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DO ETHICS DEMAND EVALUATION OF PUBLIC HEALTH LAWS? SHIFTING SCIENTIFIC SANDS AND THE CASE OF YOUTH SPORTS- RELATED TRAUMATIC BRAIN INJURY LAWS

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I. INTRODUCTION

Ideally, public health laws would be developed on a robust base of scientific, epidemiologic, and medical data and enacted independent of the various political forces at play. In reality, of course, this “gold standard” is often unattainable. The success of public health legislation in the United States depends on a combination of empirical data, anecdotal evidence, political will, political palatability, media involvement, and the myriad number of issues simultaneously vying for policymakers’ attention.¹ For example, in the months and years following September 11, 2001, legislative attention focused suddenly and squarely on homeland security; chronic disease prevention and other kinds of public health measures

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1. See THE COUNCIL OF STATE GOVERNMENTS, STATE POLICY GUIDE: USING RESEARCH IN PUBLIC HEALTH POLICYMAKING 2, 11 (2008).

understandably took a back seat.² A cursory scan of state public health and environmental laws reveals that lawmaking often requires compromise with political factors at play.³ This may explain why jambalaya, a traditional Louisiana rice dish, when prepared in the “traditional manner” for public consumption, is exempt from any conflicting state sanitation laws⁴ or why a frog that dies during a frog-jumping contest in California cannot be eaten.⁵ Furthermore, academic evidence often is poorly tailored to serve the process by which laws are made, and anecdotal evidence often seems to have more power to “move” legislators than does aggregate empirical data.⁶ This complex combination of factors driving the development and passage of public health laws means that they are often the result of compromise; public health is one among many important (and sometimes competing) national values, including, for example, civil liberties, autonomy, and privacy.⁷ When laws infringe upon one of these other values because lawmakers deem public health to take precedence—or when public health laws serve to create in the public a perception of safety or protection—do principles of ethics demand that the law be effective? Others have described the importance of acknowledging ethics in public health policy and the position of policy analysis as “lying squarely (if uncomfortably) between science and ethics.”⁸ We seek to take this conversation further, using youth

2. Alvin Powell, *After 9/11, Health Lessons Ignored*, HARVARD GAZETTE (Sept. 10, 2012), <http://news.harvard.edu/gazette/story/2012/09/after-911-health-lessons-still-unlearned/> (“a lot of the most important public health aspects of 9/11 were completely buried and overlooked, and continue to be even today.”).

3. See, e.g., THE COUNCIL OF STATE GOVERNMENTS, *supra* note 1, at 2, 8 (discussing the interplay of various factors in the passage of anti-tobacco laws).

4. See LA. REV. STAT. ANN. § 40:4.2 (1977) (“Notwithstanding any contrary provisions of the state sanitary code or any contrary provision of any other law or regulation, it shall be lawful to prepare jambalaya in the traditional manner for public consumption, including the use of iron pots, wood fires, and preparation in the open for service to the public at public gatherings. This Section shall not be construed to allow the sale or distribution of any unwholesome food.”).

5. See CAL. FISH & GAME CODE § 6883 (West 2015) (“Any person may possess any number of live frogs to use in frog-jumping contests, but if such a frog dies or is killed, it must be destroyed as soon as possible, and may not be eaten or otherwise used for any purpose.”).

6. See Ross C. Brownson et al., *Researchers and Policymakers: Travelers in Parallel Universes*, 30 AM. J. PREVENTATIVE MED. 164, 164 (2006) (noting the challenges faced when translating scientific evidence into appropriate and effective policy). See also THE COUNCIL OF STATE GOVERNMENTS, *supra* note 1, at 2 (noting that effective programs are not always implemented due to various factors outside of empirical evidence).

7. See James G. Hodge, Jr., *Respecting Religious Freedoms and Protecting the Public’s Health*, 130 PUB. HEALTH REP. 546, 546–47 (2015) (“The history of public health law in the United States has always been about compromise. As noted recently by U.S. Surgeon General Vivek Murthy, the authority to protect and promote communal health is balanced with constitutional or other legal rights of individuals to act or behave as they wish provided they do not harm others.”).

8. FRANK FISCHER & JOHN FORESTER, *CONFRONTING VALUES IN POLICY ANALYSIS: THE POLITICS OF CRITERIA* 53 (1987).

sports-related traumatic brain injury (“TBI”) laws as a case study to argue that policy evaluation—the attempt to ensure that public health laws are effective, or at least not harmful—and action based upon resulting knowledge are ethical imperatives, particularly in the face of evidentiary uncertainty.⁹

II. THE PHENOMENON OF YOUTH SPORTS-RELATED TBI POLICYMAKING

Concussion from sport is a clear public health problem¹⁰ and the population at risk is large. A survey conducted by the National Federation of State High School Associations estimates that participation in high school sports exceeded 7.7 million in the 2012 to 2013 school year, increasing for the twenty-fourth consecutive year.¹¹ Further, an estimated 60 million U.S. children play youth sports each year—although this number is probably low given limitations on available survey data.¹² An estimated 173,285 youth and adolescent brain injuries are treated in emergency departments in the United States annually.¹³ Rates of concussion diagnosis are increasing,¹⁴ particularly in states that were early adopters of youth concussion legislation.¹⁵ This is likely due to increased awareness and better tracking, rather than to a true increase in the incidence or prevalence of the injury.¹⁶

9. See, e.g., Scott Burris et al., *Making the Case for Laws That Improve Health: A Framework for Public Health Law Research*, 88 MILBANK Q. 169, 170 (2010) (stating that “[t]he responsible use of law as a tool for improving public health requires a commitment to the pursuit and consideration of scientific evidence when possible”); Michelle M. Mello & Kathryn Zeiler, *Empirical Health Scholarship: The State of the Field*, 96 GEO. L.J. 649, 653 (2008) (explaining that empirical investigations of health law are crucial to understanding and implementing sound policymaking).

10. Douglas J. Weibe et al., *Concussion Research: A Public Health Priority*, 17 INJ. PREVENTION 69, 69 (2011).

11. NAT’L FED’N OF STATE HIGH SCHOOL ASS’NS, 2012-13 HIGH SCHOOL ATHLETICS PARTICIPATION SURVEY, NFHS HANDBOOK 91 (2013).

12. NAT’L COUNCIL FOR YOUTH SPORTS, REPORT ON TRENDS AND PARTICIPATION IN ORGANIZED YOUTH SPORTS 7 (2008).

13. See Julie Gilchrist et al., *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, 1339–40 (2011).

14. See Andrew E. Lincoln, et al. *Trends in Concussion Incidence in High School Sports: A Prospective 11-Year Study*, 39 AM. J. SPORTS MED. 958 (2011) (noting that the concussion rate increased over the course of this study in twelve sports tested).

