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State Laws Addressing Youth Sports-Related Traumatic Brain Injury and the Future of Concussion Law and Policy

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ABSTRACT

TRAUMATIC BRAIN INJURY IN YOUNG PEOPLE attributable to sports is a significant public health issue. As of April 2014, all states and the District of Columbia have enacted laws addressing youth sports concussions. These laws contain very similar provisions, mostly based on the three tenets of Washington's Lystedt Law: education for parents and student athletes, mandatory removal from play after a suspected concussion, and some type of medical clearance before returning to physical activity. Evaluation of these laws is in its infancy, but preliminary data indicate that the laws are at least increasing awareness of the problem. Several states have revised their laws since initial passage. Changes to existing laws have centered on expanding their coverage, tightening or clarifying existing requirements according to best practices and research, and introducing attempts at primary prevention. Future policymaking is likely to continue along this path while encouraging the use of technologies and other innovations aimed at primary prevention, improving concussion identification on the field, and assessing readiness for return to play. Such innovations will be critical in addressing the problem of youth sports-related TBI, and law (informed by research) must ensure their responsible implementation.

I. BACKGROUND

Traumatic Brain Injury (TBI)[1] is a major public health issue worldwide. The Centers for Disease Control and Prevention estimate that between 1.6 and 3.8

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1. A concussion is a type of traumatic brain injury. This paper uses the terms interchangeably.

million sports-related TBIs occur every year in the United States.[2] Most believe incidence statistics to be significantly underestimated using existing national datasets, largely due to the unknown number of concussions that go unrecognized or treated at home.[3] According to a survey conducted by the National Federation of State High School Associations, participation in high school sports exceeded 7.7 million in 2012 to 2013, increasing for the twenty-fourth consecutive year.[4] Football has the highest participation rate, with nearly 1.1 million playing the sport each year.[5] A National Council for Youth Sports survey estimated that 60 million children participated in recreational youth sports each year.[6]

The potential impact on children and adolescent health is significant and nationwide. For young people aged 15 to 24 years, sports are the leading cause of TBI, second only to motor vehicle accidents.[7] Once an athlete has suffered one concussion, the risk of a second increases three to six times, putting the athlete at risk for a condition some have called second impact syndrome.[8] Research indicates that the risk is greatest for young, developing brains and that girls have more symptoms and a longer recovery period.[9]

From a public health perspective, the problem of sports-related TBI in young people is a double-edged sword; public health interventions, including law and policy, must seek to reduce incidence and severity of sports-related injury, including concussions, while continuing to promote the significant short- and long-term health benefits of physical fitness.[10] Technological innovations will be critical

2. Jean A. Langlois et al., *The Epidemiology and Impact of Traumatic Brain Injury: A Brief Overview*, 21 J. HEAD TRAUMA REHABIL. 375, 376 (2006).

3. *Id.* at 375.

4. Nat'l Fed'n of State High School Ass'ns, *2012-13 High School Athletics Participation Survey*, *in* NFHS HANDBOOK 2013-2014 (2013), *available at* http://www.nfhs.org/media/885654/2013-14-nfhs-handbook.pdf.

5. *Id.*

6. NAT'L COUNCIL FOR YOUTH SPORTS, REPORT ON TRENDS AND PARTICIPATION IN ORGANIZED YOUTH SPORTS 7 (2008), *available at* http://www.ncys.org/pdfs/2008/2008-ncys-market-research-report.pdf.

7. Luke M. Gessel et al., *Concussions Among U.S. High School and Collegiate Athletes*, 42 J. ATHLETIC TRAINING 495, 495 (2007) (citing Daniel M. Sosin et al., *Incidence of Mild and Moderate Brain Injury in the U.S.*, 10 BRAIN INJURY 47, 47–54 (1991)), *available at* http://web.eccrsd.us/christy/public/Athletic_Training/Concussion_Research_files/Gessel%20concussions.pdf.

8. Robert C. Cantu, *Posttraumatic Retrograde and Anterograde Amnesia: Pathophysiology and Implications in Grading and Safe Return to Play,* 36 J. ATHLETIC TRAINING 244, 246 (2011) (citations omitted), *available at* http://europepmc.org/articles/PMC155413;jsessionid=TFDaDlTZxpMj3ogUGgMh.28.

