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An Incomplete Pass: Inadequacies in Ohio's Youth Concussion Legislation and the Ongoing Risk for Players

Andrew J. Kane

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**AN INCOMPLETE PASS:
INADEQUACIES IN OHIO’S YOUTH CONCUSSION
LEGISLATION AND THE ONGOING RISK FOR
PLAYERS**

ANDREW J. KANE*

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I. INTRODUCTION

Like many high school students do each spring, in 2011 Zackery Lystedt walked across the stage at the White River Amphitheatre to join his fellow Tahoma High School classmates at their senior class graduation.¹ Unlike his classmates and most others, however, Zackery rose from a wheelchair, was assisted by a cane as he made his way across the stage, and did not receive a high school diploma that day.²

But there was reason to celebrate. Just to be there, Zackery had overcome numerous strokes, seven days on a ventilator, three months in a coma, three additional months of hospital rehabilitation, 13 months of immobility and 20 months on a feeding tube.³ That afternoon, the school presented Zackery with the first-ever Lystedt Adversity Award, which observed the preceding six years he had spent overcoming a near-fatal brain injury sustained at the age of 13 while playing football for his junior high school team.⁴

¹ Sheila Mickool, *The Story Behind the Zachery Lystedt Law*, SEATTLE MAGAZINE (Fall/Winter 2012), available at <http://www.seattlemag.com/article/story-behind-zackery-lystedt-law>.

² *Id.*

³ Ctrs. for Disease Control & Prevention, *The Zackery Lystedt Law: A Concussion Survivor’s Journey*, <http://www.cdc.gov/media/subtopic/matte/pdf/031210-Zack-story.pdf> (last visited Sept. 11, 2014).

⁴ Mickool, *supra* note 1.

The long road to that amphitheater began on October 12, 2006.⁵ Then just 13 years old, Zackery Lystedt took to the football field, bearing his school's colors and a desire to bring back victory.⁶ Even an apparently significant head injury toward the end of the second quarter could not keep him out of the game.⁷ Zackery was sidelined for the remainder of the half, but returned to play at the beginning of the third quarter.⁸ He did not experience any loss of consciousness, and his coach was otherwise unable to detect and react to symptoms of concussion or brain injury.⁹ No second thought was given to Zackery's continued play until the end of the game, when he began to complain of a severe headache.¹⁰ During the customary end-of-game handshake, Zackery Lystedt collapsed, and was life-flighted to an area hospital in the hope that doctors could save his life.¹¹

For decades, current and former players, doctors and brain health experts have attempted to convince the National Football League and others that the short and long-term effects of concussion and other brain injuries were of serious concern and needed to be addressed.¹² In 2013, the league settled a class-action lawsuit brought by more than 4,500 retired players to compensate them for long-term neurological injuries sustained as a result of league play.¹³ While the settlement agreement expressly rejected any admission of liability or weakness by the NFL that the injuries were caused by football,¹⁴ there was much speculation that the quick out-of-court settlement and the high settlement amount (\$765 million) were designed to avoid potentially damaging trial discovery.¹⁵

⁵ Sheila Mickool, *Taking Brain Injuries Out of Sports*, SEATTLE MAGAZINE (Fall/Winter 2012), available at <http://www.seattlemag.com/article/taking-brain-injuries-out-sports>.

⁶ See Richard Adler & Stanley A Herring, *The Zackery Lystedt Law: Preventing Brain Injuries in Children*, PATIENT POWER (May 14, 2009), <http://www.patientpower.info/audio/the-zack-lystedt-law-preventing-brain-injuries-in-children/transcript/1?r=byExpert&oid=9b05c0a0-5559-11df-81ad00262d1ccbec/transcript/1>.

⁷ See Ctrs. for Disease Control & Prevention, *supra* note 3. A video of the game shows Zack lying on the ground with his hands clutching both sides of his helmet. *Id.*

⁸ *Id.*

⁹ Adler & Herring, *supra* note 6.

¹⁰ *Id.*

¹¹ *See id.*

¹² See, e.g., Lauren Ezell, *League of Denial: The NFL's Concussion Crisis*, PBS FRONTLINE (Oct. 8, 2013), <http://www.pbs.org/wgbh/pages/frontline/sports/league-of-denial/timeline-the-nfls-concussion-crisis/>.

¹³ Alt. Dispute Resolution Ctr., Irell & Manella L.L.C., *NFL, Retired Players Resolve Concussion Litigation; Court-Appointed Mediator Hails "Historic" Agreement*, NFL COMMC'NS (AUG. 29, 2013), available at <http://nflabor.files.wordpress.com/2013/08/press-release-2.pdf>.

¹⁴ *Id.*

¹⁵ Lester Munson, *Mediation Could Be the Answer*, ESPN.COM (July 9, 2013), http://espn.go.com/espn/otl/story/_id/9462264/questions-answers-judge-decision-send-nfl-concussion-lawsuit-mediation. While \$765 million may seem like a high settlement amount, that number was quickly rejected by presiding judge Anita B. Brody of the U.S. District Court for the Eastern District of Pennsylvania. In denying preliminary approval of the settlement,

The legal and ethical implications of adult professional athletes participating in dangerous sports in exchange for large paychecks will be left for another day. This paper focuses on the involvement of youth athletes in contact sports, and the risks of neurological injury that participation entails.¹⁶ Many states have enacted legislation in an attempt to prevent stories like Zackery Lystedt's from recurring.¹⁷ These statutes differ slightly, but all resemble the model legislation first enacted in 2009 by Washington State—legislation that bears Lystedt's name.

Broadly, this paper questions whether Ohio's recently enacted youth concussion legislation adequately addresses the public health issue of sport-related brain injury, and contends that it does not. To that end, it first addresses the significance of traumatic brain injuries, including concussions, explaining that the failure to protect youth athletes from these potentially fatal conditions has largely resulted from a lack of awareness of their influence on neurological functions, and of their potential to cause serious brain injury.¹⁸ Next, this paper examines several legislative responses enacted by other states, all of which were in place before Ohio's, and compares the recently enacted Ohio legislation to them.¹⁹ This paper then advances several reasons why the Ohio legislation is ineffective in achieving its stated goals, and the particular ways by which it fails to protect youth athletes from the significant risks associated with traumatic brain injury and concussions.²⁰ Finally, it offers Ohio's legislature suggestions to bring the state's law up to a standard advocated for by brain health experts.²¹

Judge Brody stated: "In various hypothetical scenarios, the Monetary Award Fund may lack the necessary funds to pay Monetary Awards for Qualifying Diagnoses. More specifically, the Settlement contemplates a \$675 million Monetary Award Fund with a 65-year lifespan for a Settlement Class of approximately 20,000 people. Retired NFL Football Players with a Qualifying Diagnosis of Parkinson's Disease, for example, are eligible for a maximum award of \$3.5 million; those with a Qualifying Diagnosis of ALS may receive up to \$5 million. Even if only 10 percent of Retired NFL Football Players eventually receive a Qualifying Diagnosis, it is difficult to see how the Monetary Award Fund would have the funds available over its lifespan to pay all claimants at these significant award levels. *See in re National Football League Players' Concussion Injury Litig.*, No. 2:12-md-02323-AB, 2014 U.S. Dist. LEXIS 91534, at *8, *9 (E.D. Pa. July 7, 2014); *see also* Darren Heitner, *Court Denies Preliminary Approval Of \$760 Million NFL Concussion Settlement*, FORBES.COM (January 14, 2014), <http://www.forbes.com/sites/darrenheitner/2014/01/14/court-denies-preliminary-approval-of-760-million-nfl-concussion-settlement>.

¹⁶ Brian Toporek, *Concussion Laws Aimed at Student Athletes Spread*, EDUCATION WEEK (Aug. 11, 2011), http://www.edweek.org/ew/articles/2011/08/11/37concussion_ep.h30.html.

¹⁷ *Zachary Lystedt Law – House Bill 1824*, WAS. TRAUMATIC BRAIN INJURY P'SHIP ADVISORY COUNCIL, http://www.tbiwashington.org/tbi_wa/bill1824.shtml (last visited August 20 2014).

¹⁸ *See infra*, Part II.

¹⁹ *See infra*, Part III.

²⁰ *See infra*, Part IV.

²¹ *See infra*, Part IV.

II. BACKGROUND OF CONCUSSION AND ITS RELATION TO YOUTH ATHLETICS

A. Pathophysiology of Traumatic Brain Injury (TBI) and Concussion

Traumatic brain injury (TBI) encompasses a wide range of conditions, but may be concisely defined as “an alternation in brain function, or other evidence of brain pathology, caused by an external force.”²² Within that broad category, traumatic brain injuries are graded as mild, moderate, or severe.²³ A mild form of TBI is commonly known as a concussion, which may be defined with more particularity as “a biomechanically induced neurological injury, resulting in an alteration of mental status, such as confusion or amnesia, which may or may not involve a loss of consciousness.”²⁴ This basic definition of concussion is widely agreed upon in the field.²⁵ A concussion may be induced by any external biomechanical force, and may occur even if the individual is wearing protection such as a helmet.²⁶

²² BIAA Adopts New TBI Definition, BRAIN INJ. ASS’N AM. (Feb. 6, 2011), <http://www.biausa.org/announcements/biaa-adopts-new-tbi-definition>

²³ Jamshid Ghajar, *Traumatic Brain Injury*, 356 THE LANCET 923 (2000).

²⁴ Gami Barkhoudarian et al., *The Molecular Pathophysiology of Traumatic Brain Injury*, 30 CLINICS SPORTS MED. 33 (2011).