15. Teresa B. Gibson et al., *Analyzing the Effect of State Legislation on Health Care Utilization for Children With Concussion*, 169 JAMA PEDIATRICS 163, 163 (2015).

16. Accord Gregory B. Bonds et al., *Advancements in Concussion Prevention, Diagnosis, and Treatment*, U.S. SPORTS ACAD. (2014), <http://thesportjournal.org/article/advancements-in-concussion-prevention-diagnosis-and-treatment/> (noting that more concussions have been reported as more individuals become aware of concussion symptoms).

Despite increasing diagnosis, it is estimated that more than 50 percent of concussions still go undiagnosed and unreported in some athlete populations.¹⁷ Underdiagnosis may be particularly problematic in young athletes in two ways. First, youth athletes may have a less robust understanding of concussions, their consequences, and the importance of symptom reporting; thus, they may be less likely to communicate their symptoms to a parent or coach. Further, medical professionals are not always present at youth-level sports events or practices, making reporting more logistically challenging.¹⁸ On top of this, young athletes face elevated health risks associated with sports-related brain trauma. For example, compared to adults who sustain a concussion, acute concussion symptoms tend to last longer and be more severe in youth.¹⁹ In addition to delayed recovery, youth athletes are at an elevated risk of sustaining a concussive injury.²⁰ Furthermore, youth athletes who have experienced at least one previous concussion, particularly one sustained recently, are more likely to experience prolonged symptoms if they sustain a subsequent brain injury.²¹ A second concussion experienced in close temporal proximity to the first may also put a youth athlete at risk of second impact syndrome,²² which can result in major neurological consequences and even death.²³ Even without catastrophic, acute consequences, the risks of repeated brain injury in youth are not well understood, but there is the possibility that such injuries could alter neurodevelopment.²⁴ Because a variety of brain functions are not fully formed in youth (e.g., executive functions), the full extent of deficits from injury may not be initially realized. Given the nature and extent of possible health consequences of brain trauma in youth in

17. See Zachary Y. Kerr et al., *Disclosure and Non-Disclosure of Concussion and Concussion Symptoms in Athletes: Review and Application of the Socio-Ecological Framework*, 28 *BRAIN INJ.* 1009, 1011–12 (2014).

18. See David Geier, *Should EMS be Required at Football Games?*, *SPORT MEDICINE SIMPLIFIED* (2011), <http://www.drdaVIDgeier.com/should-ems-be-required-at-football-games/>.

19. Paul McCrory et al., *Summary and Agreement Statement of the 2nd International Conference on Concussion in Sport, Prague 2004*, 39 *BR. J. SPORTS MED.* 196, 197 (2005).

20. 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, 1310 (2012).

21. Matthew A. Eisenberg et al., *Time interval between Concussions and Symptom Duration*, 132 *PEDIATRICS* 8, 8 (2013).

22. 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) (stating that “once a player has incurred an initial cerebral concussion, his or her chances of incurring a second one are 3 to 6 times greater than for an athlete who has never sustained a concussion.”).

23. David X. Cifu & Craig C. Young, *Repetitive Head Injury Syndrome: Background, Epidemiology, Functional Anatomy*, *MEDSCAPE* at 1 (2014), available at <http://emedicine.medscape.com/article/92189-overview>.

24. Cantu, *supra* note 22.

particular, ensuring timely removal from play and medical evaluation are important secondary prevention mechanisms targeted by recent concussion legislation.²⁵ However, even without a diagnosed brain injury, exposure to repeated head impacts through sports has been associated with measurable cognitive impairment,²⁶ indicating that impacts that do not result in concussive injury may nevertheless have detrimental health effects.²⁷

In 2009, states began to pass legislation designed to educate student athletes, their parents, and (in many cases) coaches about TBI and the risks associated with returning to physical activity before the brain has healed sufficiently.²⁸ Washington was the first state to pass a so-called “return-to-play” law in 2009. Washington’s “Lystedt Law” was named for a thirteen-year-old middle school football player who suffered a TBI during a game and was allowed to return to the game fifteen minutes later, ultimately suffering a debilitating brain injury.²⁹ Over the next five years, other states followed suit, using Washington’s law as a prototype.³⁰ By the summer of 2015, youth sports concussion legislation had been passed in all fifty states and the District of Columbia.³¹ This rapid, nationwide adoption of public health policy was almost unprecedented and likely occurred as a result of the nonpartisan support of concussion legislation, the low perceived cost of the initiatives, and the sympathetic population targeted by the laws.³² In addition, nationwide passage of youth sports-related TBI legislation rode atop a wave of increased media attention on TBI related to professional sports, including the tragic suicides of Dave Duerson, Derek Boogaard, and

25. See NAT’L CTR. FOR INJURY PREVENTION & CONTROL, CTRS. FOR DISEASE CONTROL & PREVENTION, IMPLEMENTING RETURN TO PLAY: LEARNING FROM THE EXPERIENCES OF EARLY IMPLEMENTERS, http://www.cdc.gov/headsup/pdfs/policy/rtp_implementation-a.pdf.

26. Thomas M. Talavage et al., *Functionally-Detected Cognitive Impairment in High School Football Players Without Clinically-Diagnosed Concussion*, 31 J. NEUROTRAUMA 327 (2013).

27. *Id.*

28. *Traumatic Brain Injury Legislation*, NAT’L CONF. OF STATE LEGISLATURES (July 28, 2014), <http://www.ncsl.org/research/health/traumatic-brain-injury-legislation.aspx>.

29. Sandra Hughes, *Teen Inspires “Shake It Off Law,”* CBS NEWS, (May 14, 2009, 6:44 PM), <http://www.cbsnews.com/news/teen-inspires-shake-it-off-law/>.

30. See Adler Giersch Personal Injury Law, *The Zackery Lystedt Law Reaches All 50 States!* PERSPECTIVES (2014), <http://www.adlergiersch.com/wp-content/uploads/2014/06/Perspectives-Spring-2014.pdf>.

31. *Id.*

32. Cf. Jennifer Mosley & Mark Courtney, *Partnership and the Politics of Care: Advocates’ Role in Passing and Implementing California’s Law to Extend Foster Care*, CHAPIN HALL AT THE UNIV. CHI. (2012), http://www.chapinhall.org/sites/default/files/Partnership_Politics_5-2-13.pdf (comparing support for concussion policy with the sympathetic public response to the passage of a California foster care law).