9. *See* Tracey Covassin et al., *The Role of Age and Sex in Symptoms, Neurocognitive Performance, and Postural Stability in Athletes After Concussion*, 40 AM. J. SPORTS MED. 1303, 1304, 1309–10 (2012) (observing that concussed male collegiate athletes performed better on sensory testing and reported fewer post-injury symptoms than concussed male high school athletes, while concussed female athletes had slower reaction times and more post-concussion symptoms than concussed male athletes).

10. *See, e.g.*, Ian Janssen & Allana G. LeBlanc, *Systematic Review of the Health Benefits of Physical Activity and Fitness in School-Aged Children and Youth*, 7:40 INT. J. BEHAV. NUTR. PHYS. ACT. 11–13 (2010), http://www.biomedcentral.com/content/pdf/1479-5868-7-40.pdf.

to addressing, and thereby preventing, the causes of sports-related TBI.[11] Identifying these causes and describing the scope of the problem lies squarely with public health researchers; responsible and informed legislative and policy interventions are the concern of the legal field.[12]

II. STATE YOUTH CONCUSSION LAWS

Increasing knowledge of the health risks has spurred a series of initiatives to increase awareness and to decrease the prevalence and severity of sports-related TBIs.[13] In 2009, Washington State led the way with passage of the Lystedt Law, named for Zachary Lystedt, a middle school football player who suffered a severe brain injury after returning to a game in which he had sustained an earlier concussion.[14] With the backing of the National Football League and other influential stakeholders, the Lystedt Law became a model for other state legislative activity, resulting in rapid and widespread passage of public health legislation across the nation.[15] (*See* Table 1). As of April 2014, every state and the District of Columbia, has enacted a law that addresses youth sports concussion.[16]

11. *See infra* Part V.

12. *See infra* Part IV.

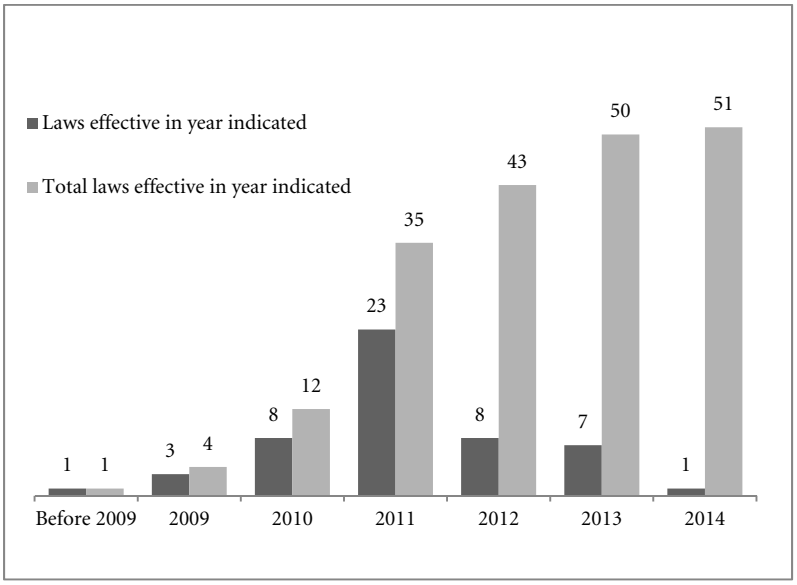
13. *See* COMMITTEE ON SPORTS-RELATED CONCUSSIONS IN YOUTH, INST. OF MED. & NAT'L RESEARCH COUNCIL, SPORTS-RELATED CONCUSSION IN YOUTH 265 (Robert Graham et al. eds., 2014) (discussing the numerous state legislative efforts directed at sports-related concussions in youth).

14. *Id.* at 45.

15. Joe Frollo, *Three Years Later, Lystedt Law Protects Young Athletes in 34 States and D.C.*, USA FOOTBALL (May 10, 2012, 9:36 AM), http://usafootball.com/news/featured-articles/three-years-later-lystedt-law-protects-young-atheletes-34-states-and-dc (discussing NFL Commissioner Roger Goodell's support for the widespread enactment of state concussion laws modeled on Washington's Lystedt Law).

16. Keri M. Lowrey, *Summary Matrix of State Laws Addressing Concussions in Youth Sports*, NETWORK PUB. HEALTH L., https://www.networkforphl.org/_asset/xc41pl/Sports-Concussion-Table.pdf (last updated June 30, 2014).

