HJRS HEC Journal Recognition System Category Y

Vol 3 Issue 2 (Oct-Dec 2025)

ISSN (Online): 3006-4740

ISSN (Print): 3006-4732

The Role of Sports Protective Equipment in Injury Prevention: Athlete Feedback on Safety Gear and Its Effectiveness

Maheen Hashim Khan Burki
PhD Scholar, Department of Sports Sciences & Physical Education, University of the Punjab, Lahore, Pakistan, maheen.burki@ue.edu.pk
Dr. Yasmeen Tabassum
Assistant Professor, Department of Sports Sciences & Physical Education, University of the Punjab, Lahore, Pakistan, yasmeentabassum111@gmail.com
Dr. Zafar Iqbal Butt
Professor, Department of Sports Sciences & Physical Education, University of the Punjab, Lahore, Pakistan, chairman.sspe@pu.edu.pk

Abstract

This study examined the effectiveness of sports protective equipment and the perceptions of university athletes regarding its use, comfort, and role in injury prevention. The research focused on football, cricket, and hockey players, who are often exposed to high injury risk due to collisions, rapid movement, and high-speed projectiles. A sample of 150 both male and females was employed (Cricket =50, Football=50, hockey =50) athletes from the University of the Punjab and the University of Education Lahore was selected through a convenient random sampling technique. These institutions were selected due to their established sports programs and diversity of athletes participating in Football, Cricket, and Hockey. The sample size was justified using the Krejcie and Morgan (1970) sampling table, which recommends a sample of 150 for a population size of 300. This sample size was considered adequate for obtaining reliable and representative results. the researcher employed an adapted version of the Trait Emotional Intelligence Questionnaire (TEIQue) developed by Petrides (2009). Although originally designed to assess emotional intelligence, specific items were adapted under expert supervision to measure athletes'perceptions of protective equipment. The questionnaire consisted of 25 items measured on a five point Likert scale, where 1 represented "Strongly Agree" and 5 represented "Strongly Disagree." adapted questionnaire, validated by experts, was used to collect data on athlete opinions, usage behavior, and perceived effectiveness of safety equipment. Results showed strong agreement that protective gear improves safety and prevents injuries, with comfort, fit, and design influencing acceptance and consistent use. Although modern safety gear was widely viewed as effective,

concerns persisted about discomfort, limited availability, affordability, and inconsistent enforcement by coaches. The findings highlight the need for enhanced athlete education, improved gear design, and continuous innovation in sport-specific protective equipment. The study contributes to a better understanding of athlete-centered factors that influence safety compliance in sports environments.

Keywords Protective Equipment, Sports Gear, Injuries Prevention, Athlete's Perception

Introduction

Protective equipment's have become a central component in sports injury prevention, particularly in high-contact sports such as football, cricket, and hockey. While sports participation enhances physical fitness, mental well-being, and social development, it also exposes athletes to varying degrees of injury risk from minor sprains to severe trauma including fractures and concussions (Rakesh, 2025). Advancements in sports technology have improved the design and engineering of protective gear, yet debates persist regarding its comfort, perceived hindrance to performance, and actual protective efficacy (McIntosh, 2012).

Athlete perceptions play a pivotal role in the real-world effectiveness of safety gear. Existing research shows that protective equipment such as helmets, mouthguards, shin guards, gloves, and pads can reduce injury severity when used appropriately. However, compliance remains inconsistent due to discomfort, restricted mobility, thermal discomfort, and skepticism about injury prevention (Gurgis et al., 2022). University-level athletes who often participate competitively but with limited institutional support are especially vulnerable to these challenges.

This study investigates the perceived effectiveness, usage patterns, and user experience of protective sports equipment among university athletes. By integrating athlete feedback with empirical injury prevention principles, the research aims to improve understanding of how safety gear contributes to real-world injury reduction.

Significance of the Study

This study offers valuable contributions to researchers, coaches, policymakers, and equipment manufacturers for several reasons. Understanding how athletes perceive protective equipment helps coaches identify barriers to compliance and improve safety protocols (Adams et al,.) Most literature focuses on elite or professional athletes. This study expands knowledge by examining young university athletes, who may lack financial resources, advanced equipment, or structured support systems (Dean & Bundon, 2021). By identifying concerns related to comfort, fit, and performance interference, the findings can support user-centered design improvements. The study highlights areas where stronger regulations, awareness campaigns, or enforcement

mechanisms may be required to enhance athlete safety. Understanding perceptions around risk, compliance, and gear usability helps inform educational programs and institutional guidelines.