Junior Seau, which may have worked to garner popular support for legislative initiatives that would “prevent” such tragedies.³³

One implication (and criticism) of this rapid adoption is that the laws themselves were rather similar. Legislatures relied largely on Washington’s Lystedt Law as a model, without policy experimentation to tailor to existing state infrastructures and processes or empirical evidence on effectiveness.³⁴ As such, most youth sports-related concussion laws included three key elements: education for parents and student athletes, immediate removal from play after suspected concussion, and medical clearance before return to play.³⁵ In May 2010, National Football League Commissioner Roger Goodell wrote a letter to the governors of the forty-four states that had not yet enacted return-to-play legislation, urging them to adopt a law with these three elements.³⁶ Another criticism of initial return-to-play laws is that they were almost completely aimed at secondary prevention (e.g., early detection of sports-related TBI) and tertiary prevention (e.g., rehabilitation and management of sports-related TBI).³⁷ Only Massachusetts included legislative attempts at primary prevention, directed toward precluding the occurrence of youth sports-related TBI in the first place.³⁸ From the outset, the Massachusetts law prohibited coaches, athletic trainers, and others from encouraging or allowing a student athlete to use sports equipment as a weapon or to engage in sports techniques that are unreasonably dangerous, such as helmet-to-helmet hits.³⁹ Given what was known, championing the three key provisions of the Lystedt Law and focusing on secondary and

33. Mark Fainaru-Wada & Steve Fainaru, *Duerson Family Objects to Settlement*, ESPN (Oct. 14, 2014), http://espn.go.com/espn/otl/story/_/id/11702872/dave-duerson-family-files-objection-nfl-concussion-settlement; John Branch, *Derek Boogaard: A Brain ‘Going Bad,’* N.Y. TIMES (Dec. 5, 2011), <http://www.nytimes.com/2011/12/06/sports/hockey/derek-boogaard-a-brain-going-bad.html>; Sam Farmer, *Junior Seau Had Brain Disease When He Committed Suicide*, L.A. TIMES (Jan. 10, 2013), <http://articles.latimes.com/2013/jan/10/sports/la-sp-sn-junior-seau-brain-20130110>.

34. Kerri McGowan Lowrey & Stephanie R. Morain, *State Experiences Implementing Youth Sports Concussion Laws: Challenges, Successes, and Lessons for Evaluating Impact*, 42 J.L. MED. & ETHICS 290, 290–91, 95 (2014). See also Hosea H. Harvey, *Reducing Traumatic Brain Injuries in Youth Sports: Youth Sports Traumatic Brain Injury State Laws, Jan. 2009–Dec. 2012*, 103 AM. J. PUB. HEALTH 1249, 1250 (2013).

35. See Harvey, *supra* note 34, at 1250.

36. *Goodell Sends Letter to 44 Governors*, ESPN (May 24, 2010), <http://sports.espn.go.com/nfl/news/story?id=5212326>.

37. THOMAS R. FRIEDEN & FRANCIS S. COLLINS, REPORT TO CONGRESS ON TRAUMATIC BRAIN INJURY IN THE UNITED STATES: UNDERSTANDING THE PUBLIC HEALTH PROBLEM AMONG CURRENT AND FORMER MILITARY PERSONNEL 70 (Nat’l Inst. of Health ed., 2013).

38. Kerri McGowan Lowrey, *Revising the Game Plan: Primary Prevention, Early Detection, and the Future of Concussion Laws*, NETWORK FOR PUBLIC HEALTH LAW (July 21, 2014), https://www.networkforphl.org/the_network_blog/2014/07/21/474/revising_the_game_plan_primary_prevention_early_detection_and_the_future_of_concussion_laws.

39. MASS. GEN. LAWS ANN. ch. 111, § 222 (West 2011).

tertiary prevention were appropriate, if not inclusive of all potentially important preventive factors (e.g., mandatory training for coaches). But what about now? Science is ever-evolving, and with it our understanding of brain injury, prevention, and protective factors are constantly changing.

To date, twenty-two states have made substantive changes to their laws since original enactment, eight states more than once.⁴⁰ These amendments generally fall into three types: (1) expanding coverage of the law (e.g., to include younger grades or recreational sports leagues),⁴¹ (2) tightening or clarifying existing requirements,⁴² and (3) efforts to prevent concussions from occurring in the first place (primary prevention) and improved early detection (secondary prevention).⁴³ Since original passage, seven states have expanded coverage of their laws to include, for example, recreational youth sports (Arkansas),⁴⁴ charter and private schools (California),⁴⁵ and sports organizations using public school property (Indiana and Virginia).⁴⁶ New Jersey amended its law in 2011 to expressly include cheerleading.⁴⁷ Nineteen states passed legislation to change specific requirements since the original passage of the law—amendments that may have come about in response to experience with implementation of the original law or new developments in knowledge.⁴⁸ For example, in 2012 Alaska added athletic trainers to its list of providers qualified to make return-to-play (“RTP”) decisions and clarified that “return to play” as defined in the statute includes return to practice as well as to competition.⁴⁹ States with large rural populations, such as Alaska, faced implementation challenges due to availability of medical providers trained in the

40. Kerri McGowan Lowrey, *Summary Matrix of State Laws Addressing Concussions in Youth Sports*, NETWORK FOR PUBLIC HEALTH LAW (June 30, 2014), https://www.networkforphl.org/_asset/xc41pl/Sports-Concussion-Table.pdf. The eight states that have made multiple post-enactment changes are California (CAL. EDUC. CODE §§ 49475, 35179.5 (West 2015)), Illinois (70 ILL. COMP. STAT. ANN. 1205/8-24 (West 2015)), 105 ILL. COMP. STAT. ANN. 5/22-80, 25/1.15 (West 2015)), Kentucky (KY. REV. STAT. ANN. § 160.445 (LexisNexis 2015)), New Hampshire (N.H. REV. STAT. ANN. § 200:52 (2013)), New Jersey, (N.J. STAT. ANN. § 18A:40–41.2 (2012)), Oregon (O.R.S. §§ 336.485, 417.875 (2015)), Rhode Island (R.I. GEN. LAWS ANN. § 16-91-1 *et seq.* (West 2016)), and Vermont (VT. STAT. ANN. tit. 16, § 1431 (2013)).

41. *See, e.g.*, N.H. REV. STAT. ANN. § 200:52 (2013) (expanding coverage of the statute to include participants in both intramural and interscholastic sports in grades four through twelve).

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

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

44. ARK. CODE ANN. § 6-18-710 (2013).

45. CAL. EDUC. CODE § 49475 (West 2015).

46. IND. CODE § 20-34-7-1.5 (2014); VA. CODE ANN. § 22.1-271.5 (2014).

47. *See* N.J. STAT. ANN. § 18A:40-41.2 (2012).