Table 1. State Youth Sports Concussion Laws Enacted by Year



The laws contain very similar provisions with very little policy experimentation, mostly based on the three tenets of Washington's Lystedt Law: (1) education for parents and student athletes,[17] (2) mandatory removal from play after a suspected concussion,[18] and (3) some type of medical clearance before returning to the activity.[19] All of the laws focus on secondary prevention efforts to mitigate the downstream effects of concussions, including recognition of possible head injuries, management of post-concussive syndrome, and preventing severe complications.[20]

III. DO THE LAWS WORK?

Most agree that return-to-play legislation is not likely to change sports culture on its own.[21] Nonetheless, state youth concussion laws may play an important role in

17. COMMITTEE ON SPORTS-RELATED CONCUSSIONS IN YOUTH, *supra* note 13, at 45.

18. *Id.*

19. *Id.*

20. *Id.* at 265 (noting that state concussion laws aim to increase awareness of concussion signs, symptoms, and outcomes and reduce risk and consequences of multiple concussions).

21. *See* Fredrick P. Rivara, *The Effect of Coach Education on Reporting of Concussions Among High School Athletes After Passage of a Concussion Law*, 42 AM. J. SPORTS MED. 1197, 1202 (2014), *available at* http://ajs.sagepub.com/content/42/5/1197 ("[A]ttitudes of athletes regarding the reporting of concussive symptoms are a major barrier to the proper care of players with concussions, and a change in these attitudes will not be accomplished through legislation alone.").

promoting a culture change in youth and professional sports away from a "culture of resistance" in self-reporting injuries[22]—one in which 30.8 percent of concussed athletes return to play after concussion[23]—and toward one centered on player safety. Evaluation of these laws is in its infancy, but preliminary data indicate that the laws are at least increasing awareness of the problem.[24] For example, a recent evaluation of the CDC's "Heads Up: Concussion in Youth Sports" initiative and materials demonstrated that a relatively small sample of coaches of youth sports were able to recognize and respond to sports-related concussions after reviewing the materials, suggesting that such efforts aimed at training for coaches can be effective at improving concussion recognition and management.[25] An evaluation of Washington state's law found that high school football and soccer coaches are receiving substantial concussion education and have good concussion knowledge and comfort with identifying concussive symptoms, but that education for athletes and parents was more limited.[26] Parents seem to feel that football is safer; participation among high school students increased for the first time in five years, with an additional 6,607 boys participating during the 2013 to 2014 school year according to the National Federation of State High School Associations' annual High School Athletics Participation Survey.[27]

Early research also reveals that, although the components of the laws are fairly uniform across states, uniformity "on the books" obscures a tremendous amount of variation of the laws in practice.[28] That is, there are nuanced differences in outcomes that may not be due to actual statutory provisions, but to differences in how the law was put into practice. Some provisions, or at least how the provisions are implemented, may not line up with prevailing science. For example, a handout or

22. *See* COMMITTEE ON SPORTS-RELATED CONCUSSIONS IN YOUTH, *supra* note 13, at 43–44 (asserting that state concussion laws address the need for concussion education in a youth sports culture that does not fully appreciate the serious health risks posed by concussions).

23. Kevin M. Guskiewicz et al., *Epidemiology of Concussion in Collegiate and High School Football Players*, 28 AM. J. SPORTS MED. 643, 648 (2000), *available at* http://ajs.sagepub.com/content/28/5/643.

24. *See* COMMITTEE ON SPORTS-RELATED CONCUSSIONS IN YOUTH, *supra* note 13, at 11 (asserting that while state concussion laws are still in the early stages of implementation, early research indicates that the concussion education programs required by most state concussion laws have improved concussion knowledge and awareness).

25. Tracey Covassin et al., *Educating Coaches About Concussion in Sports: Evaluation of the CDC's "Heads Up: Concussion in Youth Sports" Initiative,* 82 J. SCH. HEALTH 233, 234, 236 (2012), *available at* http://onlinelibrary.wiley.com/doi/10.1111/j.1746-1561.2012.00692.x/full.

26. Sara P. Chrisman et al., *Implementation of Concussion Legislation and Extent of Concussion Education for Athletes, Parents, and Coaches in Washington State*, 42 AM. J. SPORTS MED. 1190, 1195 (2014), *available at* http://ajs.sagepub.com/content/42/5/1190.