²⁵ See, e.g., Stefano Signoretti et al., *The Pathophysiology of Concussion*, 3 PM&R at S359 (2011); Paul McCrory et al., *Consensus Statement on Concussion in Sport: The 3rd International Conference on Concussion in Sport Held in Zurich, November 2008*, 44 J. ATHLETIC TRAINING 434 (2009). It is worth noting that while the basic definition of concussion is generally agreed upon, there is not *universal* agreement, especially regarding the more particular nuances of traumatic brain injury. Barry Willer & John J. Leddy, *Management of Concussion and Post-Concussion Syndrome*, 8 CURRENT TREATMENT OPTIONS NEUROLOGY 415, 415 (2006).

There is uncertainty about the definitions of mild traumatic brain injury (mTBI) and concussion. There is further uncertainty about the definition of post-concussion syndrome (PCS) and the cause and treatment of PCS. Although there has been much research on and increased understanding of the pathophysiology of concussion and mTBI, there is need for a model to clarify the diagnosis of each and ultimately a model for treatment.

Id.

The most commonly accepted definition of mTBI is that of the Centers for Disease Control and Prevention (CDC) and the American Congress of Rehabilitation Medicine: loss of consciousness for no more than 30 minutes or amnesia as a result of a mechanical force to the head, and a Glasgow Coma Scale (GCS) score of 13 to 15 [3••, Class III]. The most commonly accepted definition of concussion, developed by the American Academy of Neurology (AAN), is a trauma-induced alteration in mental status that may or may not involve loss of consciousness [4, Class III]. Although not explicitly stated in the AAN definition, there is the assumption that concussion effects are transient, whereas mTBI is considered permanent or semi-permanent. The use of the different terms, mTBI and concussion, to describe the same injury is confusing for clinicians. Instead, clinicians tend to use the term concussion to describe instances in which an individual experiences transient alteration in mental status, especially from a sports-related head injury. mTBI is used to categorize patients with more serious head injury in which there was a (brief) loss of consciousness and a GCS score of 13 or 14 at some point after the injury.

A series of neurochemical and neurometabolic events at the cellular level is triggered by the initial trauma to the brain.²⁷ First, an abrupt, indiscriminate release of neurotransmitters and unchecked ionic fluxes occurs.²⁸ “Excitatory transmitters” such as glutamate, bind to NMDA²⁹ receptors.³⁰ This triggers a cellular event known as an “action potential”, more colloquially known as a neuron firing, which is normally how neurons communicate to one another.³¹ With injury, however, aberrant “action potentials” fire increasingly as a result of injury, which causes aberrant efflux of potassium and influx of calcium.³² In an effort to correct these ionic shifts and reestablish ionic balance, the ATP-dependent³³ sodium-potassium pump works at maximum capacity.³⁴ In order to provide sufficient energy for the sodium-potassium pump to function, metabolism of glucose (glycolysis) is increased to supply the necessary ATP.³⁵ Influxes of calcium accumulate in the mitochondria, resulting in decreased ATP production and an increased need for glycolysis.³⁶ Under normal conditions, glycolysis is tightly coupled to cerebral blood flow, but “in a setting of increased glucose metabolism the insufficient blood supply can create a potentially damaging energy crisis.”³⁷ These cellular changes, among others, cause a

Id.

²⁶ Kimberly G. Harmon et al., *American Medical Society for Sports Medicine Position Statement: Concussion In Sport*, 47 BRIT. J. SPORTS MED. 15, 17 (2013).

²⁷ See Christopher C. Giza & David A. Hovda, *The Neurometabolic Cascade of Concussion*, 36 J. OF ATHLETIC TRAINING 228 (2001).

²⁸ *Id.*; Barkhoudarian et al., *supra* note 24, at 36.

²⁹ See Fei Li & Joe Z. Tsien, *Memory and NMDA Receptors*, 361 NEW ENG. J. MED. 302 (2009). “The N-methyl-D-aspartate (NMDA) receptor (NMDAR) is the predominant molecular device for controlling synaptic plasticity and memory function.” *Id.*

³⁰ Giza & Hovda, *supra* note 27.

³¹ *Id.*

³² *Id.*

³³ ATP, or adenosine triphosphate, is “energy-carrying molecule found in the cells of all living things. ATP captures chemical energy obtained from the breakdown of food molecules and releases it to fuel other cellular processes.” ENCYCLOPEDIA BRITANNICA, available at <http://www.britannica.com/EBchecked/topic/5722/adenosine-triphosphate>.

³⁴ Barkhoudarian et al., *supra* note 24; Giza & Hovda, *supra* note 27.

³⁵ See Giza & Hovda, *supra* note 27.

³⁶ *Id.*; See also Signoretti et al., *supra* note 25, at S-361 (“The uncoupling between oxygen and glucose consumption and the yet unfulfilled energy requirement explain the paradoxical temporary increase in neuronal glucose consumption, notwithstanding a period of general metabolic depression.”). Mitochondria, the cellular machinery that is responsible for producing ATP, attempts to compensate for increased energy consumption. However, this causes a dysregulation in calcium levels, resulting in calcium accumulation, which causes decreased ATP production. *Id.*

³⁷ Giza & Hovda, *supra* note 27. For a discussion of how this energy crisis can lead to “compromised synaptic plasticity (or, compromised function of the synapses)” and the subsequent cognitive defects, see Aiguo Wu et al., *Vitamin E Protects Against Oxidative*

state in the neuron commonly known as “excitotoxicity,” or where over-excitation of the neuron proves toxic for it.³⁸ This combination of cellular ionic disturbances, altered cerebral blood flow, and glucose metabolic dysfunction has been hypothesized to set the stage for more severe brain injury after a repeated concussion, described clinically as the second impact syndrome.³⁹

Another acute effect induced by concussion or other severe blunt head injury is diffuse axonal injury.⁴⁰ The traumatic impact of concussion results in traumatic axonal injury, which involves the mechanical stretching of axonal cell membranes, causing ionic flux, calcium influx and mitochondrial swelling, which is hypothesized to contribute to altered energetics, or use and production of energy, within the cell.⁴¹ These pathophysiologic processes have been shown to interfere with axonal transport, resulting in axonal “blebbing”⁴² and eventual disconnection.⁴³ This axonal damage was found to progress through various cortical and subcortical structures for four to six weeks, indicating signs of spatial learning and memory deficits in animal models of TBI during that time.⁴⁴ However, in the acute phase, axonal injury results

Damage and Learning Disability After Mild Traumatic Brain Injury in Rats, 24 NEUROREHABIL. REPAIR 290 (2010).

³⁸ See Wu et al., *supra* note 37.

³⁹ Tareq Bey & Brian Ostick, *Second-Impact Syndrome*, 10 W. J. EMERGENCY MED. 6 (2009).

Second Impact Syndrome (SIS) consists of two events. Typically, it involves an athlete suffering post-concussive symptoms following a head injury. If, within several weeks, the athlete returns to play and sustains a second head injury, diffuse cerebral swelling, brain herniation, and death can occur. SIS can occur with any two events involving head trauma.

Id.

See also Daniel W. Shrey et al., *Physical Medicine and Rehabilitation Clinics of North America 2011 The Pathophysiology of Concussions in Youth*, 22 PHYSICAL MED. & REHABILITATION CLINICS N. AM. 577 (2011) (“The pathophysiology of second impact syndrome is thought to result from the combined effects of increased intracranial blood volume (secondary to loss of cerebral blood flow autoregulation) and post-traumatic catecholamine release, leading to catastrophic cerebral edema, generally in the absence of major hematomas or other space-occupying lesions.”).

⁴⁰ Barkhoudarian et al., *supra* note 24, at 37; see also Willer & Leddy, *supra* note 25, at 417 (“In more severe brain injury, diffuse axonal injury is visible on MRI because of eventual cell death. With concussion the effects are less obvious. Diffuse axonal injury is considered instrumental in causing cognitive sequelae such as memory difficulties and problems with concentration.”).

⁴¹ Barkhoudarian et al., *supra* note 24, at 37.

⁴² “Blebs are protrusions of the cell membrane. They are the result of actomyosin contractions of the cortex, which cause either transient detachment of the cell membrane from the actin cortex or a rupture in the actin cortex,” and are commonly indicative of cellular damage and potentially cell death. G.T. Charras, *A Short History of Blebbing*, 231 J. MICROSCOPY 466, 466 (2008).

⁴³ Barkhoudarian et al., *supra* note 24, at 38.

⁴⁴ *Id.*

in axolemmal⁴⁵ permeability, and can lead to additional influx of calcium and mitochondrial swelling.⁴⁶

Increases in calcium following traumatic brain injury do not necessarily lead to cell death; elevated intracellular calcium “may lead to impaired mitochondrial metabolism, but neurons may still survive.”⁴⁷ Clinical signs and symptoms of impaired coordination, attention, memory, and cognition are manifestations of underlying neuronal dysfunction;⁴⁸ however, it is difficult to match clinical signs with specific underlying physiologic derangements.⁴⁹ In the setting of a single mild traumatic brain injury or concussion, these changes are generally self-limited and transient, although there is evidence that repeat injuries may result in a more lasting pathobiologic condition.⁵⁰

Repeated injury within a particular time frame (second impact) can lead to a much larger anatomical or behavioral impairment than two isolated injuries.⁵¹ During the hyperglycolytic phase of concussion recovery, the brain is especially vulnerable to subsequent injury.⁵² Cerebral metabolism is already at its limit, and any further demand in energy (due to increased ionic flux) or reduction in energy (due to impaired blood flow or reduced ATP synthesis) may tip the scale in favor of

The forces that produce a concussion combined with the stretching of axons result in what has been called a cascade of neurochemical changes. In animal studies, this cascade occurs over a period of hours rather than minutes and thus explains why some signs and symptoms of concussion may be delayed.