48. Kerri McGowan Lowrey, *State Laws Addressing Youth Sports-Related Traumatic Brain Injury and the Future of Concussion Law and Policy*, 10 J. BUS. & TECH. L. 61, 67 (2014).

49. ALASKA STAT. § 14.30.142(a) (2014).

recognition and management of concussions,⁵⁰ so such amendments may have been proposed to increase the number of providers qualified by law to make return-to-play decisions.⁵¹

Several states implemented stronger education and informed consent provisions for parents as well as training requirements for coaches and officials.⁵² Two states passed new provisions requiring concussion data collection,⁵³ perhaps realizing that controlling any public health problem and assessing the effectiveness of interventions requires adequate surveillance.⁵⁴ Other states incorporated provisions that require the establishment of academic adjustment protocols for student athletes that have sustained concussions, or “return to learn” provisions.⁵⁵ Perhaps states acted in response to a flurry of recent research on the need for cognitive rest and accommodations for concussed student athletes returning to the classroom.⁵⁶

From a public health perspective, states’ recent emphasis on primary prevention and improvement of early TBI detection is encouraging. As noted, only Massachusetts included primary prevention measures, such as mandated limits on contact in practices and scrimmages or safer rules of play, into its original concussion law.⁵⁷ Since original adoption, however, more states have amended their laws to add primary prevention strategies such as limits on minutes of contact during practices and scrimmages, training for coaches on strategies for reducing risk of concussion, and

50. See Lowrey & Morain, *supra* note 34, at 295.

51. *Id.* at 293.

52. See Lowrey, *supra* note 48, at 67.

53. See Substitute H.B. 5113, Gen. Assemb., Reg. Sess (Conn. 2014); VT. STAT. ANN. tit. 16 § 1431(b) (2013).

54. See, e.g., Sports-Related Concussions in Youth: Improving the Science, Changing the Culture 29 (Robert Graham et al. eds., 2014) (explaining that epidemiological surveillance data are important in developing appropriate interventions and assessing their efficacy).

55. See, e.g., Neb. Rev. Stat. Ann. § 71-9104(1)(c) (2014); Va. Code Ann. § 22.1-271.6 (2014).

56. See, e.g., Mark E. Halstead et al., *Returning to Learning Following a Concussion*, 132 PEDIATRICS 948, 953 (2013) (suggesting individualized strategies to return to classroom while symptomatic from a concussion); Christina Master et al., *Importance of ‘Return-to-Learn’ in Pediatric and Adolescent Concussion*, 41 PEDIATRIC ANNALS 1, 3–4 (2012) (providing a return-to-learn plan and suggesting school accommodations upon reentry); John G. Baker et al., *Factors Associated With Problems for Adolescents Returning to the Classroom After Sport-Related Concussion*, 54 CLINICAL PEDIATRICS 961, 966–67 (2015) (providing data-driven discussions of return-to-learn issues).

57. See Mass. Gen. Laws Ann. ch. 111, § 222 (2011) (prohibiting coaches, trainers or volunteers from encouraging or permitting “unreasonably dangerous athletic technique that unnecessarily endangers the health of the student, including using a helmet or any other sports equipment as a weapon”).

equipment requirements.⁵⁸ In an effort to improve early detection of TBI, New Jersey's amended law requires a physical examination and concussion history prior to athletic activity to identify students at greater risk.⁵⁹

As described above, amendments enacted since initial passage of the concussion legislation may have occurred for a variety of reasons. Since passage of the first concussion law in 2009, there has been a rapid proliferation of scientific research in the area of concussion.⁶⁰ In particular, a growing body of literature indicates that concussions are widely underreported and underdiagnosed.⁶¹ Additionally, some research has suggested that repetitive "minor" brain injuries, including subconcussive blows, can lead to functional,⁶² structural,⁶³ biochemical,⁶⁴ and potentially chronic neurodegenerative changes⁶⁵ with significant health consequences. This developing scientific evidence may have motivated legislators to incorporate the primary prevention strategies as described above. Further, experience upon implementation may have led to the amendments' clarification of language (e.g., that returning to play includes practice) or stipulation that only parents need to sign and return a single concussion information sheet per year per organization or school.⁶⁶

58. See, e.g., VT. STAT. ANN. tit. 16, § 1431(c) (2013) (requiring coaches' training to include strategies for reducing risk of concussion during athletic activities); CONN. GEN. STAT. § 10-149b (2010) (requiring development of refresher courses on safety practices and current best practices in football coaching); TEX. EDUC. CODE ANN. § 33.094 (2011) (limiting the number of years any football helmet may be used).

59. N.J. STAT. ANN. § 18A:40-41.7 (2013).

60. See generally Sports-Related Concussions in Youth: Improving the Science, Changing the Culture (Robert Graham et al. eds., 2014) (reviewing the available scientific literature on sports-related concussions).

61. See, e.g., Kerr, *supra* note 17, at 1009 (stating that numerous concussions of high school and college athletes go unreported); Timothy B. Meier et al., *The Underreporting of Self-Reported Symptoms Following Sports-Related Concussion*, 18 J. SCI. & MED. IN SPORT 507, 510 (2015) (providing data showing that athletes underreport post-concussive symptoms to team medical staff).

62. Talavage et al., *supra* note 26, at 327, 334 (noting that some athletes who experienced collision events demonstrated neurocognitive deficits even without observable signs of concussion).

63. Jeffrey J. Bazarian et al., *Subject-Specific Changes in White Matter on Diffusion Tensor Imaging After Sports-Related Concussion*, 30 MAGNETIC RESONANCE IMAGING 171, 176, 178 (2012).

64. Nicolas Marchi et al., *Consequences of Repeated Blood-Brain Barrier Disruption in Football Players*, 8 PLOS ONE 1, 8 (2013).

65. Ann C. McKee et al., *The Spectrum of Disease in Chronic Traumatic Encephalopathy*, 136 BRAIN 43, 44-45, 48 (2013) (analyzing post-mortem brains of subjects with repetitive mild traumatic brain injury and finding evidence of chronic traumatic encephalopathy in most subjects); Robert A. Stern et al., *Clinical Presentation of Chronic Traumatic Encephalopathy*, 81 NEUROLOGY 1122, 1124 (2013) (discussing the clinical presentations of athletes who died with chronic traumatic encephalopathy, a neurodegenerative disease).