27. *High School Participation Increases for 25th Consecutive Year*, NAT'L FED'N OF STATE HIGH SCHOOL ASS'NS (Aug. 21, 2014), http://www.nfhs.org/articles/high-school-participation-increases-for-25th-consecutive-year/.

28. Kerri M. Lowrey & Stephanie R. Morain, *State Experiences Implementing Youth Sports Concussion Laws: Challenges, Successes, and Lessons for Evaluating Impact*, J. L. MED. & ETHICS (forthcoming 2014) (manuscript at 296–98) (on file with authors) (finding that states experienced significantly varied implementation with substantively similar concussion laws).

Web site screen during registration is sufficient to constitute "education" of the risks of concussion under many state laws, as implemented.[29] The effectiveness of these passive methods of communicating risk information in this setting is unknown, but research suggests that, in general, passive risk communication may not be sufficient to encourage behavior change.[30] Policy evaluation studies will need to consider the presence or absence of these and other requirements that may be supported by science, as well as the context of the laws' implementation.[31]

IV. THE FUTURE OF CONCUSSION POLICYMAKING

Now that many of these laws have been in effect for a few years, legislatures are revisiting them and making changes as best practices and results of policy evaluation emerge. Twenty-two states have made substantive changes to their laws since original enactment,[32] six states more than once,[33] and more states are likely to follow suit. These changes fall into three main categories: (1) expanding coverage of the law,[34] (2) tightening or clarifying existing requirements,[35] and (3) introducing efforts at primary prevention (i.e., preventing concussions from occurring in the first place) and improved early detection.[36]

As implementation progresses and evidence emerges that state youth sports concussion laws seem to be "working," states will likely expand the reach of their laws to recreational youth sports and school-based athletics in middle and elementary schools.[37] Since original passage, seven states have expanded coverage of

29. *See* Chrisman, *supra* note 26, at 1191 ("These laws allow for the significant interpretation of 'concussion education,' particularly with regard to modality (e.g., written, video, slide presentation, online, in person).").

30. *See* Anik Giguère et al., *Printed Educational Materials: Effects on Professional Practice and Healthcare Outcomes*, 10 COCHRANE DATABASE SYSTEMATIC REVS. 2, 23 (2012) (evaluating the limited effectiveness of printed educational materials in explaining behavioral risks); Dominic Golding et al., *Evaluating Risk Communication: Narrative vs. Technical Presentations of Information About Radon*, 12 RISK ANALYSIS 27, 33–34 (1992) (finding that when explaining radon's risk, passive risk communication failed to encourage significant increases in radon testing or mitigation).

31. *See* Lowrey & Morain, *supra* note 28 (manuscript at 298) (suggesting that an awareness of the varied implementation of state concussion legislation provides a first step for evaluating the effectiveness of such legislation).

32. *See* Lowrey, *supra* note 16 (summarizing states' post-enactment changes to youth concussion laws).

33. *See id.* (indicating that California, Illinois, Kentucky, New Hampshire, New Jersey, and Ohio have made multiple post-enactment changes to their youth sports concussion laws).

34. *See* N.H. REV. STAT. ANN. § 200:52 (2013) (expanding coverage of the statute to include participants in both intramural and interscholastic sports in grades 4-12).

35. *See* VT. STAT. ANN. tit. 16, § 1431 (2013) (clarifying the role of coaches).

36. *See* CONN. GEN. STAT. § 10-149b (2014) (requiring coaches to complete an annual refresher course on developments in concussion recognition, prevention, and safety practices).

37. *See* COMMITTEE ON SPORTS-RELATED CONCUSSIONS IN YOUTH, *supra* note 13, at 11 (noting that research indicates that the concussion education programs mandated by most state concussion laws are effective in improving concussion awareness); Lowrey, *supra* note 16 (indicating that several states have already amended their concussion laws to cover youth recreational sports).

their law.[38] For example, Arkansas expanded coverage of its law to recreational youth sports,[39] California to charter and private schools,[40] and Indiana and Virginia to sports organizations using school property.[41] New Jersey amended its law in 2011 to expressly include cheerleading.[42]

Lessons from implementation, research developments, and knowledge about best practices likely will result in states adding components to strengthen or streamline their concussion-related laws. Nineteen states have tightened or clarified specific requirements since original adoption of the law.[43] For example, in 2012 Alaska added athletic trainers to the list of individuals qualified to make RTP decisions and clarified that "return to play" includes return to practice.[44] Connecticut and Vermont included provisions for concussion data collection.[45] Nebraska and Virginia enhanced their laws by adding "return-to-learn" provisions, which require the establishment of protocols for student athletes that have sustained concussions, including academic adjustments.[46] Several states strengthened education and informed consent requirements for parents as well as training requirements for coaches and officials.[47]