Willer & Leddy, *supra* note 25, at 417.

⁴⁵ Refers to the plasma cell membrane surrounding an axon. *See, e.g.*, M.O. Fitzpatrick et al., *The Role of the Axolemma in the Initiation of Traumatically Induced Axonal Injury*, 64 J. NEUROLOGY NEUROSURGERY & PSYCHIATRY 285 (1998).

⁴⁶ Giza & Hovda, *supra* note 27.

⁴⁷ B. Tavazzi et al., *Cerebral Oxidative Stress and Depression of Energy Metabolism Correlate with Severity of Diffuse Brain Injury in Rats*, 56 NEUROSURGERY 582 (2005). In a setting of “mild” TBI, as distinguished from more severe brain injury, the biomechanical dysfunctions are typically fully reversible. *Id.*; Indeed, excitotoxicity has been demonstrated to exhibit effects in neuron functionality *without* cell death. *Id.*

⁴⁸ Giza & Hovda, *supra* note 27.

⁴⁹ *Id.*; *see also* Lovell Mark et al., *Return to Play Following Sports-Related Concussion*, 23 CLINICS SPORTS MED. 421 (2004).

Given that concussion is a metabolic rather than structural injury, traditional neurodiagnostic techniques (eg, CT, MRI, neurologic exam) are almost invariably normal following concussive insult [7]. It should be stressed, however, that these techniques are invaluable in ruling out more serious pathology (eg, cerebral bleed, skull fracture) that may also occur with head trauma.

Id. at 422.

⁵⁰ Barkhoudarian et al., *supra* note 24, at 33.

⁵¹ Giza & Hovda, *supra* note 27.

⁵² *See* D.A. Hovda et al., *Concussive Brain Injury Produces a State of Vulnerability for Intracranial Pressure Perturbation in the Absence of Morphological Damage*, in INTRACRANIAL PRESSURE VIII 469, 469 (C.J.J. Avezaat et al., eds., 1993).

irreversible neuronal injury.⁵³ Once again, injured cells may be able to recover after an initial injury, but a second concussion during this energy crisis can lead to cell death.⁵⁴ This compound traumatic brain injury can lead to second impact syndrome,⁵⁵ resulting in major neurological deficits, coma, or death.⁵⁶

Research on concussive injury typically divides the injury to the brain between primary and secondary mechanisms.⁵⁷ Like excitotoxicity, another significant secondary injury mechanism that takes place in the minutes to days following a concussive injury to the brain is neuroinflammation.⁵⁸ Neuroinflammation contributes to “ongoing neurodegeneration and neurological impairments associated with TBI.”⁵⁹ Concisely, neuroinflammation contributes to neurological degeneration by exacerbating excitotoxicity (resulting in increased cell death),⁶⁰ preventing the functional connections required for axonal growth and repair, and increasing overall neurotoxicity through the release of pro-inflammatory cytotoxic substances.⁶¹ Secondary injury mechanisms are considered “so complex and intertwined ... that the concept of a single magic bullet strategy for neuroprotection is no longer accepted.”⁶²

⁵³ *Id.* In a concussed state of vulnerability, even a non-lethal impact in close temporal proximity can lead to permanent damage and cell death. *See also* Giza & Hovda, *supra* note 27.

⁵⁴ Signoretti et al., *supra* note 25.

⁵⁵ As an illustration, “second impact syndrome” (SIS) involves a patient who, while still having symptoms from a previous head injury, experienced a second injury that led to “sustained intracranial hypertension and catastrophic outcomes.” RL Saunders, *The Second Impact in Catastrophic Contact-Sports Head Trauma*, 252 J. AM. MED. ASS’N 538 (1984). This entity, also known as the second impact syndrome, is the occurrence of catastrophic cerebral edema after mTBI/concussion. A Bowen, *Second Impact Syndrome: A Rare, Catastrophic Preventable Complication of Concussion in Youth Athletes*, 23 J. EMERGENCY NURSING 287 (2003).

⁵⁶ Barkhoudarian et al., *supra* note 24. It is generally understood that Zackery Lystedt sustained a catastrophic brain injury attendant to second impact syndrome, which resulted from continued receipt of contact hits to the head after sustaining a concussion earlier in the game. *See e.g.*, Ctrs. for Disease Control & Prevention, *supra* note 3.

⁵⁷ David J. Loane & Alan I. Faden, *Neuroprotection for Traumatic Brain Injury: Translational Challenges and Emerging Therapeutic Strategies*, 31 TRENDS PHARMACOLOGICAL SCI. 596, 596 (2010).

⁵⁸ Alok Kumar & David J. Loane, *Neuroinflammation After Traumatic Brain Injury: Opportunities for Therapeutic Intervention*, 26 BRAIN BEHAVIOR & IMMUNITY 1191 (2012).

⁵⁹ *Id.* “Post-traumatic neuroinflammation is characterized by glial cell activation, leukocyte recruitment, and upregulation of inflammatory mediators.” *Id.*

⁶⁰ Arne Schousboe & Helle S., *Role of Astrocytes in Glutamate Homeostasis: Implications for Excitotoxicity*, 8 NEUROTOXICITY RES. 221, 221 (2005).

⁶¹ W.B. Cafferty et al., *Functional Axonal Regeneration Through Astrocytic Scar Genetically Modified to Digest Chondroitin Sulfate Proteoglycans*, 27 J. NEUROSCI. 2176 (2007).

⁶² Kumar & Loane, *supra* note 58.

As each of these physiologic conditions underlying concussion recovery has its own time frame, and each head injury can be very different from the next, it is difficult to definitively state the true duration of vulnerability to a second injury.⁶³ Persistent depression of glucose uptake, often thought of as fairly indicative of ongoing concussion recovery, has been observed in humans two to four weeks following the initial injury.⁶⁴

Aside from the acute effects of concussion and the risk of second impact syndrome, isolated concussive events (and even sub-concussive injury) may have long-term effects on the brain as well.⁶⁵ This typically occurs when an individual has sustained patterns of repeated concussions over time, such as in long-term athletic play.⁶⁶ This pattern of repeated brain injury has been associated with cumulative degenerative effects on cerebral function and cognition, including early onset of memory disturbances and even dementia.⁶⁷ In long-term studies of professional football players, increased incidence of behavioral impairments such as depression was found in addition to cognitive defects.⁶⁸ Generally speaking, long-term cognitive

⁶³ Rob Vagnozzi et al., *Temporal Window of Metabolic Brain Vulnerability to Concussion: A Pilot 1H-magnetic Resonance Spectroscopic Study in Concussed Athletes—Part III*, 62 NEUROSURGERY 1286, 1291 (2008); see also Roberto Vagnozzi et al., *Assessment of Metabolic Brain Damage and Recovery Following Mild Traumatic Brain Injury: A Multicentre, Proton Magnetic Resonance Spectroscopic Study in Concussed Patients*, 133 BRAIN 3232, 3233 (2010).

⁶⁴ Giza & Hovda, *supra* note 27. This is thought to be a result of dysregulated glucose metabolism resulting from injury, which cannot be compensated for and is only corrected over time. *Id.*

⁶⁵ Hovda et al., *supra* note 52.

⁶⁶ See, e.g., Sonia M. Gysland et al., *The Relationship Between Subconcussive Impacts and Concussion History on Clinical Measures of Neurologic Function in Collegiate Football Players*, 40 ANNALS OF BIOMED. ENGINEERING 14, 19 (2011). Studies show that measurable changes in ordinary brain function are not typically seen after a single season of routine subconcussive injury. *Id.* “While our findings over the course of a single season do not support the notion that football exposure may contribute to depression, early onset dementia and CTE, the methodologies presented could help to establish a foundation for a more longitudinal study aimed at answering these questions.” *Id.*

⁶⁷ Kevin M. Guskiewicz et al., *Association Between Concurrent Concussion and Late-Life Cognitive Impairment in Retired Professional Football Players*, 57 NEUROSURG. 719 (2005). One study concluded that:

... a history of concussion, particularly recurrent concussion, may be a risk factor for the expression of late-life memory impairment, MCI [mild cognitive impairment], and AD [Alzheimer’s Disease] ... retired professional football players were found to have a progressive decline in mental health functioning and a higher rate of memory problems and cognitive decline associated with a history of concussion. Retired players with a history of three or more concussions were at highest risk of being diagnosed by a physician as having MCI and of having significant memory problems based on their own account and the observations of their spouse or caregiver.

Id. at 722.

⁶⁸ *Id.* at 719. See also T. Holsinger et al., *Head Injury in Early Childhood and the Lifetime Risk of Depression*, 59 ARCHIVES GENERAL PSYCHIATRY 17 (2002).

and behavioral defects were associated with players who had sustained three or more cumulative concussions.⁶⁹

While these physiological defects are quite serious in the setting of a fully developed adult brain, more relevant and important here are the ways in which traumatic brain injury affects developing brains differently.

B. How Traumatic Brain Injury Affects Youth Differently

“In children aged 15 years or younger, the estimated incidence rate of traumatic brain injury is 180 per 100,000 children per year, of which 85% are categorized as mild injuries (concussions).”⁷⁰ Annually, this results in 1 million children sustaining a concussion, and accounts for 10% of youth visits to emergency rooms.⁷¹ The most common mechanism of concussion is sport-related, and accounts for 30% of all concussions in individuals between five and nineteen years of age.⁷² Given the significant risks associated with traumatic brain injury and the structural and neuropsychological differences between an immature brain and the adult brain, understanding the effects of these injuries on the immature brain is a paramount concern.