Literature Review

Sports participation provides numerous physical, psychological, and social benefits but carries an inherent risk of injury. Sports-related injuries contribute significantly to healthcare burdens and lost athlete training time, making prevention strategies essential (Kerr et al., 2021). Protective equipment plays a crucial role by attenuating biomechanical forces and reducing the risk of fractures, concussions, and soft-tissue injuries (Verhagen & van-Mechelen, 2021). Modern safety gear uses principles of energy absorption, dissipation, and force distribution. Helmets, for example, reduce skull fractures but remain limited in preventing concussions due to the complexity of brain movement within the skull (Post et al., 2020). Similarly, shin guards reduce tibial impact but vary in effectiveness depending on material quality and fit. Athlete discomfort such as heat buildup and restricted motion remains a barrier to compliance (Andresen et al., 2020).

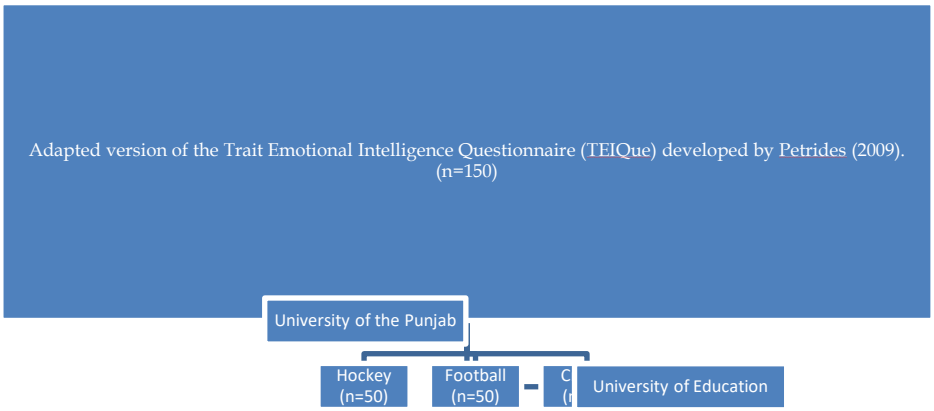
Football players frequently experience knee, ankle, and head injuries. Shin guards are mandatory due to high tibial injury rates, though many athletes express dissatisfaction with comfort and fit. Headgear remains controversial in concussion prevention (Zuckerman et al., 2018). In cricket, helmets with enhanced materials and neck protectors have gained importance, particularly after high-profile injuries. Nevertheless, fielders often avoid protective equipment due to thermal discomfort and restricted mobility (Sethi et al., 2020). Hockey players face risks from high-velocity sticks and balls. Goalkeepers wear comprehensive protective sets, while field players rely heavily on mouthguards, shin guards, and facemasks during penalty corners. Compliance varies based on league rules and cultural norms (Sigurdsson et al., 2016)

Athlete Perceptions

Perception-driven factors influencing protective equipment adoption include. Poor fit is a primary cause of non-compliance. Athletes may believe safety gear restricts performance. Heavy padding creates heat stress. Gear perceived as unattractive may be rejected, especially by younger athletes. Athletes who underestimate injury risk may avoid protective gear. These perceptions greatly influence real-world adherence and injury outcomes (White et al., 2018).

Technological Innovation and Equipment Design

Recent innovations include smart helmets, wearable impact sensors, and 3D-printed custom gear (King et al., 2021). Advanced materials such as carbon composites and viscoelastic foams improve energy absorption. However, accessibility and cost remain major limitations in developing countries.



Policy, Governance, and Research Gaps

Governance bodies often implement mandatory equipment rules only after severe injuries occur (Vriend et al., 2017). There is limited longitudinal research on real-world injury reduction, and female athlete needs remain underrepresented.

Methodology

This quantitative study used a adapted close ended and structured questionnaire to evaluate athlete perceptions regarding protective equipment. Using convenient randomized sampling through google form from University of the Punjab and University of Education because these two institution have established sports sciences degree program.

Research Design

A descriptive quantitative research design was adopted to collect measurable data and statistically analyze trends in perception, comfort, usage, and effectiveness

Population

The population included male and female university athletes participating in football, cricket, and hockey at the University of Education and the University of the Punjab.

