VIEWPOINT

The Need for an Intervention to Prevent Sports Injuries
Beyond "Rub Some Dirt on It"

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Although 1.35 million children visit emergency departments for sports-related injuries each year in the United States, athletic bodies lack a systematic approach for monitoring injury risk and adopting interventions to curtail injuries.[1] Rather than using randomized clinical trials or other evidence-based approaches to evaluate interventions, the decision-making process for adopting interventions is characterized by protracted debates that overweigh subjective factors, such as how sports have traditionally been played.[2,3] The magnitude of this problem merits serious attention; more than 46.5 million children participate in team sports in the United States alone.[1] Two underappreciated factors contribute to this situation: behavioral biases that distort and delay intervention decisions and a lack of data. In this Viewpoint, we draw lessons from behavioral economics, as well as prior sports injury intervention debates, to offer prescriptions for improving the decision-making processes for sports injury prevention.

The debate in the early 2000s regarding introducing protective eyewear in girls' lacrosse epitomizes the challenge of implementing changes. In the early 2000s, many coaches and administrators were opposed to mandating protective eyewear, arguing that its use would promote aggressive play and increase the risk of injury.[2] Skeptics also feared that adopting eyewear protection would undermine the character of girls' lacrosse and blur the distinction between girls' lacrosse, a low-contact sport, and boys' lacrosse, a high-contact sport.[2] After years of debate, US Lacrosse mandated eyewear use for girls' lacrosse in 2005; following this change, eye injuries decreased by 84%, with no associated increase in the roughness of play.[2] Similar debates have occurred across youth sports.[3] In controversial changes to reduce head injuries, US Soccer recommended a ban on heading of the ball for players younger than 10 years, US Hockey banned checking for youth 12 years and younger, and Pop Warner Football limited physical contact in practices and eliminated kickoff returns, the most dangerous play in US football.[3]

Despite decades of sports injury prevention efforts, both injury data and evidence of the efficacy of protective gear and other interventions are surprisingly limited. Protective gear is typically initially adopted by self-selected volunteers and followed by mandates in different jurisdictions based on subjective perceptions of risk rather than empirical evidence. Injury data are rarely compiled in a systematic way, and calls for mandatory injury reporting remain rare.[3] Compounding this problem is the challenge of compiling accurate statistics for injuries, such as concussions, that require subjective assessments for diagnosis.

Against this backdrop, debates about protective gear and rule changes are led by athletic authorities who often prefer preserving the status quo and typically lack expertise in collecting data and making evidence-based decisions. Worse, in some sports, administrators have suppressed objective investigations of interventions to promote safety. For example, US football leaders have systematically concealed the risks of concussions.

Without a systematic, evidence-based process for evaluating interventions, sports administrators are prone to behavioral biases. These behavioral biases both distort and delay intervention decisions:

- Status quo bias: rather than evaluate alternatives objectively, several factors guide decision makers to prefer the status quo.[4] This is particularly true for administrators who anticipate greater regret and increased culpability for adverse outcomes that might result from an active rather than passive choice. If a rule change or the introduction of protective gear might increase the risk of injury (eg, when wearing extra equipment players may feel safer and thus play more aggressively, known as the *gladiator effect*, or the protective equipment itself, such as a helmet, might cause injuries to other players), the potential for causing harm by making a change is typically weighed more heavily than the harm caused by inaction and maintaining the status quo.[4]
- Loss aversion: in decision making, losses are given disproportionate weight and sports administrators are likely to be reluctant to give up something they value.[5] For example, consider the debate surrounding eliminating the kickoff return in US football. The potential gain is improved player safety. The cost involves eliminating an exciting feature of the game. Because of loss aversion, the cost side of the equation is weighed disproportionately.[5] To assess this tradeoff objectively, decision makers would need to consider the mirror image of this decision: imagine that someone proposed a new US football feature that would add an exciting play but risk player safety.
- Confirmation bias: in making decisions, people tend to seek confirming evidence.[6] When mixed reports emerge, people often focus on the evidence that confirms their initial beliefs.[6] This makes changing beliefs difficult. For example, in 2008 the National Collegiate Athletic Association introduced a "targeting" rule in football to reduce head injuries that penalizes players who target the head or neck of an opponent that they tackle.[7] However, following this rule change, the rate of lower extremity injuries increased as players aimed lower when tackling to avoid penalties.[7] A

decision maker skeptical of the benefits of rule changes might use these data to bolster their initial belief that rule changes are unhelpful and merely shift injury burdens.