The developing brain differs from the adult brain in such factors as water content, degree of myelination (the level of axonal insulation in the central nervous system), blood volume, blood-brain barrier, cerebral metabolic rate of glucose, blood flow, numbers of synapses (which correlate readily with overall neural function), and geometry and elasticity of the skull’s sutures.⁷³ Any one of these could be a factor in modifying the threshold of injury to the child’s head.⁷⁴ Finally, due to more limited

⁶⁹ Barkhoudarian et al., *supra* note 24, at 42. “Retired professional football players with three or more concussions were twice as likely to be diagnosed with MCI as those with one or two previous concussions, and five times more likely than those with no previous concussions.” Guskiewicz et al., *supra* note 67, at 723.

⁷⁰ P McCrory et al., *Can We Manage Sport Related Concussion in Children the Same as in Adults?*, 38 BRIT. J. SPORTS MED. 516, 516 (2004). These numbers vary depending on the source. For example, the CDC reports that in 2010, the rate of TBI-related hospital visit was anywhere between 900 and 1000 per 100,000. *Rates of TBI-related Emergency Department Visits by Age Group—United States, 2001–2010*, CDC, available at http://www.cdc.gov/traumaticbraininjury/data/rates_ed_byage.html (last updated Feb. 24, 2014).

⁷¹ McCrory et al., *supra* note 70, at 516.

⁷² Kevin M. Guskiewicz et al., *Pediatric Sports Related Concussion*, 3 PHYS. MED. & REHAB. 353 (2011).

⁷³ *Id.*

⁷⁴ M.L. Prins et al., *Repeat Traumatic Brain Injury in the Juvenile Rat is Associated with Increased Axonal Injury and Cognitive Impairments*. 32 DEV. NEUROSCI. 510 (2010). One well known study of juvenile rats found that not only did single experimental head injuries cause cognitive defects in the rats, but a second head injury conducted to the rat one day later cause increased memory impairment as well as other neuropathological changes due to axonal injury. *Id.*

compensatory abilities as well as certain biological factors, the young brain recovers much more slowly and irregularly than an adult brain.⁷⁵

The most common cognitive symptoms of concussion, including memory loss, confusion and headache, present in children in the same manner as adults.⁷⁶ Several rare but significant clinical differences, however, occur predominantly in children and teenagers who have sustained a concussion.⁷⁷ For instance, a single concussive impact on a young brain may cause cerebral swelling, which can lead to brainstem herniation and death.⁷⁸ Indeed, a single impact of any severity may result in this rare and fatal complication.⁷⁹

Probably more important than the physiological differences between adult and young brains are the neuropsychological differences. Because the brain is cognitively maturing during adolescence, the brain may be more vulnerable to the impact of head injury due to the disturbances of neuronal maturation caused by the trauma.⁸⁰ Secondly, the cognitive development of the young brain makes the proposition of determining an individual's baseline neurocognitive functionality more difficult,⁸¹ which can impair a physician's ability to evaluate a patient as being symptomatic or asymptomatic.⁸²

⁷⁵ Shrey et al., *supra* note 39 (“The young brain may be biologically more vulnerable to repeat mild TBI, through impairments in neural activation/plasticity and increased sensitivity of developing axons to biomechanical forces.”).

⁷⁶ See Cara Camiolo Reddy et al., *Adolescent Sports Concussion*, 19 *PHYSICAL MED. REHABILITATION CLINICS N. AM.* 247 (2008).

⁷⁷ McCrory et al., *supra* note 70. It has been suggested that the young brain's inability to autoregulate its blood supply in a post-concussive setting may be the cause of more significant injuries related to second impact syndrome. See Melvin Field et al., *Does Age Play a Role in Recovery From Sports Related Concussion? A Comparison of High School and Collegiate Athletes*, 142 *J. PEDIATRICS* 546 (2003).

⁷⁸ McCrory et al., *supra* note 70, at 516.

⁷⁹ News stories reflect this rare, but very real tragedy. See, e.g., *High School Football Player Dies from Brain Injury Sustained in Fourth Quarter of Game*, ASSOCIATED PRESS (Nov. 12, 2013), <http://www.dailymail.co.uk/news/article-2504194/High-school-football-player-Charles-Youvella-dies-brain-injury.html>.

⁸⁰ Michael W. Kirkwood et al., *Pediatric Sport-Related Concussion: A Review of the Clinical Management of an Oft-Neglected Population*, 117 *PEDIATRICS* 1359 (2006).

⁸¹ William B. Barr & Michael McCrea, *Sensitivity and Specificity of Standardized Neurocognitive Testing Immediately Following Sports Concussion*, 7 *J. INT'L PSYCHOL. SOC'Y* 693 (2001).

Objective, quantitative measurement of neurocognitive functioning is considered perhaps the defining skill that sets the neuropsychologist apart from other clinicians and researchers in the neurosciences. In clinical settings, neuropsychological testing is now widely recognized as a sensitive and sophisticated means of detecting and characterizing neurocognitive impairment resulting from central nervous system trauma or disease.

Id. at 693.

⁸² McCrory et al., *supra* note 70. A proper authorization for a concussed athlete to return to play requires a determination that the individual is completely asymptomatic. *Id.* Because latent brain damage may exist in spite of a conclusion of outward clinical symptoms,

For this reason, experts have recommended baseline neurocognitive testing for adolescent athletes prior to the beginning of each season. This recommendation acknowledges the difficulty of evaluating recovery from concussive injury by considering self-reported or outwardly identifiable clinical symptoms alone, as well as the critical importance of preventing re-entry until the athlete is fully healed.⁸³

After sustaining a sport-related concussion, an athlete has greater exposure to subsequent concussive injury.⁸⁴ As a practical matter, youth face the most significant risk of conditions associated with cumulative concussions due to the extended window of time between the first concussion sustained and the end of their playing careers.⁸⁵ The total number of years during which an athlete is active in contact sports becomes important with respect to head injury and overall brain health when considering statistics like one reported by the Sports Legacy Institute: football players receive an average of 1,000 hits to the head per season.⁸⁶

Studying the effects of pediatric concussions reveals diminished cognitive functionality for high school athletes who had played contact sports for several years.⁸⁷ In addition, high school athletes who reported a history of two or more concussions, but were otherwise healthy, demonstrated similar neurocognitive scores as those who sustained a *recent* concussion.⁸⁸ Decreased attention and mental speed were likewise observed in students reporting a history of two or more concussions.⁸⁹

comparing a post-concussion neurological scan with a pre-season baseline scan is increasing understood to be an essential element of concussion management. *Id.*; *See also infra* Part IV.A.

⁸³ Margot Putukian, *Neuropsychological Testing as it Relates to Recovery From Sports-Related Concussion*, 3 PM&R S425 (2011). “The domains of cognitive function that demonstrate deficits by [neuropsychological] testing after concussive injury include memory and learning, reduced attention and the ability to process information, slowed reaction times and increased variability in response, and reduced planning, diminished problem solving, and decreased ability to switch a mental set.” *Id.* at S426.

⁸⁴ McCrory et al., *supra* note 70, at 516.

⁸⁵ Shrey et al., *supra* note 39, at 14. Two inherent factors in youth athletics are:

[T]he population of young children exposed to contact sports is relatively unselected genetically, and thus, genetic risk factors for worsened acute symptomatology have not yet been weaned out, as they may be in more elite collegiate or professional adult athletic populations . . . [and that] the risk of cumulative damage may be mathematically linked to duration of exposure, which is logically greater when exposure to concussions begins at a younger age.

Id.

⁸⁶ *See, e.g.* Robert Cantu & Chris Nowinski, *Sports Legacy Institute “Hit Count” White Paper*, SPORTS LEGACY INST. (Feb. 3, 2012), *available at* <http://www.sportslegacy.org/wp-content/uploads/2012/07/Hit-Count-White-Paper-072512.pdf>.

⁸⁷ Field et al., *supra* note 77.

⁸⁸ McCrory et al., *supra* note 70. This evidence suggests that the permanent, long-term effects of cumulative concussions may resemble the acute effects of single concussions. *Id.*

⁸⁹ Rosemarie Scolaro Moser, *Enduring Effects of Concussion in Youth Athletes*, 17 ARCHIVES CLINICAL NEUROPSYCHOL. 91, 98 (2002).

And further, athletes between eight and sixteen years old were found to have defects in processing complex visual stimuli nearly three months after the initial injury.⁹⁰

Despite numerous studies presenting evidence of lasting effects on youth who have sustained concussions, the question of whether traumatic brain injury really affects the developing brain differently than adult brains remains definitively unanswered by the medical community.⁹¹ One proposition for which there is widespread agreement, however, is that concussion management in youth requires a substantially more conservative approach than management in adults.⁹²

C. Benefits of Participation in Youth Athletics

No discussion of the risks faced by youth who participate in contact sports could be fairly advanced without also enumerating the many benefits of that participation. Organized sports present a multitude of benefits to young people, including moral, educational, social, physical and economic benefits.⁹³

The physical benefits of youth sports are numerous, which is especially important given the high proportion of sedentary and obese individuals in the United States.⁹⁴ Many youth participate at the grade school level in interscholastic leagues, and most recognizably at the high school level. Expected health benefits are the greatest during adolescent life, which enhances the importance of athletic participation at a young age.⁹⁵

From the earliest stages, participation in organized football yields many benefits to participants. The American Journal of Bioethics asserts that football is an intellectually demanding sport, which requires considerable memorization and

⁹⁰ Michael W. Collins et al., *Cumulative Effects of Concussion in High School Athletes*, 51 NEUROSURGERY 1175, 1178 (2002).