66. WIS. STAT. § 118.293 (2013).

III. SCIENTIFIC EVIDENCE AND PUBLIC HEALTH LAWMAKING

The discipline of public health law has been defined as “[t]he study of the legal powers and duties of the state . . . to ensure the conditions for people to be healthy . . . and of the limitations on the power of the state to constrain for the common good the autonomy, privacy, liberty, proprietary, and other legally protected interests of individuals” for protection or promotion of community health.⁶⁷ Lawrence Gostin argues that public health law concerns government authority to prevent injury and disease and to promote the public’s health, as well as appropriate constraints on state action to protect individual freedoms.⁶⁸ In short, government has widespread authority to act in the public’s interest, but must do so within the constraints of law and the Constitution.⁶⁹

Public health laws are passed upon a certain set of scientific assumptions that guide decision-making on whether the benefit to the common good outweighs any resulting limitations on individual liberties or other values. When evidence emerges that challenges those assumptions, that legal intervention must be revisited and revised.⁷⁰ Likewise, when surveillance demonstrates an unacceptable, unintended consequence, the law must be retooled to mitigate such unfavorable consequences. For example, a recent study of Graduated Drivers Licensing (“GDL”) laws, which now exist in all fifty states and the District of Columbia, found a significant reduction in fatal crashes for sixteen-year-old drivers in states with stronger GDL laws; however, the study also revealed an increase in fatal crashes for eighteen-year-olds in those same states, suggesting that strong GDL laws may have induced young drivers to wait until age eighteen to obtain licensure to avoid GDL requirements.⁷¹ Policymakers and injury prevention professionals must now grapple with this new problem, possibly by revising the laws or through targeted education. Without evaluation research, however, unintended consequences of the law would remain unknown.

67. LAWRENCE O. GOSTIN, *PUBLIC HEALTH LAW: POWER, DUTY, RESTRAINT* 4 (2d ed. 2008).

68. *Id.* at 4, 5.

69. *Id.* at 11 (explaining that the government has certain police powers which can legitimately restrict certain rights to achieve a common good but they must be within constitutional and statutory constraints).

70. INST. OF MED. OF THE NAT’L ACADEMIES, *FOR THE PUBLIC’S HEALTH: REVITALIZING LAW AND POLICY TO MEET NEW CHALLENGES* 20 (2011) (stating that antiquated public health statutes need to be revisited and revised based on new scientific knowledge and emerging population health priorities).

71. James C. Fell & Eduardo Romano, *Are Strong Graduated Driver Licensing Laws Having Unintended Consequences?*, 57 *ANNALS ADVANCES AUTOMOTIVE MED.* 351 (2013).

There is precedent for acting in the face of scientific uncertainty, and there is often good justification for doing so. The Precautionary Principle states that “[w]hen an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.”⁷² When potential harm is great, legislating with less substantial scientific evidence of “effectiveness” is probably appropriate.⁷³ Even if a policy intervention infringes upon individual or organizational liberties, ethics may actually require that policymakers make an educated guess, based on incomplete evidence, about what is causing a certain harm and craft an educated attempt to alleviate that risk.⁷⁴

Researchers are still studying the precise pathophysiology of concussion and its sequelae.⁷⁵ However, by 2009, when the first sports-related concussion law was passed in Washington, researchers could agree that there was *something* about repeated concussion that elevated risk for at least some young athletes, and that a reasonable approach to addressing this risk was to ensure that concussed athletes did not suffer a subsequent concussion before the brain had adequately healed from the first.⁷⁶ While some implementation challenges existed,⁷⁷ the laws posed minimal burdens for individuals and organizations. Furthermore, they were often consistent with existing state policies and procedures, as many state-level athletic associations and school departments had already begun implementing some sort of concussion protocol for students.⁷⁸ Thus, the laws merely codified what was already happening. By 2014, all states and the District of Columbia had passed similar laws.⁷⁹

72. See *Wingspread Statement on the Precautionary Principle*, SCI. & ENVTL. HEALTH NETWORK (Jan. 26, 1998), <http://www.sehn.org/wing.html>.

73. See, e.g., Inst. of Med. of the Nat'l Academies, *supra* note 70, at 4.

74. See *id.* (stating that such new laws based on limited evidence should be done only when the unintended harms from action are within acceptable limits).

75. See, e.g., Kimberly G. Harmon et al., *American Medical Society for Sports Medicine Position Statement: Concussion in Sport*, 47 BRIT. J. SPORTS MED. 15, 17 (2013) (explaining the complex neurometabolic processes and axonal injury that underlies the clinical presentation of cerebral concussion).

76. See, e.g., Hosea H. Harvey et al., *The Four Stages of Youth Sports TBI Policymaking: Engagement, Enactment, Research, and Reform*, 43 J.L. MED. & ETHICS 87, 88 (2015).

77. NAT'L CTR. FOR INJURY PREVENTION & CONTROL, *supra* note 25 (identifying potential implementation barriers associated with return-to-play laws).

78. Tracey Covassin et al., *Current Sport-Related Concussion Teaching and Clinical Practices of Sports Medicine Professionals*, 44 J. ATHLETIC TRAINING 400, 402–03 (2009) (showing that return-to-play protocols existed even before 2009 and employed similar methods such as clinical examination and physician recommendation).

79. Kerri McGowan Lowrey, *Summary Matrix of State Laws Addressing Concussions in Youth Sports*, NETWORK FOR PUBLIC HEALTH LAW (June 30, 2014), https://www.networkforphl.org/_asset/xc41pl/Sports-Concussion-Table.pdf.

IV. DISCUSSION OF ETHICAL CONSIDERATIONS

Ethical principles dictate that public health laws should be evidence-based.⁸⁰ In the ideal case, extensive and high-quality data exist to demonstrate a clear causal link between a legal intervention and the desired health outcome. For example, decades of epidemiological and medical research have established a clear causal link between tobacco smoke and a premature death for smokers and bystanders alike.⁸¹ Economic studies have demonstrated that tobacco excise taxes reduce tobacco consumption, particularly among younger populations, curbing both current and future tobacco use, and correspondingly reducing tobacco-related morbidity and mortality.⁸² The extensive evidence provides a compelling case for the use of public health authority. However, a commitment to evidence-based policymaking does not necessarily require policymakers to refrain entirely from action until such robust evidence exists.⁸³ It would be unrealistic—and deleterious to the public's health—to demand that public health laws be delayed until they can be supported by robust scientific evidence from systematic reviews.⁸⁴ In some cases, the urgency of the public health problem at issue demands that policymakers devise solutions in the face of uncertain or mixed evidence.⁸⁵

In evaluating the level of evidence necessary to justify implementation, policymakers must consider both the significance of the public health problem and the extent of the burdens imposed by proposed

80. See, e.g., Nancy E. Kass, *An Ethics Framework for Public Health*, 91 AM. J. PUB. HEALTH 1776, 1778–79 (2001) (stating that a greater burden on society requires stronger evidence to support the policy).