Sample and Sampling Technique

A sample of 150 athletes was selected based on Krejcie and Morgan (1970) recommendations for a population of 300. Convenience sampling was used due to accessibility and time limitations.

Data Collection Tool

An adapted questionnaire Sport Protective Equipment and Injury Prevention Questionnaire SPEIPQ (Khan 2024) based on the Trait Emotional Intelligence Questionnaire (TEIQue) was used with 25 Likert scale items (1 = Strongly Agree to 5 = Strongly Disagree).

Validity and Reliability

Expert review confirmed content validity. Pilot testing and Cronbach's Alpha ($\alpha = 0.701$) demonstrated acceptable reliability.

Data Analysis

Data were analyzed using SPSS Version 26. Descriptive statistics summarized participant demographics and perceptions. Chi-square tests were conducted to identify significant differences across demographic groups.

Sport Protective Equipment and Injury Prevention Questionnaire SPEIPQ (Khan 2024)

Section No.1. Perception of Safety Equipment Use.

Q.1-Using safety gear (helmets, pads, gloves etc.) makes me feel more secure during practice or competition.

Q. 2- I believe safety equipment significantly reduces the risk of injury in my sport.

Q. 3- I always use all the required safety gear during training sessions and competitions.

Q. 4- My performance is not negatively affected by wearing safety gear.

Q.5- Safety gear should be mandatory for all athletes in my sport to prevent injuries.

Section No.2- Effectiveness of Safety Gear in Injury Prevention

Q.6- The protective gear I use has effectively prevented injuries in past situations.

Q.7- I have experienced fewer injuries since I started using modern safety equipment.

Q.8- I trust that the safety gear I use is designed to protect me against the most common injuries in my sport.

Q.9-Safety equipment in my sport has improved in quality over the past few years.

Q.10- The safety gear I use provides adequate protection against serious injuries, such as concussions or fractures.

Section No.3- Comfort and Fit of Safety Equipment

Q.11- My safety gear is comfortable to wear during both practice and games.

Q.12- Poorly fitting safety gear can compromise its effectiveness in preventing injuries.

Q.13- I would be more willing to wear safety equipment if it was more comfortable or better fitting.

Q.14-The design of my current safety gear allows me to perform at my best without discomfort.

Q.15- I am satisfied with the range of sizes and adjustments available in my safety equipment.

Section No.4- Athlete Compliance and Attitude toward Usage

Q.16- I consistently wear all recommended safety gear, even during informal practice sessions.

Q.17- I would stop participating in a sport if adequate safety equipment was not available.

Q.18- My teammates are also diligent about wearing their safety gear during games and practices.

Q.19- Athletes who do not wear safety gear are more likely to get injured.

Q.20- Coaches and team management strongly enforce the use of safety equipment during all activities.

Section No.5- Improvements and Innovations in Safety Gear

Q.21- There is a need for more innovation in sports safety gear to better prevent injuries.

Q.22- I believe that current safety gear does not fully protect athletes from all possible injuries in my sport.

Q.23- I would like to see more lightweight and flexible safety equipment in the future.

Q.24- Manufacturers should focus on making safety gear more sport-specific to address unique injury risks.

Q.25- I am satisfied with the accessibility and affordability of modern safety gear in my sport.

Results

Demographic Overview

- **Gender:** 64.7% male, 35.3% female.
- **Sports Represented:** Equal representation (33.3% each) from football, cricket, and hockey.
- **Age Group:** The largest proportion of athletes falls in the 25+ age group (37.3%), closely followed by the 22–25 group (36.7%). Participants aged 18–21 account for 24.7%, while only 1.3% are younger than 18. This shows that most respondents are young adults actively engaged in competitive sports.
- **Experience in Sports:** Most participants (62%) have 1–5 years of sports experience, while 38% have 6–10 years. This indicates that the sample consists largely of athletes with early to midlevel experience rather than highly seasoned professionals

Perceptions of Safety Gear

Sense of Security: 80% agreed/strongly agreed that safety gear made them feel secure.

Injury Risk Reduction: 63.3% strongly agreed that safety equipment reduces injury risk.

Compliance: 74% reported consistent use during training and competition.

Comfort and Fit:

- 74.7% agreed that their gear was comfortable.
- 67% stated that poorly fitting equipment reduces effectiveness.