⁹¹ Mark E. Halsted, Kevin D. Walter and The Council on Sports Medicine and Fitness, *Sport Related Concussion in Children and Adolescents*, 126 PEDIATRICS 597 (2010). Treating young athletes with a concussion is uniquely challenging because their brains are still developing. *Id.* at 603. Lack of published data on the preadolescent athlete hinders evidence-based decision making in this age group. *Id.*

⁹² See, e.g., Field et al., *supra* note 77; Mark R. Lovell et al., *Recovery from Mild Concussion in High School Athletes*, 98 J. NEUROSURGERY 295 (2003); Michael P. McClincy et al., *Recovery from Sports Concussion in High School and Collegiate Athletes*, 27 BRAIN INJ. 33 (2006).

⁹³ Fredric Gilbert & L. Syd Johnson, *The Impact of American Tackle Football-Related Concussion in Youth Athletes*, 2 AJOB NEUROSCIENCE 48, 50 (2011).

⁹⁴ Nancy L. Weaver, *Preventing Sports Injuries: Opportunities for Intervention in Youth Athletics*, 46 PATIENT EDUC. & COUNS. 199, 199 (2002).

⁹⁵ *Id.* With respect to football, one of the earliest organized associations was the Junior Football Conference, later known as the Pop Warner League. *The History of Professional Football*, USA FOOTBALL, INC., <http://web.archive.org/web/20070818020621/http://www.usafootball.com/about-us/history-of-the-sport/amateur/index.php> (last visited Sept. 13, 2014). Originally designed to keep idle youth out of trouble in Philadelphia, the Pop Warner league has become the largest youth football program in the United States, with 360,000 participants in 41 states. *Id.*

cognitive performance under stress.⁹⁶ In addition, it teaches decision-making, “harmonious dynamism,”⁹⁷ and social values such as cooperation and fairness.

Athletics in general can increase self-esteem and serve such practical functions as improving grades and reducing dropout rates.⁹⁸ Finally, there are some available financial benefits to participation in youth athletics.⁹⁹ Many student athletes receive scholarship money for their performances in different sports, with football being a notable example.¹⁰⁰ In some cases, the individual would not be able to afford attendance at a particular high school (or in the case of college, at all), but for the athletic scholarship.¹⁰¹

Furthermore, youth sports have numerous benefits for the institutions that sponsor teams. Youth sports are “popular as a spectator sport at the college and professional levels, and [are] a locus of community cohesion and tradition at all levels.”¹⁰² Sports have many financial benefits for institutions, such as schools, as well. Sports cannot only raise revenue, but can serve as a major engine for advertising for the school, which can “increase its literal capital as well as social capital.”¹⁰³

Efforts to regulate youth athletics, even in the very important interest of enhancing player safety, should bear in mind the outstanding benefits youth derive from participation. Those who seek to implement rule changes or an increased regulatory framework need to ask whether the intended benefits outweigh any burdens imposed on the game.

⁹⁶ Gilbert & Johnson, *supra* note 93, at 50.

⁹⁷ *Id.* Harmonious dynamism involves the ability of an individual to interact in complex ways with a wide variety of individuals. *Id.*

⁹⁸ J.L. Mahoney, *School Extracurricular Activity Participation as a Moderator in the Development of Antisocial Patterns*, 71 *CHILD DEV.* 502, 512 (2000). In 2011, 12% of American children dropped out of school before receiving a high school diploma. *Educational Attainment, Income, and the Cost of Dropping Out*, NATIONAL DROPOUT PREVENTION CENTER, <http://www.dropoutprevention.org/statistics> (last visited Sept. 1, 2014).

⁹⁹ Gilbert & Johnson, *supra* note 93, at 51.

¹⁰⁰ *Id.* “Divisions I and II schools provide more than \$2 billion in athletics scholarships annually to more than 126,000 student-athletes.” *How Do Athletic Scholarships Work?*, NCAA, <http://www.ncaa.org/about/resources/media-center/how-do-athletics-scholarships-work> (last visited Aug. 31, 2014).

¹⁰¹ Gilbert & Johnson, *supra* note 93, at 51.

¹⁰² *Id.*

¹⁰³ *Id.* at 50. As a caveat, some suggest that accompanying these significant financial incentives are the potential conflicts of interest which may arise, and may implicate the exploitation of youth athletes who stand to benefit much less from the hard work, and who assume much more risk. *Id.*

D. Challenges Facing the Legislature: Unsuccessful Attempts to Make the Game Safer

Determining the actual number of sport-related concussions is difficult, due to the widespread underreporting of these injuries.¹⁰⁴ The Centers for Disease Control estimates that each year, Americans sustain between 1.6 and 3.8 million concussions, including 300,000 head injuries in high school athletics alone, of which 90% are concussions.¹⁰⁵ Because of the commonplace nature and the seriousness of the injury, a multi-faceted approach to reducing the incidences of youth concussion is warranted, one that employs tactics other than legislation to make the game safer.¹⁰⁶

1. Safety Equipment Alone Does Not Create a Meaningfully Safer Environment for Contact Sports

Equipment changes have been proposed as one method of preventing concussions.¹⁰⁷ Helmets and other headgear are the first line of defense against concussion and other traumatic brain injury. Helmets reduce the acceleration of the head upon impact, which limits the collision of the brain with the wall of the skull, as well as decreasing the likelihood of axonal injury associated with sudden deceleration.¹⁰⁸ Material inside the helmet compresses upon impact to absorb force, and slowly restores itself to its original shape.¹⁰⁹ In effect, this compression and restoration stretches out the duration of the impact (to avoid axonal injury due to sudden deceleration), and absorbs force to reduce momentum transferred to the head.¹¹⁰

¹⁰⁴ Aaron M. Karlin, *Concussion in the Pediatric and Adolescent Population: "Different Population, Different Concerns,"* 3 *PHYSICAL MED. & REHABILITATION* S369, S370 (2011);

The actual incidence of concussion in the pediatric population is likely to be underestimated and under-reported because of factors such as a lack of initial recognition by the athlete, coaches, trainers, or other medical personnel; a lack of follow-up in a medical setting; and the failure to report symptoms because of a fear of loss of playing time or the youth athlete's desire to try to "push through" concussion symptoms.

Id.

¹⁰⁵ *Id.* "In the years 2001-2005, an estimated 502,000 patients aged 8—19 years were diagnosed with a concussion in U.S. emergency departments (EDs), with half being sports related." *Id.*

¹⁰⁶ Daniel H. Daneshvar et al., *Helmets and Mouth Guards: The Role of Personal Equipment in Preventing Sport-Related Concussions,* 30 *CLINICS SPORTS MED.* 145, 147 (2011).

¹⁰⁷ Some commentators argue, however, that protective equipment has a deleterious effect on the game because it inspires a false sense of security and risky behavior. *See, e.g.,* C.F. Finch, *What Do Under 15 Year Old Schoolboy Rugby Union Players Think About Protective Headgear?* 35 *BRIT. J. SPORTS MED.* 2001 89, 91 (2001); B. Hagel, *Risk Compensation: A 'Side Effect' of Sport Injury Prevention?* 14 *CLINICAL J. SPORT MED.* 193 (2004).

¹⁰⁸ Daneshvar et al., *supra* note 106, at 146.

¹⁰⁹ *Id.*

¹¹⁰ *Id.*

Citing consistently evolving safety equipment, some idealistic commentators note that every athlete should be provided with the best equipment possible.¹¹¹ Others, however, point to a large percentage of youth athletes using outdated and ineffective equipment and argue that a baseline standard for equipment should be established.¹¹² In any event, while helmets and headgear are universally recommended for the purposes of reducing the seriousness of head injuries generally, consensus exists that the mere *reduction* of biomechanical forces to the brain implicated by effective use of helmets does not result in a meaningful reduction in the likelihood or seriousness of concussion.¹¹³ Simply put, there is no clinical evidence that protective equipment will prevent concussion.¹¹⁴

2. Education Programs Alone Do Not Create a Meaningfully Safer Environment for Contact Sports

Another strategy for reducing the incidence of concussion is widespread education regarding the seriousness of the condition, the risks associated with single-incident and repeat concussions, and the signs and symptoms which may suggest a concussion has been sustained.¹¹⁵ A positive feedback loop has been observed between concussion awareness and the reported incidents of concussion, and experts point to increased awareness resulting from concussion educational programs as the underlying cause of a growing number of reports.¹¹⁶ Accordingly, the increased rate of concussion in the last decade does not reflect an *actual* increase in the number of concussions sustained by athletes, but rather an increase in the number of reported events due to a growing awareness of the seriousness and severity of the injury. Enhancing education will result in the very least in increased reporting and treatment of concussion, and at most a reduction in the actual number of concussions sustained. Reporting of concussions is considered essential to the treatment process due to the sensitive recovery period that must be observed before an athlete returns to play.¹¹⁷

Educating all parties involved in youth sports is imperative in meeting this goal. These parties include athletes, parents, coaches, trainers, therapists, referees, organizations, leagues, healthcare professionals, and the media. In addition to private health and wellness organizations, the Centers for Disease Control (CDC) has played a major role in the widespread dissemination of precautionary and preventative information.¹¹⁸ While educational programs are a recent development, studies

¹¹¹ Charles H. Tator, *Sports Concussion Education and Prevention*, 6 J. CLINICAL SPORT PSYCHOL. 293, 300 (2012).

¹¹² Daneshvar et al., *supra* note 106, at 146.

¹¹³ *Id.*

¹¹⁴ *Id.* at 153.

¹¹⁵ Tator, *supra* note 111, at 300.