81. See Majid Ezzati & Alan D. Lopez, *Estimates of Global Mortality Attributable to Smoking in 2000*, 362 THE LANCET 847, 851 (2003) (stating that in 2000, 4.83 million premature deaths were attributed to smoking). See also Ctrs. for Disease Control & Prevention, *Smoking-Attributable Mortality, Years of Potential Life Lost, and Productivity Losses-United States, 2000–2004*, MMWR WEEKLY (Nov. 14, 2008), <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5745a3.htm>.

82. See, e.g., F. J. Chaloupka et al., *Tax, Price and Cigarette Smoking: Evidence From the Tobacco Documents and Implications for Tobacco Company Marketing Strategies*, 11 TOBACCO CONTROL 62, 66–67 (2002). See also John A. Tauras, *Public Policy and Smoking Cessation Among Young Adults in the United States*, 68 HEALTH POL'Y 321, 321–22 (2004) (stating that “cessation represents the single most important step smokers can take to enhance the quality and length of their lives”).

83. See Ronald Bayer et al., *Salt and Public Health: Contested Science and the Challenge of Evidence-Based Decision-Making*, 31 HEALTH AFFAIRS 2738, 2743 (2012).

84. See *id.* (stating that if policymakers waited to act until there were no scientific disagreements, a “substantial and preventable burden” would be imposed on policy).

85. See, e.g., *id.* at 2740, 2742

legislative action.⁸⁶ Both considerations lend support to the initial passage of youth sports TBI laws. First, the prevalence of sports-related concussions represents a clear public health problem.⁸⁷ The age of the target population adds additional justification, given the vulnerable status of minors and the corresponding societal interest in safeguarding their health and welfare, as well as the downstream implications of concussions and other brain injuries for long-term cognitive development.⁸⁸ Second, the burdens imposed by the laws are arguably minimal. As the laws focus on educational and secondary prevention strategies, rather than imposing specific tests or invasive procedures for individuals or changes to the sports themselves, such as limiting the type or frequency of contact, they present a relatively light infringement upon individual liberty.⁸⁹ In addition, while there are some financial costs associated with development and implementation of educational materials, these costs seem reasonable given the magnitude of the public health problem.⁹⁰

In light of these considerations, the initial passage of youth sports TBI laws seems consistent with an ethical commitment to evidence-based policymaking. However, acting in the face of uncertainty creates an additional duty for public health policymakers to monitor and evaluate both the health condition targeted by the policy and the specific effects of policy, and tailor the law accordingly.⁹¹ Even where scientific evidence is sound,

86. See Kass, *supra* note 80, at 1778–79 (stating that while “all programs must be based on sound data . . . the quality and volume will vary. The question . . . is what quantity of data is enough to justify a program’s implementation?”).

87. See Christine M. Baugh et al., *Requiring Athletes To Acknowledge Receipt of Concussion-Related Information and Responsibility to Report Symptoms: A Study of the Prevalence, Variation, and Possible Improvements*, 42 J.L. MED. & ETHICS 297, 297–98 (2014) (stating that concussions can have negative medical, social, and behavioral outcomes and that 65 percent of emergency room visits for children ages five through eighteen are due to sports- and recreation-related brain injury).

88. See Elisabeth Koloup, *Get Your Head in the Game: Legislation Addressing Concussions in Youth Sports and Its Development in Maryland*, 42 U. BALT. L.F. 207, 208–09 (2011) (“[y]outh athletes in particular are susceptible to lasting damage caused by concussions for several reasons, including underdeveloped brain tissue, frequent neglect, and oversight.”).

89. See Baugh et al., *supra* note 87, at 299, 301 (stating that most state laws only require parents to sign a consent form and prohibit reentry of the athletes after injury).

90. See Lesley Lueke, *High School Athletes and Concussions: More Than A Game at Stake*, 32 J. LEGAL MED. 483, 497 (2011) (“Requiring a training course for all individuals involved would be very inexpensive, if not free. For example, states could simply require that athletes, coaches, trainers, physicians, and volunteers complete materials provided by the CDC’s Heads Up program.”).

91. See Michelle M. Mello et al., *Critical Opportunities for Public Health Law: A Call for Action*, 103 AM. J. PUB. HEALTH 1979, 1986 (2013) (citing GDL and child safety laws as examples of laws which were evaluated and tweaked after their implementation).

the policy may not “work” as intended due to any number of features in the implementation environment.⁹²

In general, policymakers have the duty to ensure that public health laws are consistent with available evidence and effective in achieving their aims. One way of explaining the origin of this duty is that in creating public health laws, policymakers are generally infringing on individuals’ liberties. Certain infringements are justified if the public health issues involved are important; the public health benefit of laws banning smoking in restaurants or requiring drivers and their passengers to wear seatbelts are deemed to outweigh the individual liberty interests at stake.⁹³ However, the right of policymakers to constrain personal liberty for the sake of public health relies upon being sufficiently certain that the public health aims are achieved. In this way, policymakers and the public health community that advocated for the intervention bear a duty to ensure that the policy effectively advances the public health ends that justified it.

In addition to the clear normative value for evaluating effectiveness, such evaluation may also yield political benefits. Providing evidence of the effectiveness of public health legal interventions may help overcome ideological opposition to the expanding use of government authority. Conversely, acknowledging areas in which public health authority has misfired may also help to stem concern for an ever-expanding regulatory state.⁹⁴

Evaluating effectiveness is thus a critical step in public health policymaking. Furthermore, as the effectiveness of an intervention may shift as underlying conditions change, the duty to monitor effectiveness should be viewed not as a one-time commitment, but rather an ongoing process. For example, effective interventions to promote screening for TBI “may become less effective as baseline screening rates improve.”⁹⁵ Similarly, the effectiveness of concussion education programs may decline as baseline levels of concussion awareness increase among coaches, players, and the broader population. In other circumstances, the feasibility

92. See, e.g., Mike Males, *California’s Graduated Driver License Law: Effect on Teenage Drivers’ Deaths Through 2005*, 38 J. RESEARCH & SAFETY 651, 655–58 (2007) (showing that while the California GDL law lowered the number of deaths of sixteen-year-olds, the law simultaneously caused an increase in the number of deaths of eighteen-year-olds due to factors such as the maturity level of the driver and the “lower risk per mile driven” of the sixteen-year-olds).

93. See Kass, *supra* note 80, at 1781 (stating that policymakers must first determine whether a policy is likely to achieve its stated goals and minimize potential burdens).