Performance Impact: 77.3% believed safety gear did not hinder performance.

Effectiveness:

- 64.7% stated safety gear prevented injuries in past situations.
- 66% experienced fewer injuries with modern equipment.

Innovation Need:

- 81.4% agreed more innovation is needed in safety gear design.

Discussion

The results demonstrate strong athlete confidence in the role of protective equipment in injury prevention. This aligns with the literature indicating that biomechanically engineered protective gear reduces injury severity when used correctly.

However, comfort and proper fit emerged as critical determinants of compliance, supporting global findings that athlete-centered design enhances the likelihood of consistent use (Andersen et al., 2021). Participants also indicated that enforcement by coaches influences compliance, reflecting the importance of institutional safety culture.

Despite high perceived effectiveness, some athletes still reported discomfort, concerns about availability, and affordability issues particularly relevant in developing countries. The strong call for innovation suggests that current gear still does not fully meet athlete needs in terms of breathability, flexibility, and customization.

Conclusion

This study concludes that sports protective equipment plays a significant role in reducing injuries among university athletes in football, cricket, and hockey. Athlete perceptions strongly support the value of safety gear, but adherence is influenced by comfort, fit, accessibility, and enforcement. Modern protective equipment is viewed as effective, yet athletes desire further advancements to enhance comfort and performance.

References

Adams, W. M., Casa, D. J., & Drezner, J. A. (2016). Sport safety policy changes: saving lives and protecting athletes. Journal of athletic training, 51(4), 358-360. Almeida, G. G., & Afonso, P. D. (2025). Shoulder, arm, and elbow injuries in soccer players. Skeletal Radiology, 54(4), 731-741.

Andresen, M., Bisgaard, K., & Mouritsen, H. (2020). Athletes‘ compliance and attitudes toward protective equipment in contact sports. *Sports Medicine - Open, 6*(1), 45. https://doi.org/10.1186/s40798-020-00278-5 Backe, S., Janson, S., & Timpka, T. (2012). Governance and implementation of sports safety practices by municipal offices in Swedish communities. International journal of injury control and safety promotion, 19(2), 163-169.

Bailey, A. M., Sanchez, E. J., Park, G., Gabler, L. F., Funk, J. R., Crandall, J. R., ... & Wonnacott, M. (2020). Development and Evaluation of a Test System for Assessing the Performance of American Football Helmets. Annals of Biomedical Engineering, 48(10), 2566–2579.

Beckwith, J. G., Greenwald, R. M., & Chu, J. J. (2020). Measuring head kinematics in football: Correlation between the head impact telemetry system and the hybrid III headform. *Annals of Biomedical Engineering, 48*(6), 1520–1532. https://doi.org/10.1007/s10439-020-02500-4

Black, A. M., Patton, D. A., Eliason, P. H., & Emery, C. A. (2017). Prevention of sport-related facial injuries. Clinics in sports medicine, 36(2), 257-278.

Cecchini, J. A., & Carnero, E. A. (2021). Risk compensation in sport: A systematic review. European Journal of Sport Science, 21(10), 1367-1376. 55

Choudhury, R. D., Assumi, K. H., Nath, D., Kalai, S., & Nath, S. C. (2024). Progress of protective gear in preventing sports injuries. Brazilian Journal of Development, 10(3), e67830-e67830.

Daneshvar, D. H., Baugh, C. M., Nowinski, C. J., McKee, A. C., Stern, R. A., & Cantu, R. C. (2011). Helmets and mouth guards: the role of personal equipment in preventing sport-related concussions. Clinics in sports medicine, 30(1), 145.

Daniels, A. P. (2024). Incidence and risk factors for symptomatic lumbar bone stress injury in female and male youth cricket bowlers.

Dean, N. A., & Bundon, A. (2021). Helmets aren‘t cool‖: Surfers‘ perceptions and attitudes towards protective headgear. International Review for the Sociology of Sport, 56(5), 739-756.

Dick, R., Hootman, J. M., Agel, J., & Marshall, S. W. (2021). Facial protection and injury prevention in field hockey: Policy, compliance, and effectiveness. *British Journal of Sports Medicine, 55*(12), 678–684. https://doi.org/10 .1136/ bjsports-2020-103124

Dlugosch, S., Hu, H., & Chan, A. C. (2012). Impact protective clothing in sport: areas of application and level of utilization. Research Journal of Textile and Apparel, 16(3), 18-28.