¹¹⁶ Lynn Zinser, *Report Shows an Increase in Concussion Awareness*, N.Y. TIMES (Oct. 6, 2011), http://www.nytimes.com/2011/10/07/sports/report-shows-rise-in-er-visits-for-concussions-among-young.html?_r=0.

¹¹⁷ McCrory et al., *supra* note 70, at 518.

¹¹⁸ Zinser, *supra* note 116.

indicate that education is already causing a reduction in the rates of concussion, and improved outcomes for concussions sustained.¹¹⁹ Further, “fair play” ethics are taught to athletes as part of these education agendas. These programs emphasize methods of gameplay, especially involving the contact elements, which reduce the risk of serious head injury. One example particular to football is to teach players how to avoid impact with an opposing player’s helmet, to reduce the risk of inducing a concussion.¹²⁰

An educational agenda is almost universally required by the many state statutes addressing youth concussion. Among these statutes’ typical provisions, the educational components have been among the most successful.¹²¹ Nevertheless, no amount of education, no matter how thorough or effective, can possibly prevent concussions or completely eliminate their risks from the game.

Some studies and commentators have noted the futility of youth concussion education due to the culture and attitudes of the youth athletes themselves. While the incidence of under reporting of personal injuries has been explored in various academic studies, it was strikingly demonstrated by a 2010 survey conducted by ESPN in which 54.1% of players surveyed said they would play in spite of a concussion, especially if the individual were a star player, and especially if it were an important game.¹²² Another question asked whether a chance at playing in the NFL was worth a significant chance of permanent brain damage.¹²³ Almost 45% of respondents answered in the affirmative—that they were willing to subject themselves to a high risk of significant neurological injury in exchange for what amounts to exceedingly unrealistic opportunity to play professional football.¹²⁴ This risky behavior on the part of young athletes cannot be blamed on a lack of awareness of the severity of concussion; as discussed, the educational components of various states’ youth concussion legislation have been among the most effective.¹²⁵

¹¹⁹ Tator, *supra* note 111, at 300.

¹²⁰ *Id.*

¹²¹ See e.g., C. Shenouda et al., *The Effects of Concussion Legislation One Year Later—What Have We Learned: A Descriptive Pilot Survey of Youth Soccer Player Associates*, 4 *PHYSICAL MED. & REHABILITATION* 427, (2012).

¹²² Hans Gissing, *Concussion Confidential*, *ESPN THE MAGAZINE* (Dec. 19, 2010), <http://sports.espn.go.com/espn/news/story?id=5925876>.

¹²³ *Id.*

¹²⁴ *Id.* Some sources evaluate the possibility of a high school football player making the NFL at 0.08%. *Your Child’s Future in Youth Sports: The Real Odds*, IMOM, <http://www.imom.com/parenting/tikes/learning/extra-curricular/your-child%E2%80%99s-future-in-sports-the-real-odds/> (last visited Jan. 22, 2013). Another source puts the possibility even lower: 0.01%. *Youth Sports Statistics*, STATISTIC BRAIN, <http://www.statisticbrain.com/youth-sports-statistics/> (last updated Sept. 9, 2013). It is widely agreed that the chances of high school football players making it into the NFL are quite slim. *Id.*

¹²⁵ Shenouda et al., *supra* note 121. A study undertaken by researchers at the University of Washington, in an effort to study the effectiveness of Washington’s Lystedt Law one year after its implementation, found that 96% of respondents understood the nature and seriousness

Rather, the culture of the game and the competitiveness of athletes both young and old fuel many of these risky decisions. As an illustration: athletes in the NFL are required to take baseline neurocognitive tests, against which tests administered after a suspected concussion will be compared. It is reported that athletes purposely perform poorly on these tests so that they have a better chance of being cleared to play *even in the event of an actual concussion*.¹²⁶ Whether directly inspired by the professionals or inherent in the game itself, this attitude trickles all the way down to the youngest of football players.¹²⁷

The ramifications of this attitude hit particularly close to home in a May 2013 study published by the American Academy of Pediatrics, which found that of the 120 football players surveyed in the Cincinnati, Ohio area, about 25% said they had suffered a concussion, and more than 50% admitted they would continue to play in spite of symptoms of concussion.¹²⁸ Demonstrative of the machismo culture of youth athletics, particularly football, some respondents said that athletes have a “responsibility” to play in important games despite having a concussion.¹²⁹ The study further found no discernable correlation between an athlete’s knowledge of concussions and a propensity to exercise precaution when it came to injury.¹³⁰ In other words, education simply is not enough to certify safer gameplay.

3. Reduction of Contact Elements is Strongly Opposed; Milder Rule Changes Alone Do Not Create a Meaningfully Safer Environment for Contact Sports

Although subject to much criticism from athletic and social groups alike, an extreme option is advanced by those who see it as the only truly effective way to significantly reduce or eliminate the risk or incidence of concussion in youth athletes: rule adjustments which remove contact elements from youth athletics.¹³¹ The most extreme example of proposed rule adjustments is simply to ban tackle football altogether for individuals below a certain age.¹³² Even the proponents of this rule change are quick to point out that it would be met with great opposition due to the widespread affection for youth football. Proponents also concede that a no-contact rule would have negative effects on the many benefits of youth sports

of concussions and other traumatic brain injury, and 90% agreed return to play should be delayed while symptoms remained present. *Id.*

¹²⁶ Andy Benoit, *How Players Are Cheating On Concussion Tests*, CBSSPORTS.COM (April 22, 2011), <http://www.cbssports.com/mcc/blogs/entry/22475988/28737071>.

¹²⁷ LINDA CARROLL & DAVID ROSNER, *THE CONCUSSION CRISIS* (SIMON & SHUSTER, 1st ed. 2012). This book explores at length the machismo culture that dominates football and emphasizes the need for safety reforms.

¹²⁸ Carla Kemp, *High School Athletes Say Concussion Wont Sideline Them*, AAP NEWS (May 6, 2013), <http://aapnews.aapublications.org/content/early/2013/05/06/aapnews.20130506-2.full>.

¹²⁹ *Id.*

¹³⁰ *Id.*

¹³¹ *Id.*

¹³² Gilbert & Johnson, *supra* note 93, at 56. The idea of banning tackle football all together has been referred to by one commentator as the “nuclear option.” *Id.*

addressed above.¹³³ As a result, eliminating contact elements for athletes below a certain age and mandating contact-free practices are considered extreme positions, advocated for by some brain health experts but generally rejected by the youth athletic community. There is tremendous social pressure to preserve the game of football as it has existed in the hearts and minds of fans and participants, and this pressure acts in opposition to reforms advocated by health professionals. While some rule changes may be acceptable (e.g. prohibiting helmet-to-helmet contact), the notion of eliminating contact altogether has yet to gather any sort of popular approval.

Some milder rule changes have already taken effect, from the professional level down to amateur youth leagues. In professional football, the NFL prohibits horse-collar tackles and helmet-to-helmet hits.¹³⁴ The NCAA likewise prohibits college football players from targeting the helmet and any contact that initiates with the head or neck area.¹³⁵ High school football players are subject to a great many prohibitions, including face tackling, butt blocking, spearing, helmet-to-helmet contact, and targeting the neck or head in any way.¹³⁶ These rule changes illustrate that the need for safety reforms is already recognized at all levels of gameplay.¹³⁷ Less severe than eliminating contact altogether, these optimized approaches leave the game substantially intact while enacting incidental rule changes to certain contact elements that make the game safer.¹³⁸

In the context of youth sports, proposed rule changes include: 1) a “hit count,”¹³⁹ which limits the number of hits youth football players are permitted to sustain (similar to mandatory pitch counts enforced by little league baseball to protect the pitching arms of young players); 2) limiting full contact practices and drills, based upon evidence that far more hits are sustained during practice than during competitive play; 3) reducing the length of the season, or alternatively reducing permitted on-field playing time during a particular game; 4) prohibiting all use of the helmet as an offensive or defensive weapon, coupled with education and training to support alternative styles of play; and 5) requiring players to start in an upright two-point stance, rather than the head-lowered three point stance currently in use.¹⁴⁰ Utilizing these less drastic changes as part of an optimized approach will reduce the risks of traumatic injury to players while fundamentally preserving their ability to

¹³³ *Id.*

¹³⁴ Mike Florio, *Horse-Collar Rule Will be a Point of Emphasis in 2012*, NBC SPORTS (Sep. 4, 2012), <http://profootballtalk.nbcsports.com/2012/09/04/horse-collar-rule-will-be-a-point-of-emphasis-in-2012/>.

¹³⁵ *Id.*

¹³⁶ Tator, *supra* note 111.

¹³⁷ 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).

¹³⁸ Tator, *supra* note 111.

¹³⁹ For a thorough discussion of why hit counts are necessary for youth contact sports, see Cantu & Nowinski, *supra* note 86.

¹⁴⁰ *Id.*

play, and thus their opportunity to reap the benefits derived from participation in the sport.¹⁴¹

Absent state or federal legislation on the subject, the extent to which rule changes will be implemented to make the game safer will largely depend on the preferences of the athletic organization. While ideally each youth football organization would take an affirmative role by modifying gameplay in the interest of necessary increases in player safety, legislation may be necessary to ensure that adjustments are made in a consistent and meaningful way. In addition, problems with out-of-date equipment, player compliance, and the overall unavoidable culture of the game contribute to the necessity for legislative intervention.