- Ostrich effect: people avoid negative information.[8] Prior work has identified the ostrich effect in finance; people check their portfolios more frequently when they rise than when they fall.[8] This aversion to bad news might influence athletic directors who avoid collecting injury data or avoid analyzing the injury data they already have.

Another barrier to making effective intervention decisions is a lack of data. With few exceptions, youth sports programs lack systematic data collection in general and systems through which to collect and link injury data with equipment or rule changes. Without reliable records it is nearly impossible to make evidence-based decisions.

Given the current state of youth sports, the following prescriptions are likely to substantially improve the decision process for assessing interventions to improve safety. First, athletic bodies should institute standardized procedures for collecting data. Second, athletic bodies should formalize decision-making processes for adopting rule and equipment changes. By adopting systematic procedures, such as objectively weighing the costs and benefits of inaction, we can mitigate the influence of biased decision making.

Third, we call for the development of a review board to assess sports injury risks and prevention interventions. This board should assemble experts, including health care clinicians, sports authorities, lawmakers, and social scientists, to pursue the objectives of collecting data, designing experiments, analyzing data, and making decisions. This central body would also reduce the sport-to-sport and jurisdiction-to-jurisdiction variability in sports injury prevention approaches that we currently observe. This body will help to correct the lack of clustered, randomized trials to assess the effects of interventions. These studies would measure the intended and unintended consequences of protective interventions to guide informed decision making while being mindful of the fact that well-intentioned interventions may harm safety.[7]

These proposed changes are costly. Our proposal will require resources, cooperation across disciplines, and a shift in culture. However, the current approach to injury prevention lacks evidence, is overly dependent on expert opinions that are prone to behavioral biases, and is too slow. Participation in sports provides important health benefits to youth athletes. However, without a systematic approach to making data-driven decisions we are putting the millions of children who play sports at an unnecessarily high injury risk. The least they deserve is a systematic, evidence-based decision process for making the sports they play safer.

ARTICLE INFORMATION

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REFERENCES

1. Ferguson RW, Green A, Hansen LM. Game changers: stats, stories and what communities are doing to protect young athletes. https://www.safekids.org/research-report/game-changers-stats-stories-and-what-communities-are-doing-protect-young-athletes. Accessed August 8, 2018.

2. Lincoln AE, Caswell SV, Almquist JL, et al. Effectiveness of the women's lacrosse protective eyewear mandate in the reduction of eye injuries. *Am J Sports Med*. 2012;40(3):611-614. doi:10.1177/0363546511428873

3. Yang YT, Baugh CM. US youth soccer concussion policy: heading in the right direction. *JAMA Pediatr*. 2016;170(5):413-414. doi:10.1001/jamapediatrics.2016.0338

4. Landman J. Regret and elation following action and inaction: affective responses to positive versus negative outcomes. *Pers Soc Psychol Bull*. 1987;13(4):524-536. doi:10.1177/0146167287134009

5. Tversky A, Kahneman D. Loss aversion in riskless choice: a reference-dependent model. *Q J Econ*. 1991;106(4):1039-1061. doi:10.2307/2937956

6. Nickerson RS. Confirmation bias: a ubiquitous phenomenon in many guises. *Rev Gen Psychol*. 1998;2(2):175-220. doi:10.1037/1089-2680.2.2.175

7. Westermann RW, Kerr ZY, Wehr P, Amendola A. Increasing lower extremity injury rates across the 2009-2010 to 2014-2015 seasons of National Collegiate Athletic Association football: an unintended consequence of the "targeting" rule used to prevent concussions? *Am J Sports Med*. 2016;44(12):3230-3236. doi:10.1177/0363546516659290

8. Karlsson N, Loewenstein G, Seppi D. The ostrich effect: Selective attention to information. *J Risk Uncertain*. 2009;38(2):95-115. doi:10.1007/s11166-009-9060-6