Emery, C. A., Hagel, B., & Morrongiello, B. A. (2006). Injury prevention in child and adolescent sport: whose responsibility is it?. Clinical journal of sport medicine, 16(6), 514-521. 56

Evans, S. A. (2022). The biomechanics of ice hockey: health and performance using wearable technology. Journal of Men's Health, 18(9), 1-12.

Filter, A., Olivares-Jabalera, J., Dos' Santos, T., Madruga, M., Lozano, J., Molina, A., ... & Loturco, I. (2023). High-intensity actions in elite soccer: Current status and future perspectives. International journal of sports medicine, 44(08), 535- 544.

Finch, C. F., McIntosh, A. S., & McCrory, P. (2001). What do under 15 year old schoolboy rugby union players think about protective headgear?. British journal of sports medicine, 35(2), 89-94. French, C., & Kelley, R. (2013). Laryngeal fractures in lacrosse due to high speed ball impact. JAMA Otolaryngology Head & Neck Surgery, 139(7).

Gurgis, J. J., Kerr, G., & Darnell, S. (2022). Safe sport is not for everyone': Equitydeserving athletes' perspectives of, experiences and recommendations for safe sport. Frontiers in psychology, 13, 832560. Hedlund, J. (2019). Risky business: Safety regulations, risk compensation, and individual behavior. Injury Prevention, 25(Suppl 1), i48-i54.

Hölmich, P., & Thorborg, K. (2015). Injuries in the Pelvis, Groin, Hip and Thigh. In Nuclear Medicine and Radiologic Imaging in Sports Injuries (pp. 551-562). Berlin,

Heidelberg: Springer Berlin Heidelberg. Janssen, K. W., van der Zwaard, B. C., van Mechelen, W., & Verhagen, E. A. (2022). The effectiveness of ankle braces in reducing the incidence of acute ankle injuries in adolescent athletes: a systematic review. British Journal of Sports Medicine, 56(17), 990-998. 57

Karimi, A., Razaghi, R., Navidbakhsh, M., Sera, T., & Kudo, S. (2016). Quantifying the injury of the human eye components due to tennis ball impact using a computational fluid–structure interaction model. Sports Engineering, 19(2), 105-115.

Kenny, S. J., Palacios-Derflingher, L., Whittaker, J. L., & Emery, C. A. (2018). The influence of injury definition on injury burden in preprofessional ballet and contemporary dancers. Journal of orthopaedic & sports physical therapy, 48(3), 185-193.

Kerr, Z. Y., Chandran, A., & Nedimyer, A. K. (2021). Epidemiology of sports-related injuries in youth: Patterns, prevention, and future directions. Journal of Athletic Training, 56(4), 346–354. https://doi.org/10.4085/1062-6050- 0411.20

Kerr, Z. Y., Marshall, S. W., Dompier, T. P., Corlette, J., Klossner, D. A., & Gilchrist, J. (2015). College sports-related injuries-United States, 2009-10 through 2013- 14 academic years. MMWR Morb Mortal Wkly Rep, 64(48), 1330-1336.

Khan, M.H.(2024). *The Role of Sports Protective Equipment In Injury Prevention: Athlete Feedback On Safety Gear and Its Effectiveness* [Master's Thesis, University of the Punjab]

Khan, A. Q., Rizwan, S., & Irfan, M. (2023). COMPARATIVE STUDY OF CRICKET MANAGEMENT LAWS IN PAKISTAN AND OTHER JURISDICTIONS: A LEGAL PRESPECTIVES. International Research Journal of Social Sciences and Humanities, 2(2), 133-146.

Kim, S. Y., Chan, C. L., & Hyam, D. M. (2016). Facial fractures in football: incidence, site, and mechanism of injury. British journal of oral and maxillofacial surgery, 54(8), 936-940. 58

King, D., Hume, P. A., & Clark, T. N. (2021). Instrumented mouthguardsA review of design and validation for use in sports. Sports Biomechanics, 20(2), 143– 161. https://doi.org/10.1080/14763141.2019.1667620

Knapik, J. J., Hoedebecke, B. L., Rogers, G. G., Sharp, M. A., & Marshall, S. W. (2021). Effectiveness of mouthguards for the prevention of orofacial injuries and concussions in sports: systematic review and meta-analysis. Sports Medicine, 51(7), 1437-1456.