III. ENACTED AND PROPOSED LEGISLATIVE SOLUTIONS

A. *Washington's Lystedt Law: The First Attempt at Legislative Intervention*

On May 14, 2009, then-Governor Christine Gregoire signed Washington House Bill 1824 into law.¹⁴² Known as the Zackery Lystedt Law, its purpose was to address the significant risks associated with concussion in youth athletics.¹⁴³ The law would bear his name not only to memorialize his struggle in the aftermath of preventable traumatic brain injury, but because he and his companions had canvassed the state seeking support of the legislature, had testified in support of the law in the state capitol, and had been some of the measure's most ardent supporters.¹⁴⁴ Much of the credit for the law's passage is given to Richard H. Alder, Lystedt's attorney and the president of the Brain Injury Association of Washington.¹⁴⁵ Alder led the charge by soliciting support from youth athletic groups and professional organizations alike, and drafted the bill which would eventually become law.¹⁴⁶ When passed, the legislation was the only of its kind.¹⁴⁷ Today, many states have enacted similar legislation and a few have surpassed it in effectiveness, but the Lystedt law serves in many ways as model legislation. Thus, it provides an appropriate starting point for examining legislative responses to concussion and other brain injuries in youth sports.

The brief statute first invokes the contemporary clinical agreement regarding the serious nature of concussive injury—that (a) concussions are exceedingly common and have the potential to cause serious injury or death if not properly treated; (b) they can range from mild to severe, can be sustained during any type of sport of

¹⁴¹ Gilbert & Johnson, *supra* note 93.

¹⁴² *Zachary Lystedt Law – House Bill 1824*, *supra* note 17.

¹⁴³ *Id.* While proponents of the bill focused on the hazards related to football, overall goal was to address safety in youth athletics in a broad sense, and each of these statutes applies equally to all youth sports, not just football.

¹⁴⁴ Mickool, *supra* note 1.

¹⁴⁵ Mickool, *supra* note 5.

¹⁴⁶ *Id.*

¹⁴⁷ Shenouda et al., *supra* note 121.

recreational activity, and may or may not involve the loss of consciousness;¹⁴⁸ and (c) returning to play before a concussion is fully healed is especially dangerous, and a risk to which the youth in Washington have previously been exposed.¹⁴⁹

After asserting that a premature return to play for concussed athletes is the target behavior that the statute seeks to eradicate, the legislation sets forth the means to accomplish that goal. The state's Interscholastic Activities Association must work with school districts to develop educational materials explaining the risk of concussion and second-impact syndrome, and provide them to parents, coaches and athletes.¹⁵⁰ Athletes who are minors, in addition to parents, will annually sign and return a form acknowledging receipt of this information.¹⁵¹ Failure to return the form precludes an athlete from participating.¹⁵² Importantly, these documents emphasize the mandatory nature of the law. It insists that parties are to err on the side of conservatism in these instances; mere suspicion of a concussion is enough to warrant removal from gameplay.¹⁵³ This attitude is encapsulated in the now-widespread mantra, "when in doubt, sit them out."¹⁵⁴

A key aspect of these educational endeavors is promoting the ability for all parties to recognize and react to symptoms of a possible or actual concussion. The Interscholastic Activities Association maintains a comprehensive website that makes the educational materials readily available to parents, coaches and athletes.¹⁵⁵ Downloadable information sheets are available, and provide a laundry list of concussion symptoms, from those stated with clinical particularity ("amnesia," or "sensitivity to light or noise") to very generic (athlete "just doesn't feel right").¹⁵⁶ Information sheets also list possible observations that could be made by teammates while on the field indicating a concussion.¹⁵⁷ For instance, if a player has slurred

¹⁴⁸ WASH. REV. CODE § 28A.600.190 (2009). "Even 10 years ago, a young athlete with a "ding" or low-grade concussion would have been allowed to return to sports as soon as 15 minutes after his or her symptoms had cleared." Mark E Halsted, *Sport-Related Concussion in Children and Adolescents*, 126 PEDIATRICS 597 (2010).

¹⁴⁹ § 28A.600.190.

¹⁵⁰ *Id.*

¹⁵¹ *Id.*

¹⁵² *Id.*

¹⁵³ *Id.*

¹⁵⁴ See e.g., *Concussion Information – When in Doubt, Sit Them Out!*,

WIS. INTERSCHOLASTIC ATHLETIC ASS'N, http://www.wiaawi.org/Portals/0/PDF/Health/WIAA_concussion_rev.pdf

(last visited Aug. 20, 2014).

¹⁵⁵ *Concussion Management Guidelines*, WASH. INTERSCHOLASTIC ACTIVITIES ASS'N, <http://www.wiaa.com/subcontent.aspx?SecID=623> (last visited Aug. 20, 2014).

¹⁵⁶ See generally, *Coaching Resources; Parent Guardian Resources*, WASH. INTERSCHOLASTIC ACTIVITIES ASS'N, <http://www.wiaa.com/subcontent.aspx?SecID=625> (last visited Aug. 20, 2014).

¹⁵⁷ *Id.* For example, "forgets plays," "unsure of game, score or opponent," or "answers questions slowly." *Id.*

speech, is unsure of the score, or forgets plays, athletes and coaches are trained to associate these behaviors with concussion.¹⁵⁸

The ability to recognize and properly react to a concussion is the core purpose of the Washington legislation (as well as most others enacted thereafter¹⁵⁹). That appropriate reaction includes not only the mandatory removal from gameplay of any athlete exhibiting the symptoms of a concussion, but the equally-important undertaking of a return-to-play (RTP) schedule that prevents the athlete from resuming activity while symptomatic.¹⁶⁰ A return-to-play schedule is designed to shield the athlete from further contact until the athlete's concussion has been fully healed, in an attempt to prevent the potentially catastrophic effects of second impact syndrome.¹⁶¹ This can be a difficult proposition, because a concussed individual, even after he or she stops exhibiting physiological and psychological symptoms, may still be harboring latent internal brain injury.¹⁶² The necessarily conservative RTP system requires the athlete to abstain from participation until authorized to return by a medical professional who determines that the injury to the brain has fully subsided.¹⁶³

There is wide variance among state statutes with respect to *who* may issue these RTP authorizations, and the most conservative examples draw the narrowest boundaries for who is qualified.¹⁶⁴ Washington's law is among the most conservative: only a licensed health care provider who is trained in the evaluation and management of concussions may authorize a concussed athlete to return to gameplay.¹⁶⁵

Perhaps presumed necessary by the legislature, the statute provides that volunteer health care providers who issue these RTP authorizations on behalf of schools and athletic organization are not liable for civil damages resulting from their decisions, except in the case of gross negligence or intentional misconduct.¹⁶⁶ Some have argued that were it not for these immunizations from liability, schools and athletic organizations would be hard-pressed to find doctors willing to participate in the program.¹⁶⁷

¹⁵⁸ *Id.*

¹⁵⁹ Krystal L. Tomei et al., *Comparative Analysis of State-Level Concussion Legislation and Review of current Practices in Concussion*, 33 NEUROSURGICAL FOCUS 1, (2012).

¹⁶⁰ *Concussion Information – When in Doubt, Sit Them Out!*, *supra* note 154.

¹⁶¹ Guskiewicz et al., *supra* note 72. *See also Concussion Information – When in Doubt, Sit Them Out!*, *supra* note 154.

¹⁶² Guskiewicz et al., *supra* note 72.

¹⁶³ *CONCUSSION MANAGEMENT GUIDELINES*, *supra* note 155.

¹⁶⁴ *See infra* Part III.B.

¹⁶⁵ WASH. REV. CODE § 28A.600.190 (2009).

¹⁶⁶ *Id.*

¹⁶⁷ Cathy J. Jones, *College Athletes: Illness or Injury and the Decision to Return to Play*, 40 BUFF. L. REV. 113 (1992). An important corollary to this notion of immunity is that “while a decision to hold a surrogate immune from liability could induce more persons to be willing to be surrogates and could facilitate their decision making, immunity may remove the incentive necessary to exercise great care in making the decision.” *Id.*

Though the earliest example of its type, Washington's 2009 law is still too new to judge its effectiveness in terms of reducing rates of concussion and severe brain injury in youth athletes. One study published in 2012, focusing on youth soccer rather than football, concluded that parents, coaches and youth athletes in Washington were generally more aware of the risks of and necessary responses to concussion than they had been prior to the law's implementation.¹⁶⁸ Overall, however, the survey returned inconsistent results.¹⁶⁹ While most respondents demonstrated good knowledge of concussion symptoms and precautions, they nevertheless reported inconsistencies with respect to the most critical element of concussion prevention strategies: return-to-play guidelines.¹⁷⁰ Sixty percent of respondents were unable to identify a specific authority figure who was in charge of return-to-play decisions, and almost seventy percent of respondents were unaware of any protocol their teams had for tracking and recording players' concussions.¹⁷¹ The study concluded that youth soccer organizations, many of which are organized by volunteer coaches and referees, would benefit from greater organizational structure and data collection mechanisms.¹⁷²

In contrast, paid officials and other full-time members of school and league communities commonly administer youth football. For this reason, the shortcomings identified by the previous survey should not necessarily be imputed to youth football. Still, few conclusions have been drawn about the law's effectiveness since its implementation in 2009, mainly as a result of a dearth of studies addressing the law's effectiveness and schools' compliance under the law. Regardless of how widespread they may be, instances of partial or non-compliance call into question the law's ability to regulate at the local level.

B. Widespread Enactment in the Various States: 2009-2013

1. Strong legislative examples: Massachusetts, Rhode Island

Following the 2009 passage of Washington's Lystedt Law, a growing number of states adopted unique versions of a youth concussion statute.¹⁷³ A review of these laws reveals significant discontinuity among them, with some examples excluding provisions deemed essential by supporters of the original Washington model.¹⁷⁴

¹⁶⁸ Shenouda et al., *supra* note 121.

