccer headgear is marketed for reducing head acceleration and risk of concussion. Objective: To determine the effect of sex and soccer headgear on head impact kinematics and dynamic stabilization during soccer heading. Design: Cross-sectional design. Setting: Research laboratory. Patients or Other Participants: Forty-four college-aged soccer players (29 women, 15 men). Intervention(s): Using a head impact model, participants performed 4 soccer headers under 3 headgear conditions (control, Head Blast Soccer Band, and Full90 Select Performance Headguard). Main Outcome Measure(s): Dependent variables assessed before soccer heading were head-neck anthropometrics and isometric neck muscle strength, and those assessed during soccer headers were resultant linear head acceleration, Head Injury Criteria (HIC₃₆), and superficial neck muscle electromyography. Statistical analyses included multivariate and univariate analyses of variance with repeated measures, independent-samples t tests, appropriate follow-up analyses of variance and post hoc t tests, and Pearson product moment correlations ($\alpha = .05$). Results: Head acceleration in women was 32% and 44% greater than in men when wearing the Head Blast (21.5 g versus 16.3 g) and Full90 Select (21.8 g versus 15.2 g), respectively ($P < .05$). Compared with men, women exhibited 10% greater head accelerations (20.2 g

versus 18.2 g) during the control condition ($P = .164$). Conclusions: Female soccer players exhibited greater head accelerations than their male counterparts when wearing headgear. Our results are important clinically because they indicate that soccer headgear may not be an appropriate head injury prevention tool for all athletes.

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Notes: National Sport Information Centre holds this title.

[The effect of protective headgear on head injuries and concussions in adolescent football \(soccer\) players.](#)

Delaney, J. S.; Al-Kashmiri, A.; Drummond, R.; Correa, J. A., British Journal of Sports Medicine Feb2008, Vol. 42 Issue 2, p110

Abstract: Objective: To examine the effects of protective headgear in adolescent football (soccer) players. Design: Cross-sectional study. Setting: Oakville Soccer Club, Oakville, Canada. Participants: Football players aged 12-17 years. Intervention: A questionnaire examining the 2006 football season using self-reported symptoms. Main outcome measures: The number of concussions experienced during the current football season, the duration of symptoms, injuries to the head and face and any associated risk factors for these injuries. Results: In the population studied, 47.8% had experienced symptoms of a concussion during the current football year. 26.9% of athletes who wore headgear (HG) and 52.8% of those who did not wear headgear (No-HG) had concussions. Approximately 4 out of 5 athletes in each group did not realize they had suffered a concussion. More than one concussion was experienced by 50.0% of the concussed HG athletes and 69.3% of the concussed No-HG group. 23.9% of all concussed players experienced symptoms for at least 1 day or longer. Variables that increased the risk of suffering a concussion during the 2006 football year included being female and not wearing headgear. Being female and not wearing football head-gear increased the risk of suffering an abrasion, laceration or contusion on areas of the head covered by football headgear. Conclusion: Adolescent football players experience a significant number of concussions. Being female may increase the risk of suffering a concussion and injuries on the head and face, while the use of football headgear may decrease the risk of sustaining these injuries.

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[Mouthguards in Sport Activities.](#)

Knapik, Joseph J.; Marshall, Stephen W.; Lee, Robyn B.; Darakjy, Salima S.; Jones, Sarah B.; Mitchener, Timothy A.; DelaCruz, Georgia G.; Jones, Bruce H., Sports Medicine 2007, Vol. 37 Issue 2, p117

Abstract: Three systematic reviews were conducted on: (i) the history of mouthguard use in sports; (ii) mouthguard material and construction; and (iii) the effectiveness of mouthguards in preventing orofacial injuries and concussions. Retrieval databases and bibliographies were explored to find studies using specific key words for each topic. The first recorded use of mouthguards was by boxers, and in the 1920s professional boxing became the first sport to require mouthguards. Advocacy by the American Dental Association led to the mandating of mouthguards for US high school football in the 1962 season. Currently, the US National Collegiate Athletic Association requires mouthguards for four sports (ice hockey, lacrosse, field hockey and football). However, the American Dental Association recommends the use of mouthguards in 29 sports/exercise activities. Mouthguard properties measured in various studies included shock-absorbing capability, hardness, stiffness