Knapik, J. J., Hoedebecke, B. L., Rogers, G. G., Sharp, M. A., & Marshall, S. W. (2019). Effectiveness of Mouthguards for the prevention of orofacial injuries and concussions in sports: systematic review and meta-analysis. Sports medicine, 49(8), 1217-1232.

Li, F., Liu, P., Lou, Y., & Yi, S. (2022). Rehabilitation Treatment and Monitoring of Ankle Achilles Tendon Ligament Injury in Athletes Repaired by Nanomaterials. Journal of Nanomaterials, 2022(1), 5156292.

Lim, J., Wong, S., McErlain-Naylor, S. A., Scanlan, A., Goggins, L., Ahmun, R., ... & Weldon, A. (2023). Strength and conditioning for cricket fielding: A narrative review. Strength & Conditioning Journal, 45(5), 509-524.

López-Valenciano, A., Ruiz-Pérez, I., Garcia-Gómez, A., Vera-Garcia, F. J., De Ste Croix, M., Myer, G. D., & Ayala, F. (2020). Epidemiology of injuries in professional football: A systematic review and meta-analysis. British Journal of Sports Medicine, 54(12), 711–718. https://doi.org/10.1136/bjsports-2018-099577

Marshall, S. W., Loomis, D. P., Waller, A. E., Chalmers, D. J., Bird, Y. N., Quarrie, K. L., & Feehan, M. (2005). Evaluation of protective equipment for prevention of injuries in rugby union. International journal of epidemiology, 34(1), 113-118. 59

Maxeiner, H., & Bockholdt, B. (2003). Homicidal and suicidal ligature strangulation—a comparison of the post-mortem findings. Forensic Science International, 137(1), 60-66. McIntosh, A. S. (2012). Biomechanical considerations in the design of equipment to prevent sports injury. Proceedings of the Institution of Mechanical Engineers, Part P: Journal of Sports Engineering and Technology, 226(3-4), 193-199.

Mihalik, J. P., Lynall, R. C., Wasserman, E. B., Guskiewicz, K. M., & Marshall, S. W. (2020). Evaluating the effectiveness of protective equipment in sport. Current Sports Medicine Reports, 19(10), 414-420.

Olivier, J., & Creighton, P. (2017). Bicycle injuries and helmet use: a systematic review and meta-analysis. International Journal of Epidemiology, 46(1), 278-292. Orchard, J., Rae, K., Brooks, J., & Hägglund, M. (2016). Shin guard use and injury reduction in football: A laboratory and field evaluation. Clinical Journal of Sport Medicine, 26(4), 291–297. https://doi.org/10.1097 /JSM. 0000000000000275

Phillips, N., Ranson, C., & Peirce, N. (2019). The evolution of cricket helmet design: Assessing safety standards and injury prevention. BMJ Open Sport & Exercise Medicine, 5(1), e000512. https://doi.org/10.1136/bmjsem-2019-000512

Post, A., Oeur, A., Hoshizaki, T. B., & Gilchrist, M. D. (2020). Examination of helmet performance in preventing concussions in sports: A systematic review. Sports Engineering, 23(1), 12. https://doi.org/10.1007/s12283-020-00328-9

Priya, S., Singh, R., & Kapoor, R. (2019). Effectiveness of customized mouthguards in preventing oral injuries in field hockey players. Dental Traumatology, 35(3), 157–163. https://doi.org/10.1111/edt.12454 60

Qaxxorovich, S. G. (2025). TECHNOLOGICAL INNOVATIONS IN SPORTS EQUIPMENT. AMERICAN JOURNAL OF EDUCATION AND LEARNING, 3(3), 567-576. Rakesh, R. D. (2025). Sports-Related Injuries in Adolescents: Prevention, Treatment, and Long-Term Outcomes. Scholar's Digest: Journal of Orthopedics, 1(1), 115-133.