94. Mello et al., *supra* note 91, at 1985.

95. Laurie M. Anderson et al., *Evidence-Based Public Health Policy & Practice: Promises and Limits*, 28 AM. J. PREVENTATIVE MED. 226, 228 (2005).

of policy implementation may change.⁹⁶ For example, changes in the geographic distribution of medical providers may affect the availability of qualified providers to evaluate concussed student-athletes, which in turn will shape the ability of schools to comply with RTP requirements.

Policy evaluation becomes more important where the science is uncertain or where the law (as with youth sports-related TBI laws) creates a presumption of safety. Many facets of youth sports-related TBI laws are untested. For example, youth and parent concussion education are required by many of the existing youth TBI laws.⁹⁷ However, approaches to implementing this education vary widely and remain largely unevaluated. Furthermore, several aspects of existing approaches call into question the plausibility of efficacy.⁹⁸ For example, in some states the information sheets themselves must be signed and returned, precluding the opportunity for later reference if the athlete or parent is concerned about a possible concussion.⁹⁹ Additionally, many approaches are relatively passive, such as the small-print information sheets or pass-through screens on youth sports registration websites.¹⁰⁰ Although these approaches may comply with the education requirement of state law, the effectiveness is unknown and to-date largely untested.¹⁰¹

The rapid pace of concussion research is likely to yield further insights that will show where current concussion laws are likely to yield health gains—but also where they are likely to fall short.¹⁰² For example, ongoing research into the pathophysiology of concussion sequelae will hopefully shed light upon whether and when an athlete can safely return to play, which should be incorporated into future educational and RTP requirements.¹⁰³ Other research into subconcussive hits may further support arguments for the reduction of repeated head impacts, which should then

96. See, e.g., *id.* (“[F]easibility of implementing interventions may change over time. Privacy laws (e.g., Health Insurance Portability and Accountability Act of 1996 (HIPPA), for instance, many influence the ability of healthcare systems to carry out interventions such as sending personalized reminders.”).

97. See Baugh et al., *supra* note 87, at 299.

98. *Id.* at 302.

99. *Id.* at 299 (stating that eighteen states merely require concussion information sheets to be signed and returned).

100. *Id.* at 303–04.

101. *Id.* at 305 (stating that future controlled experimental research is warranted to determine whether state laws have been effective in promoting concussion reporting).

102. Andrew J. Kane, *An Incomplete Pass: Inadequacies in Ohio’s Youth Concussion Legislation and the Ongoing Risk for Players*, 28 J.L. & HEALTH 201, 227–37 (2015) (detailing the numerous agencies performing concussion research and the benefits and weaknesses of current concussion legislation).

103. See Kimberly G. Harmon et al., *American Medical Society for Sports Medicine Position Statement: Concussion in Sport*, 47 BRIT. J. SPORTS MED. 15–26, 26 (2013).

shape decision-making regarding reduction of contact practices and perhaps even rule changes.¹⁰⁴ Investigations examining the differential effects of brain trauma across phases of neurodevelopment could yield important information about when it may be more or less risky to begin participation in contact football.¹⁰⁵ The dialogue between evolving science and concussion policy could allow for important reductions in the risks of participation in contact sports while facilitating the important benefits of physical activity.

Finally, policy evaluation should be also undertaken with an eye towards assessing the unintended consequences of TBI laws. For example, as one of us has argued elsewhere, the problem of TBI in youth sports may be a double-edged sword for public health.¹⁰⁶ That is, interventions that aim to reduce concussion incidence may have the unintended consequence of reducing overall youth participation in sports in general, potentially exacerbating challenges of childhood obesity and physical inactivity, which themselves can lead to serious health consequences.¹⁰⁷ TBI laws may also have deleterious implications for equity, as schools serving primarily minority and low-socioeconomic students, as well as schools in rural settings, may face the greatest implementation challenges.¹⁰⁸ Indeed, research on the early implementation of TBI laws identified concerns related to access to qualified medical providers to assess concussed athletes, particularly in rural and medically underserved areas.¹⁰⁹ It is concerning that additional requirements aimed at protecting youth, such as baseline assessments or requiring attendance of an athletic trainer or medical professional at games or other events,¹¹⁰ might prove too expensive or

104. See Tareq Bey & Brian Ostick, *Second Impact Syndrome*, 10 WEST J. EMERGENCY MED. 6, 6–9 (2009).

105. See, e.g., Linda J. Carroll et al., *Prognosis for Mild Traumatic Brain Injury: Results of the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury*, 43 J. REHAB. MED. SUPPLEMENT 84, 87–89 (2004) (comparing the prognoses of children and adults who have suffered mild traumatic brain and finding that children tend to recover more quickly and with a lower mortality rate).

106. Lowrey, *supra* note 48, at 62.

107. Cf. Ian Janssen & Allana G. LeBlanc, *Systematic Review of the Health Benefits of Physical Activity and Fitness in School-Aged Children and Youth*, 40 INT. J. BEHAVIORAL NUTRITION & PHYSICAL ACTIVITY 1, 13 (2010).

108. Jason Navia, Comment, *Sitting on the Bench: Failure of Youth Football Helmet Regulation and the Necessity of Government Intervention*, 64 ADMIN. L. REV. 265, 286, 289–90 (2012). See also Alan Schwarz, *Group to Phase Out Old Football Helmets*, N.Y. TIMES (Mar. 10, 2011), <http://www.nytimes.com/2011/03/11/sports/football/11helmet.html> (noting the cost differential between old and new helmets and impact on underfinanced schools and youth organizations).

109. Lowrey & Morain, *supra* note 34, at 296.

110. See, e.g., Ben Strauss, *Concussion Lawsuits Rankle School Groups*, N.Y. TIMES (May 20, 2015), <http://www.nytimes.com/2015/05/21/sports/football/concussion-lawsuits-rankle-school-groups.html>; Josh Weir, *States Adopting Concussion Laws, But Politics, Money Key to National*

otherwise infeasible for low-resourced schools. This could lead to closures of sports programs and exacerbation of underlying disparities in access to sports and other activities for poor and minority youth.¹¹¹ Alternatively, if these measures are implemented in situations where appropriate resources are not available, they may provide a false sense of security. For example, if baseline testing is implemented in a way that is ineffective (e.g., without sufficient medical oversight), parents may feel that return to play decisions are being made on sounder medical evidence than is, in fact, the case. Further policy evaluation will prove critical in ensuring that policies are not only effective, but also equitable.