From both a public health and business perspective, perhaps the most promising development is the emphasis on primary prevention and better early TBI detection in more recent legislative initiatives, such as mandated limits on contact in practices and scrimmages, as well as safer rules of play.[48] Few states sought to incorporate primary prevention measures into their original concussion laws. One exception, Massachusetts, prohibits coaches, trainers, and others from encouraging or allowing a student athlete to use sports equipment as a weapon or to engage in sports

38. *See* Lowrey, *supra* note 16 (identifying states' post-enactment changes to youth sports concussion laws).

39. ARK. CODE ANN. § 6-18-710 (2013).

40. CAL. EDUC. CODE § 49475 (West 2014).

41. *See* IND. CODE § 20-34-7-1.5 (2014); VA. CODE ANN. § 22.1-271.5 (2014); *see also*, Lowrey, *supra* note 16, at 7, 18.

42. *See* N.J. STAT. ANN. § 18A:40-41.2 (West 2013); *see also* Lowrey, *supra* note 16, at 12.

43. *See* Lowrey, *supra* note 16 (detailing the changes states have made to requirements since original adoption).

44. ALASKA STAT. § 14.30.142(a) (2012); *see also* Lowrey, *supra* note 16, at 2.

45. *See* 2014 Conn. Pub. Acts. 14-66; VT. STAT. ANN. tit. 16 § 1431(b) (2013); *see also* Lowrey, *supra* note 16, at 3–4, 18.

46. *See* NEB. REV. STAT. ANN. § 71-9104(1)(c) (West 2012); VA. CODE ANN. § 22.1-271.6 (2014); *see also*, Lowrey, *supra* note 16, at 11, 18.

47. *See* Lowrey, *supra* note 16 (describing California, Illinois, Indiana, Oregon, Rhode Island, and Vermont's new requirements for coaches and officials).

48. *See, e.g.*, Assemb. B. 2127, 2014 Leg., Reg. Sess. (Ca. 2014); CONN. GEN. STAT. § 10-149b (2014); *see also* Lowrey, *supra* note 16, at 2–4 (indicating that both California and Connecticut are implementing new requirements for safer practices); *Traumatic Brain Injury Legislation*, NAT'L. CONF. ST. LEG. (July 2, 2014), http://www.ncsl.org/research/health/traumatic-brain-injury-legislation.aspx (explaining the advances all fifty states and the District of Columbia have taken towards legislation that addresses traumatic brain injury).

techniques that are unreasonably dangerous, such as helmet-to-helmet hits.[49] Three states have amended their laws since original passage to add primary prevention strategies,[50] and others recently considered legislative changes that would advance primary prevention approaches.[51] Connecticut and Vermont now require coaches' training to include, respectively, efforts at reducing concussive and subconcussive hits and best practices on number of games and appropriate minutes of full-contact practices and scrimmages.[52] New Jersey's new sports safety law requires a physical examination and concussion history to be taken prior to athletic activity to identify students at greater risk.[53] In 2014, California amended its law to limit full-contact practices to twice per week and stipulate that the full-contact portion of a practice cannot exceed 90 minutes in one day.[54] Also in 2014, Connecticut considered limiting full-contact practices to 90 minutes per week, but the provision was tabled in the enacted version of the bill pending further study.[55]

States are also increasing efforts to regulate sports equipment. In 2014, Florida's High School Athletic Association's Board of Directors reached a controversial decision to require some form of helmet for girls' lacrosse, against the advice of U.S. Lacrosse (the sport's national governing board).[56] New York's State High School Athletic Association and the Maryland General Assembly considered and declined requiring helmets in girls' lacrosse in 2012 and 2013, respectively.[57] The issue is far from resolved, particularly as researchers continue to study reasons for the increased incidence and severity of TBI in young female athletes. California and Texas laws establish age and reconditioning standards for helmets in school football programs.[58] Accordingly, recent legislative action suggests that future concussion-related policy trends include expansion of current laws to cover recreational sports

49. MASS. GEN. LAWS ANN. ch. 111, § 222 (West 2014).

50. *See* VT. STAT. ANN. tit. 16, § 1431(c) (2013) (requiring changes to coaches' training to recognize, for example, symptoms of a concussion, or how to reduce the risk of concussion during athletic activities); R.I. GEN. LAWS § 16-11.1-1 (2013) (requiring coaches to acquire training and certification); *see also* Lowrey, *supra* note 16 (detailing the states that have made improvements to their laws).