Ranson, C., Peirce, N., & Young, M. (2018). Cricket helmet safety: A review of compliance and effectiveness following recent policy changes. Journal of Science and Medicine in Sport, 21(12), 1211–1216. https://doi.org/10.1016/j.jsams.2018.05.011

Rowson, S., Duma, S. M., & Stemper, B. D. (2016). Biomechanical performance of football helmets: Correlating laboratory impact data with on-field head accelerations. Annals of Biomedical Engineering, 44(6), 1734–1745. https://doi.org/10.1007/s10439-015-1514-8

Saidi, A., Gauvin, C., Ladhari, S., & Nguyen-Tri, P. (2021). Advanced functional materials for intelligent thermoregulation in personal protective equipment. Polymers, 13(21), 3711.

Sethi, M., Dizon, J., & Raza, S. (2020). Protective equipment use in cricket: Barriers to compliance and athlete perceptions. Asian Journal of Sports Medicine, 11(2), e102187. https://doi.org/10.5812/asjsm.102187

Sigurdsson, A., Hardison, J., & Cohen, D. (2016). Mouthguard use and orofacial injuries in field hockey: A systematic review. Sports Health, 8(4), 343–348. https://doi.org/10.1177/1941738116652663 61 Spennemann, D. H. (2021). Turbans vs. helmets: a systematic narrative review of the literature on head injuries and impact loci of cranial trauma in several recreational outdoor sports. Sports, 9(12), 172.

Stretch, R., Bartlett, R., & Ranson, C. (2017). Epidemiology of injuries in first-class cricket: Analysis of protective equipment effectiveness. South African Journal of Sports Medicine, 29(1), 1–6. https://doi.org/10.17159/2078- 516X/2017/v29i0a1248

Sundgot-Borgen, J., Meyer, N. L., Lohman, T. G., Ackland, T. R., Maughan, R. J., Stewart, A. D., & Müller, W. (2013). How to minimise the health risks to athletes who compete in weight-sensitive sports review and position statement on behalf of the Ad Hoc Research Working Group on Body Composition, Health and Performance, under the auspices of the IOC Medical Commission. British journal of sports medicine, 47(16), 1012-1022.

Tatar, Y., Tunay, V. B., Baltaci, G., & Ergun, N. (2019). Custom-made mouthguards and their protective effect on dental injuries in professional football players. Dental Traumatology, 35(6), 360–366. https://doi.org/10.1111/edt.12475

Theodoropoulos, J., Bettle, J., & Khan, M. (2020). Protective equipment in field hockey goalkeepers: Effectiveness, compliance, and future directions. *Clinical Journal of Sport Medicine, 30*(5), 471–476. https://doi.org/10.1097/JSM.0000000000000652 Tillayeva, N., & Usmonova, F. (2025). THE IMPACT OF DISLOCATIONS, SPRAINS, AND FRACTURES ON JOINT HEALTH. Современные подходы и новые исследования в современной науке, 4(7), 177-182. 62

Tjønndal, A. (2021). Protective sports equipment: Athletes‘ perceptions, acceptance, and use. Sport in Society, 24(5), 711–726. https://doi.org/10. 1080/17430437.2020.1725891 Verhagen, E., & van Mechelen, W. (2021). Sports injury prevention: The role of protective equipment. British Journal of Sports Medicine, 55(15), 845–846. https://doi.org/10.1136/bjsports-2020-103618

Vriend, I., Gouttebarge, V., Finch, C. F., van Mechelen, W., & Verhagen, E. A. L. M. (2017). Intervention strategies used in sport injury prevention: A systematic review. *Sports Medicine, 47*(10), 2027–2043. https://doi.org/10.1007/s40279- 017-0736-6

White, P., Otago, L., & Donaldson, A. (2018). Female athlete perspectives on protective equipment: Fit, function, and compliance. *International Journal of Sports Science & Coaching, 13(5), 761–769. https://doi.org/10. 1177/17479 54118768246

Xu, C., Nunic, Z., & Wang, T. (2023). Application of knowledge engineering in sports protective gear design: A study on innovative methods based on extension theory. International Journal of Knowledge and Innovation Studies, 1(2), 73-88.

Yang, J., Bowling, J. M., Lewis, M. A., Marshall, S. W., Runyan, C. W., & Mueller, F. O. (2005). Use of discretionary protective equipment in high school athletes: prevalence and determinants. American journal of public health, 95(11), 1996- 2002.

Zuckerman, S. L., Kerr, Z. Y., Yengo-Kahn, A., Wasserman, E., Covassin, T., & Solomon, G. S. (2018). Epidemiology of sports-related concussion in NCAA athletes. American Journal of Sports Medicine, 46(4), 1094–1102.