(indicative of protective capability), tensile strength, tear strength (indicative of durability) and water absorption. Materials used for mouthguards included: (i) polyvinylacetate-polyethylene or ethylene vinyl acetate (EVA) copolymer; (ii) polyvinylchloride; (iii) latex rubber; (iv) acrylic resin; and (v) polyurethane. Latex rubber was a popular material used in early mouthguards but it has lower shock absorbency, lower hardness and less tear and tensile strength than EVA or polyurethane. Among the more modern materials, none seems to stand out as superior to another since the characteristics of all the modern materials can be manipulated to provide a range of favourable characteristics. Impact studies have shown that compared with no mouthguard, mouthguards composed of many types of materials reduce the number of fractured teeth and head acceleration. In mouthguard design, consideration must be given to the nature of the collision (hard or soft objects) and characteristics of the mouth (e.g. brittle incisors, more rugged occlusal surfaces of molars, soft gingiva). Laminates with different shock absorbing and stress distributing (stiffness) capability may be one way to accommodate these factors. Studies comparing mouthguard users with nonusers have examined different sports, employed a variety of study designs and used widely-varying injury case definitions. Prior to the 1980s, most studies exhibited relatively low methodological quality. Despite these issues, meta-analyses indicated that the risk of an orofacial sports injury was 1.6-1.9 times higher when a mouthguard was not worn. However, the evidence that mouthguards protect against concussion was inconsistent, and no conclusion regarding the effectiveness of mouthguards in preventing concussion can be drawn at present. Mouthguards should continue to be used in sport activities where there is significant risk of orofacial injury.

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[The Use and Acceptance of Headgear Among College Women Soccer Players. \(Poster Session\)](#)

Achar, Suraj; Bracker, Mark; Winscott, Michelle M., Clinical Journal of Sport Medicine Sept 2007: Vol. 17 Issue 5. p. 425

Abstract: Nine female college soccer players participated in a randomized trial of the use of protective headgear. The rate of concussion was three times higher in the non-headgear wearing group, and all participants expressed interest in using the equipment in the future.

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[Soccer Headgear Proven Effective In Play.](#)

Training & Conditioning Oct2007, Vol. 17 Issue 7, p6

Abstract: The article reports that wearing headgear decreases the risk of concussion and head trauma for soccer players. A research commissioned by FIFA confirmed that wearing headgear reduced impact forces. Research findings showed that concussion rate among players who wore headgear was 26.9 percent, compared to 52.8 percent among those not wearing the gear.

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[The Effect of Protective Headgear on Head Injuries and Concussions in Adolescent Soccer Players. \(Abstract\)](#)

Scott, J.; Delaney, A.; Al-Kaashmiri, R.; Drummond, R.; Correa, J., Clinical Journal of Sport Medicine Mar 2007: Vol. 17 Issue 2. p. 165

Abstract:

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Notes: National Sport Information Centre holds this title

[Effectiveness of mouthguards in reducing neurocognitive deficits following sports-related cerebral concussion.](#)

By Mihalik JP, McCaffrey MA, Rivera EM, Pardini JE, Guskiewicz KM, Collins MW, Lovell MR, Dental Traumatology: Official Publication Of International Association For Dental Traumatology [Dent Traumatol], ISSN: 1600-4469, 2007 Feb; Vol. 23 (1), pp. 14-20; PMID: 17227375;

Although it is widely accepted that mouthguards decrease the incidence of dental injuries, there is a controversy among sports medicine professionals as to the effectiveness of mouthguards in decreasing the incidence or severity of sports-related cerebral concussion (SRCC). While some experimental data suggest that this may be the case, there exist a number of reports suggesting that mouthguards do not serve this purpose. These conclusions have been drawn, however, without actually measuring the extent of neurocognitive dysfunction in athletes following sports-related concussion. The purpose of this study was to determine whether mouthguard use reduces the neurocognitive and symptomatic impairments that follow an injurious episode of SRCC. Preseason baseline data were collected as part of an ongoing clinical program that uses a computerized neurocognitive test to assess various faculties of brain function and symptoms reported at the time of testing. Follow-up testing from 180 student-athletes who had sustained an SRCC was analyzed for the purpose of this study. These athletes were separated into one of two groups: those who reported using mouthguards and those who did not. Neurocognitive testing was accomplished using the Immediate Post-Concussion and Assessment Test (ImPACT). Results suggest that neurocognitive deficits at the time of the athletes' first follow-up assessment did not differ between mouthguard users and non-users, suggesting that mouthguard use does little to reduce the severity of neurocognitive dysfunction and onset of symptoms following sports-related head trauma. However, an interesting finding in this study was that athletes experienced significantly lower neurocognitive test scores and reported higher symptom scores following SRCC regardless of mouthguard use. This emphasizes a thorough clinical evaluation of athletes that have sustained an SRCC. Although it was found in this study that mouthguard use does not decrease the severity of concussion, it is important to note that the use of mouthguards is paramount in reducing maxillofacial and dental trauma and their use should continue to be mandated by athletic associations and supported by all dental and sports medicine professionals.