51. *See* TEX. EDUC. CODE ANN. § 33.094 (West 2012) (establishing a change to advancing primary prevention by limited the number of years any football helmet may be used).

52. CONN. GEN. STAT. § 10-149b (2014); VT. STAT. ANN. tit. 16 § 1431(c)(3)(A) (2013); *see also* Lowrey, *supra* note 16, at 3–4, 17.

53. N.J. STAT. ANN. § 18A:40-41.1 (West 2013); *see also* Lowrey, *supra* note 16, at 12.

54. *See* CAL. EDUC. CODE § 49475 (West 2014); *see also* Lowrey, *supra* note 16, at 2–3.

55. *See* H.B. 5113, 2014 Gen. Assemb., Reg. Sess. (Conn. 2014).

56. Chelsea Janes, *Florida Mandates Helmets for High School Girls' Lacrosse Players*, WASH. POST, June 18, 2014, http://www.washingtonpost.com/sports/highschools/florida-mandates-helmets-for-high-school-girls-lacrosse-players/2014/06/18/3439f940-f721-11e3-a3a5-42be35962a52_story.html.

57. *See* Todd Nelson, *Girl's Lacrosse Helmet Issue Voted on*, SCHOLASTIC ATHLETICS, Winter 2010–2011, at 16; H.B. 1123, 433rd Gen. Assemb., Reg. Sess. (Md. 2013).

58. CAL. EDUC. CODE § 17581 (West 2014) (explaining that high school students may only wear football helmets approved by a recognized certifying agency); TEX. EDUC. CODE § 33.094 (West 2011) (establishing that football helmets may not be used for more than sixteen years, and helmets ten years or older must be reconditioned at least once every two years).

and younger school-based sports, clarification of current regulations based on evolving best practices and research developments, increased emphasis on prevention and early detection, and increased regulation of sports equipment.[59]

V. CONCUSSION TECHNOLOGY, INNOVATION, AND CONSUMER CONCERNS

The emphasis on primary prevention and early TBI detection creates opportunities for technological research and development. Companies are researching innovative tools for improving sideline assessments, such as helmet impact sensors or accelerometer devices.[60] Such technologies provide real-time monitoring of head impact exposure to identify high-risk impacts and, at least in theory, alert sideline personnel that a concussion assessment is warranted.[61] Maryland introduced a bill during the 2014 legislative session that would have established a pilot program to test the use of helmet sensors in one high school football team in each county.[62] The state's Athletic Trainers Association and Nurses Association, among others, opposed the bill due to concerns about false negatives, a false sense of security in an untested diagnostic tool, compromising helmet standards, conducting "research" without appropriate informed consent, and the sense that the bill "puts the equipment ahead of the science."[63] Additionally, concerns persist that such real-time impact indicators may give players motivation to hit even harder, or "light up" opposing players.[64] Helmet manufacturers generally have not supported the use of helmet sensors.[65] The National Operating Committee on Standards for Athletic Equipment issued a statement indicating that "any change in configuration, padding, shell geometry, or protective system requirements" requires new

59. *See supra* Part IV.

60. *See* Rhiannon Potkey, *School Watch Report: Is Technology the Answer to Football Concussions?*, VENTURA COUNTY STAR (Nov. 15, 2013, 9:40 AM), http://www.vcstar.com/news/education/schoolwatch/is-technology-the-answer-to-football-concussion; Robert Roble, *Sports Using Technology to Detect, Prevent Athlete Head Injuries*, SPORTSTECHIE (Mar. 6, 2014), http://iq.intel.com/sports-using-technology-detect-prevent-athlete-head-injuries/.

61. Brooke de Lench, *Impact Sensors: Many Benefits of Real-Time Monitoring*, MOMSTEAM (June 26, 2013, 4:36 PM), http://www.momsteam.com/print/6264.