V. SUPPORTING EVIDENCE-BASED POLICYMAKING

Our proposition that policymakers have an ethical duty to evaluate public health laws and use that evidence to modify them as necessary suggests several key features needed to fulfill this commitment. First, fulfilling a commitment to evaluation implies that public health policymaking should be viewed as a recursive process, one in which scientific evidence is constantly evaluated to identify the effects of implementation of existing policies, and evidence is fed back into the policymaking process to shape decisions about existing and future policies.¹¹² Policy surveillance is thus integral for ethical public health policymaking—generating longitudinal data about the laws’ provisions and implementation to be used in policy evaluation research, and facilitating understanding about when a public health law meets its health objective, and the mechanism by which it does so.¹¹³ Continued development of longitudinal, coded legal datasets, such as the National Cancer Institute’s Classification of Laws Associated with School Students (“C.L.A.S.S.”),¹¹⁴

Policies, PEORIA J. STAR (Aug. 21, 2013), <http://www.pjstar.com/article/20130821/NEWS/308219906>.

111. Cf. Kelley Holland, *Lower-Income Students Getting Shut Out of Sports*, NBC NEWS (July 27, 2014, 7:17 PM), <http://www.nbcnews.com/business/consumer/lower-income-students-getting-shut-out-sports-n164941> (stating that 24 percent of families reduced or stopped participation in youth sports due to the cost).

112. Jamie F. Chriqui et al., *What Gets Measured Gets Changed: Evaluating Law and Policy for Maximum Impact*, 39 J.L. MED. & ETHICS 21, 23 (2011).

113. See EVAN D. ANDERSON ET AL., TEMPLE UNIV. BEASLEY SCH. OF LAW, PUB. HEALTH LAW RESEARCH PROGRAM, MEASURING STATUTORY LAW AND REGULATIONS FOR EMPIRICAL RESEARCH 25 (2012); Scott Burris et al., *Making the Case for Laws That Improve Health: A Framework for Public Health Law Research*, 88 MILBANK Q. 169, 170 (2010).

114. See, e.g., Louise C. Mâsse et al., *Development of a School Nutrition–Environment State Policy Classification System (SNESPCS)*, 33 AM. J. PREVENTATIVE MED. S277, S277 (2007). See also Louise C. Mâsse, et al., *Development of a Physical Education–Related State Policy Classification System (PERSPCS)*, 33 AM. J. PREVENTATIVE MED. S264, S265 (2007) (describing how policy data is collected and how data systems are developed); *About C.L.A.S.S.*, NAT’L CANCER INST., <http://class.cancer.gov/About.aspx> (last visited Jan. 15, 2016).

and resources for the systematic creation of such datasets, such as Public Health Law Research (“PHLR”) LawAtlas,¹¹⁵ will be critical to building capacity for ongoing sound research on the effectiveness of legal and legislative interventions.

Second, it suggests the importance of involving stakeholders in policymaking. Research suggests that when key stakeholders—including the targeted populations affected by legislation and those responsible for implementation—were involved in policymaking directed at youth TBI from the outset, there were fewer barriers to implementing TBI laws.¹¹⁶ Involving stakeholders in policymaking can provide important insights for what works “on the ground,” and can suggest strategies for overcoming early obstacles.

Finally, just as lawmakers have the duty to evaluate the effectiveness of their concussion legislation, sports leagues have the duty to evaluate the effectiveness of their rule changes aimed at reducing concussive impacts. In recent years, many sports leagues have made rule changes in response to the increased awareness of the health impacts of concussion.¹¹⁷ These rule changes are positive steps by the leagues in reaction to a growing public health concern. However, in creating an appearance of increased safety through this rule-making, sports leagues have assumed the duty of ensuring that the rules put in place actually achieve the intended goal.¹¹⁸ Without ensuring effectiveness, these rule changes may inappropriately influence parents’ decisions to enroll their children in contact sports or adult athletes’ decisions about continuing to participate in sports without actually altering the true associated risks.

VI. CONCLUSION

We argue that evaluating public health laws and retooling them in light of shifting evidence are potential ethical mandates, and suggest such

115. LAW ATLAS: THE POL’Y SURVEILLANCE PORTAL, <http://lawatlas.org/about> (last visited Jan. 15, 2016).

116. Lowrey & Morain, *supra* note 34, at 296.

117. See, e.g., *Safety Rules & Regulations*, NAT’L FOOTBALL LEAGUE (Aug. 9, 2013, 7:47 PM), <http://www.nfl.com/news/story/0ap1000000228345/article/safety-rules-regulations> (stating the NFL’s recent changes to contact and return-to-play rules); Christopher Gasper, *MLB to Ban Home Plate Collisions*, ESPN (Dec. 15, 2013), http://espn.go.com/mlb/hotstove13/story/_/id/10121849/mlb-intends-ban-home-plate-collisions-2015.

118. See Roger Goodell, *Roger Goodell Explains Commitment to Make NFL Safer*, NAT’L FOOTBALL LEAGUE (Oct. 4, 2013), <http://www.nfl.com/news/story/0ap2000000254840/printable/roger-goodell-explains-commitment-to-make-nfl-safer>. See also, Heather McGillivray, *Where is the Awareness: Can Concussed Players Really Assume the Risk in a Concussed State?*, 21 JEFFREY S. MOORAD SPORTS L.J. 529, 567–68 (2014).

obligations are deserving of further study and discussion. If public health is “an inescapably moral enterprise,”¹¹⁹ then ethics must play an important role in public health law development, enactment, implementation, and evaluation. Legal interventions in public health ideally would rest on robust, valid, and replicable evidence of “effectiveness,” evidence that the law will bring about a desired health outcome or prevent an undesired one. This is not always possible or desirable; there are valid reasons to take action before the evidence base is solid, particularly when vulnerable populations are involved (e.g., children). Youth sports-related TBI laws represent a timely case study: public health laws that were enacted to protect children despite an uncertain evidence base as to the nature of the problem and the most effective way to address it.¹²⁰ As evidence from the medical field and from implementation emerge, states have begun to amend their laws in response— even those that had been in effect for less than a year. A law that restricts freedom or creates a perception of enhanced safety or protection and does not “work” is, we argue, an unethical one, because it either unnecessarily restricts autonomy or creates a false perception of safety. Should evidence of ineffectiveness or unintended consequences of the laws rise to the surface, we argue that ethics requires the law be changed to ensure that young athletes truly are protected by the legal intervention. As Carol Petrini argues, “an ethically sound health policy is likely to be a practical, effective health policy.”¹²¹

119. Carlo Petrini, *Ethics-Based Public Health Policy?* 100 AM. J. PUB. HEALTH 197, 197 (2010) (citing WILLIAM DUNN, *VALUES, ETHICS AND THE PRACTICE OF POLICY ANALYSIS* 198 (1976)).

120. See, e.g., Harvey et al., *supra* note 76, at 88.

121. Petrini, *supra* note 119, at 197.