Database: MEDLINE with Full Text

[Recommendations for the Use of Mouthguards in Contact Sports: Can They Also Reduce the Incidence and Severity of Cerebral Concussions?](#)

Desmarteau, Derric, Current Sports Medicine Reports Oct2006, Vol. 5 Issue 5, p268

Abstract: The article cites a study which aims to give several recommendations for the use of mouthguards in contact sports. It examines if mouth guards could reduce the incidence and severity of cerebral concussions caused by contact sports. The researchers suggest to use properly fitted mouthguard because of oral protection that it could give. However, it was later found that mouthguards could not reduce the incidence of concussion in contact sports.

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Notes: National Sport Information Centre holds this title

[Preventing head and neck injury.](#)

McIntosh, A.S.; McCrory, P., British Journal of Sports Medicine June 2005: Vol. 39 Issue 6. p. 314-318

Abstract: A wide range of head and neck injury risks are present in sport, including catastrophic injury. The literature since 1980 on prevention of head and neck injury in sport was reviewed, focusing on catastrophic and brain injury and identifying the range of injury prevention methods in use. There have been few formal evaluations of injury prevention methods. Approaches that are considered, or have been proven, to be successful in preventing injury include: modification of the baseball; implementation of helmet standards in ice hockey and American football and increased wearing rates; use of full faceguards in ice hockey; changes in rules associated with body contact; implementation of rules to reduce the impact forces in rugby scrums. Helmets and other devices have been shown to reduce the risk of severe head and facial injury, but current designs appear to make little difference to rates of concussion. Research methods involving epidemiological, medical, and human factors are required in combination with biomechanical and technological approaches to reduce further injury risks in sport.

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Notes: National Sport Information Centre holds this title

[Effectiveness of headgear in football.](#)

By Withnall C, Shewchenko N, Wonnacott M, Dvorak J, British Journal Of Sports Medicine [Br J Sports Med], ISSN: 1473-0480, 2005 Aug; Vol. 39 Suppl 1, pp. i40-8; discussion i48; PMID: 16046355;

Commercial headgear is currently being used by football players of all ages and skill levels to provide protection from heading and direct impact. The clinical and biomechanical effectiveness of the headgear in attenuating these types of impact is not well defined or understood. This study was conducted to determine whether football headgear has an effect on head impact responses.

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Notes: National Sport Information Centre holds this title

[Performance enhanced headgear: a scientific approach to the development of protective headgear.](#)

McIntosh, A.; McCrory, P.; Finch, C.F., British Journal of Sports Medicine Feb 2004: Vol. 38 Issue 1. p. 46-49

Abstract: Background: There is a continuing debate about the performance of protective headgear in rugby union, rugby league, and Australian rules football. Objectives: To examine the impact energy attenuation performance of foam that could be incorporated into headgear and examine the performance of prototypes of modified headgear. Methods: Impact tests were conducted on polyethylene foams and protective headgear. Free fall drop tests with a rigid headform on to a flat rigid anvil were conducted. Resultant headform acceleration was measured. Means of the headform acceleration maxima for repeat tests were calculated. Results: Tests on polyethylene foam indicated that an increase in thickness from 10 mm to 16 mm would improve headgear performance. These

modifications were incorporated in part into two headgear models: the Albion Headpro and the Canterbury brand Body Armour honeycomb headgear. The headgear tests show that significant reductions in headform acceleration were achieved by increasing the foam density and thickness. Mean headform acceleration maxima for the 16 mm thick modified rugby headgear was about 25 % of that of standard headgear for lateral impact 0.3 and 0.4 m drop heights and 27 % for the centre front 0.3 m drop tests. At these impacts, the headform acceleration for the modified rugby headgear was below 200 g. Conclusions: Significant improvements in impact energy attenuation performance are possible with small design changes. Whether these are sufficient to reduce the rate or severity of concussion in rugby and Australian rules football can only be shown by formal prospective studies on the field.

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Notes: National Sport Information Centre holds this title

[Training and equipment to prevent athletic head and neck injuries.](#)

Cross, K.M.; Serenelli, C., Clinics in Sports Medicine July 2003: Vol. 22 Issue 3. p. 639-667 Abstract: Due to the likelihood of poor outcomes from neurotraumas, it is very important that coaches and athletes comply with preventive measures. Strength training, sporting techniques, and equipment are the fundamental means of addressing this issue. Cervical spine injuries may be best addressed by cervical stabilization exercises and the use of proper sporting techniques. Concussions, however, are best addressed by proper use and fitting of sports equipment and sporting techniques.

equipment (Sporting goods); SPINE -- Wounds & injuries

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Notes: National Sport Information Centre holds this title

[Do mouthguards prevent concussion? / Le port de protege-dents peut-il prevenir les commotions cerebrales ou spinales ?](#)

McCrory, P., British Journal of Sports Medicine Apr 2001: Vol. 35 Issue 2. p. 81-82

Abstract:

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