62. H.B. 426, 434th Gen. Assemb., Reg. Sess. (Md. 2014).

63. Letter from Maryland Athletic Trainers' Association to Sheila Hixon, Chair, House Ways & Means Committee (Feb. 12, 2014), *available at* http://htmlimg2.scribdassets.com/5w57dy3bsw3k5dp7/images/1-b1c9f80429.jpg; Letter from Maryland Nurses Association to Sheila Hixon, Chair, House Ways & Means Committee (Feb. 12, 2014), *available at* http://www.scribd.com/doc/210962056/Md-Bill-HS-Football-Helmet-Sensors-OPPOSED-by-Md-Nurses-Assn.

64. Stephanie Smith, *Head Impact Sensors: On the Field Placebo or Danger?*, CNN WIRE (Nov. 14, 2013), http://www.cnn.com/2013/11/15/health/youth-head-sensors.

65. *See generally* Brooke de Lench & Lindsey Barton Straus, *Standard Setting by Non-Governmental Agencies in the Field of Sports Safety Equipment: Promoting the Interests of Consumers or Manufacturers?*, 10 J. BUS. & TECH. L. 47 (2015).

certification testing, effectively voiding existing warrantees.[66] Nonetheless, concussion policy on all levels is moving toward technological solutions to the problem. Indeed, some speculate that all 32 teams of the National Football League could be using accelerometer devices as soon as 2015, as two companies work to fine tune their products based on pilot data.[67]

Importantly, return-to-play laws have created opportunities for research and development lessening the disparate impact of implementation on youth athletes in rural and underserved communities.[68] Access to medical personnel who are legally authorized to make return-to-play assessments and adequately trained in concussion diagnosis and management is limited in many areas.[69] Athletic trainers, who are licensed or otherwise regulated in 49 states and the District of Columbia[70] and are arguably the best persons to recognize a concussed athlete due to their proximity to the game and relationship with the athletes,[71] are available to only about 42 percent of high schools[72] and likely far fewer trainers are available to recreational leagues and middle schools. Such data suggest that any positive outcomes from state youth concussion laws may not be universal, even within states. Therefore, innovations that facilitate access to concussion management and treatment, such as "teleconcussion evaluations,"[73] are essential to ensure that the protective benefits of state concussion laws reach every child athlete.

In an effort to protect the public from over-hyped health claims, some Federal agencies have imposed sanctions on irresponsible businesses that seemingly have taken efforts to ride the wave of hyper-aware consumers.[74] For example, in August

66. *See* Statement, Nat'l Operating Comm. on Standards for Athletic Equip., NOCSAE Statement on Third Party Helmet Add-on Products and Certification (July 16, 2013), *available at* http://nocsae.org/wp-content/uploads/2013/07/Third-party-add-on-statement-with-letterhead.pdf.

67. Tom Pelissero, *All NFL Teams May Be Using Head Impact Sensors by 2015*, USA TODAY SPORTS (June 16, 2014, 9:47 AM), http://www.usatoday.com/story/sports/nfl/2014/06/16/head-impact-sensors-concussions-2015/10572251.

68. *See* Chrisman, *supra* note 26, at 1191.

69. *See* COMMITTEE ON SPORTS-RELATED CONCUSSIONS IN YOUTH, *supra* note 13, at 268.

70. *Profile of Athletic Trainers*, NAT'L ATHLETIC TRAINERS' ASS'N (July 2014), http://www.nata.org/sites/default/files/Athletic_Trainer_Profile.pdf.

71. *See, e.g.*, Cynthia LaBella et al., Presentation at the American Academy of Pediatrics National Conference: A Comparative Analysis of Injury Rates and Patterns Among Girls' Soccer and Basketball Players at Schools with and Without Athletic Trainers from 2006/07-2008/09 (Oct. 22, 2012) (on file with author) (finding at highs schools with athletic trainers, girls' soccer and basketball players had more diagnoses, concussions, and fewer overall injuries); Cynthia LaBella, *Concussion and Female Middle School Athletes*, 312 J. AM. MED. ASS'N 739, 740 (2014) (describing the importance of athletic trainers on site).

72. *Athletic Trainers Fill a Necessary Niche in Secondary Schools*, NAT'L ATHLETIC TRAINERS' ASS'N (Mar. 12, 2009), http://www.nata.org/NR031209.

73. *See* Bert B. Vargas et al., *Teleconcussion: An Innovative Approach to Screening, Diagnosis, and Management of Mild Traumatic Brain Injury*, 18 J. TELEMEDICINE & E-HEALTH 803, 805 (2012) (discussing the ability of "teleconcussion" to "bridge the gap in access to specialty care").

74. *See* News Release, FTC, Settlement with FTC Prohibits Marketer Brain-Pad, Inc. from Claiming that Its Mouthguards Can Reduce Risk of Concussions (Aug. 16, 2012), *available at* http://www.ftc.gov/news-events/press-releases/2012/08/settlement-ftc-prohibits-marketer-brain-pad-inc-claiming-its.

2012, the Federal Trade Commission reached a settlement with Brain-Pad, Inc. prohibiting the company from claiming that its mouth guards can reduce risk of concussions or that mouth guards have been clinically proven to do so.[75] In 2013, the Food and Drug Administration (FDA) issued warning letters to multiple companies discouraging the promotion of "products labeled as dietary supplements that claim to treat concussions and prevent or treat post-concussion syndrome and other neurological disorders."[76] Several months later, the FDA issued a News Release highlighting the agency's ongoing efforts in "monitoring the [concussion] marketplace and taking enforcement actions where appropriate."[77] The oversight of these Federal agencies helps to ensure that new technology is safe and effective, and not just profitable based on the current consumer climate.

Medical advances in concussion diagnosis and treatment, technological innovations in protective equipment and concussion recognition, and new rules of play and ways of training athletes will be critical in reducing morbidity and mortality related to TBI in youth sports.[78] Still, law, informed by research and vigilant oversight, must continue to ensure the responsible implementation of these innovations.

VI. CONCLUSION

Future policymaking is likely to follow the legislative precedent set in the past few years with states tweaking concussion laws to align with best practices, and keep pace with scientific and medical developments.[79] A significant outcome of the widespread adoption and implementation of youth sports concussion laws over the past decade may be a greater willingness of state legislatures to engage in the particulars of youth sports—a realm that has been largely privatized and unregulated.[80] Concussion legislation has paved the way for increased regulation, and states are paying attention. At least six states have now passed legislation related

75. *See* Complaint at 14, *In re* Brain-Pad, Inc., and Joseph Manzo, FTC No. 122-3073, No. C-4375, Nov. 15, 2012; Agreement Containing Consent Order at 3–4, *In re* Brain-Pad, Inc., and Joseph Manzo, FTC No. 122-3073, No. C-4375, Nov. 15, 2012.

76. News Release, FDA, FDA Issues Warning Letters to Dietary Supplement Firms in Colorado and Texas for Promoting Unapproved Products as Drugs (Sept. 6, 2012), *available at* http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm318445.htm.

77. *Can a Dietary Supplement Treat a Concussion? No*, FDA CONSUMER HEALTH INFORMATION (Aug. 2014), *available at* http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm378845.htm.

78. *See* Julie Gilchrist, *Nonfatal Traumatic Brain Injuries Related to Sports and Recreation Activities Among Persons Aged ≤ 19 Years—United States 2001-2009*, 60 MORBIDITY & MORTALITY WKLY. REP. 1337, 1340 (2011) (finding that to minimize TBI in sports and recreation activities both primary prevention strategies, like appropriate helmets and coaches emphasis on safe practices, and secondary prevention strategies, like "increasing awareness of the signs and symptoms of TBI").

79. *See supra* Part IV.

80. *See supra* Part IV.

to preventing sudden cardiac arrest in young athletes.[81] State legislation promoting awareness and education on recognition and management of sudden cardiac arrest, exertion heat illnesses, and other sports-related conditions may very well be the next wave of youth sports lawmaking.[82] On the concussion front, states will continue to consider legislation that expands coverage of concussion laws to recreational sports and younger school-based sports, tightens or clarifies existing requirements based on best practices and research developments, and promotes primary prevention.[83] Laws will continue to encourage the development and use of new technologies aimed at reducing the severity of concussions, improving concussion identification on the field, and assessing readiness for return to play, while also ensuring the responsible implementation of these new innovations.[84] The race for innovative strategies to address the concussion problem has just begun; the law will need to keep pace.

81. *See Sudden Cardiac Arrest Legislation by State*, SIMON'S FUND, http://www.simonsfund.org/sudden-cardiac-arrest-legislation-by-state/ (last visited Sept. 28, 2014).

82. *See, e.g.*, Michael Popke, *Curtailing Catastrophe*, ATHLETIC BUS., Apr. 2010, at 61, 61–62.

83. *See supra* Part IV.

84. *See supra* Part V.