¹⁶⁹ *Id.*

¹⁷⁰ *Id.* Sixty-three percent of respondents chose to hold the player out if he or she forgot an instruction, whereas 31% were unsure what to do when a player presented with this symptom. *Id.* In addition, 78% chose to hold the player out if he or she was not "feeling right" or "feeling down." Eighty-three percent of respondents were able to correctly answer that continuing to play with a concussion may leave the player vulnerable to further injury and even death. *Id.*

¹⁷¹ *Id.*

¹⁷² *Id.*

¹⁷³ Toporek, *supra* note 16.

¹⁷⁴ *Id.* Differences include the nature of the educational agenda and the definitions of who is qualified issue return to play authorizations. *Id.*

Nevertheless, all 50 states and the District of Columbia have enacted legislation to address the issue of youth concussion.¹⁷⁵ To this point, the issue has been left to the various states. As will be discussed below, however, Congress has previously, and is currently, evaluating the option of federal regulation.¹⁷⁶ This section takes note of two legislative examples from Massachusetts and Rhode Island.

The Massachusetts statute refines many of the educational initiatives which emerged from the more general language of the Washington statute. For example, the Massachusetts statute mandates that training materials address second impact syndrome in detail, and that the schools provide disclosures to parents regarding department policies on safety regulations for student athletes.¹⁷⁷ All parties potentially involved in youth athletics are required to participate in a safety training program organized by the schools. This requirement is quite inclusive: everyone from coaches and parents to the marching band director is required to participate.¹⁷⁸ In contrast to the Washington law, this statute references materials published by the CDC for guidance in educating those groups.¹⁷⁹

The statute adds a required field to the forms all students and parents are required to sign and return before the beginning of the season: athletes must provide information related to any preceding sports-related head injury.¹⁸⁰ This requirement is grounded in the clinical theory that an individual with a history of concussions is more likely to experience subsequent concussions, and that those subsequent concussions are likely to be more serious.¹⁸¹ Under the Massachusetts law, coaches will have the information necessary to identify "high risk" players, and potentially make appropriate adjustments to the nature or duration of their gameplay.¹⁸²

The Massachusetts statute has a mandatory removal and RTP guideline similar to Washington, but holds to the same standard any student who loses consciousness during gameplay, regardless of whether a concussion is suspected or confirmed.¹⁸³

¹⁷⁵ *Id.*

¹⁷⁶ *See infra* Part III.C.

¹⁷⁷ MASS. GEN. LAWS CH. 111, § 222 (2011).

¹⁷⁸ *Id.*

¹⁷⁹ *Id.* While these statutes are executed at the state level, this is one of the many ways in which the states defer to federal agencies for guidance in implementing the legislation. *Id.* This notion is particularly attractive to those who argue that the need for federal regulation of this matter is self-evident. *See e.g.*, Alan Schwartz, *Congress Considers Concussion Protections*, N.Y. TIMES (Sep. 23, 2010), <http://www.nytimes.com/2010/09/24/sports/football/24concussion.html>.

We need to approach this in as many ways as we possibly can,' the Rev. Kathy Brearley testified before the Education and Labor Committee. . . . Many states have taken action, but there is little regulation on the whole to ensure that students in every state will have the same minimum protections.

Id.

¹⁸⁰ § 222.

¹⁸¹ Putukian, *supra* note 83; *See also* Guskiewicz et al., *supra* note 72.

¹⁸² § 222.

¹⁸³ *Id.*

The Massachusetts statute adds two other provisions that suggest a quite earnest effort to reduce youth concussions. First, it forbids any coach or athletic trainer from encouraging any athlete to adopt an unnecessarily dangerous playing technique that is potentially hazardous to his or her health.¹⁸⁴ This comports with the strategy of reducing rates of concussion through slight modifications to gameplay.¹⁸⁵ Second, it requires school superintendents to maintain records of compliance with the statute, and empowers the Department of Health to introduce penalties for those who do not.¹⁸⁶ This enforcement mechanism seeks to impel schools' compliance with its many provisions.¹⁸⁷

Perhaps an even stronger law is the example enacted by the state of Rhode Island in 2011—one year after Massachusetts and two years prior to Ohio.¹⁸⁸ It is similar in nature to the two statutes described above, but contains a few key distinctions.

One slight but very important difference is that whereas the Massachusetts statute suggested the CDC materials be consulted when implementing education programs,¹⁸⁹ the Rhode Island statute requires that they be used.¹⁹⁰ Not only is the use of CDC materials and all pertinent updates mandatory, but the State Department of Education must also post these materials on its own website, for ease of access by parents, coaches and others.¹⁹¹

Similar to the Washington law, Rhode Island requires licensed physicians who are trained in the management of concussions to issue the crucial RTP decisions.¹⁹² One notable advance is that the Rhode Island law encourages these physicians to work in concert with athletic trainers employed by the school, and encourages the latter to be present at all recreational events covered by the statute.¹⁹³

¹⁸⁴ *Id.* Some examples of dangerous play might include using the helmet as a weapon, spear tackling, or horse-collar tackling.

¹⁸⁵ See *supra* Part II.D.

¹⁸⁶ § 222. The materials designed to assist school districts in implementing new concussion regulations suggest the following language: “Penalties, including but not limited to personnel sanctions and forfeiture of games, for failure to comply with provisions of the school district’s or school’s policy.” Mass. Dep’t of Pub. Health, *Head Strong: Guidance for Implementing the Massachusetts Regulations on Head Injuries and Concussions in School Athletics* (Jan. 2012), available at <http://www.mass.gov/eohhs/gov/departments/dph/programs/community-health/dvip/injury-prevention/sports-related-concussions-and-head-injuries.html>.

¹⁸⁷ One of the greatest shortcomings in Ohio’s law is the lack of enforcement mechanisms. See *infra* Part IV.D.

¹⁸⁸ R. I. GEN. LAWS §§ 16-91 (2011).

¹⁸⁹ § 222.

¹⁹⁰ § 16-91.

¹⁹¹ *Id.* Advocates for a federal legislative approach would suggest that this is likewise indicative of states’ willingness to outsource regulatory responsibilities to a federal agency.

¹⁹² *Id.* In Rhode Island, a licensed physician may consult with an athletic trainer when making his decision, but ultimately the physician retains complete discretion. *Id.*

¹⁹³ *Id.* The intended effect of this cooperative effort is a greater likelihood of proper management of suspected concussions, as well as the removal of such a burden from coaches and parents, many of whom, in spite of educational efforts, would only have abstract notions of concussion symptoms and management.

Probably the most significant addition to the Rhode Island statute is that it encourages student athletes to perform a baseline neurocognitive examination prior to the beginning of each sport season.¹⁹⁴ As discussed above, establishing a neurocognitive baseline in a growing, adolescent brain is essential for making accurate RTP decisions.¹⁹⁵ However promising the intention, the statute stops short at requiring this testing procedure of all students.¹⁹⁶ Further, without subsidization this and other ideal practices may be cost-prohibitive for many schools and athletic organizations.¹⁹⁷ Nevertheless, the mere mention of this test represents a significant evolution from most other states' statutes—including Ohio's—and indicates progress in the development of these laws as research and technology develops.

2. Weak legislative example: Wyoming

State-based approaches to the problem of youth concussion are inherently subject to the prerogatives of each respective legislature and tend to reflect local social values. Consequently, the legislation is wide-ranging.¹⁹⁸

The Wyoming state legislature, for example, declined to require removal from play upon suspicion of concussion when it adopted its legislation in 2011.¹⁹⁹ Therefore, a Wyoming student who sustains a violent hit on the football field and who exhibits concussion symptoms is not explicitly required to be taken out of the game—the very scenario that left Zackery Lystedt and so many others with significant neurological injury. The Wyoming statute requires only that school district boards of trustees “adopt protocols to address risks associated with concussions and other head injuries resulting from athletic injuries . . . [including] restrictions concerning participation in school athletic events after suffering a concussion.”²⁰⁰ The statute does not require participation in any specific educational programs, nor require any signed compliance forms that have become commonplace in other states.²⁰¹ The reluctant tone of the legislation in Wyoming and certain other states²⁰² sharply contrasts with Massachusetts, which declared its statute an emergency law and implemented its changes immediately.²⁰³

¹⁹⁴ *Id.*

¹⁹⁵ McCrory et al., *supra* note 25.

¹⁹⁶ § 16-91.

¹⁹⁷ See A. Collie & P. Maruff, *Computerised Neuropsychological Testing*, 37 BRIT. J. SPORTS MED. 2 (2003).

¹⁹⁸ Tomei et al., *supra* note 159.

¹⁹⁹ WYO. STAT. ANN. § 21-3-110 (2013).

²⁰⁰ *Id.*

²⁰¹ *Id.*

²⁰² Enacted in Arkansas in 2013, senate bill 773 appropriated funds, through which the state department of education could create “a pilot project on concussion management,” but funds were stipulated not to exceed \$1M. S.B. 773, 89TH GEN. ASSEMB., REG. SESS. (ARK. 2013).

²⁰³ MASS. GEN. LAWS CH. 111, § 222 (2011).

3. Failed and proposed federal legislation: ConTACT, PSAC and the Care Tools Act of 2013

On several occasions, the United States Congress has considered legislation at the federal level which would provide uniformity across the various states for addressing the issue of youth concussion: the failed ConTACT Act and Protecting Students Against Concussions Act in 2010 and 2011, respectively, and the yet-undetermined Concussion Treatment and Care Tools Act of 2013.

The cursory Concussion Treatment and Care Tools Act of 2010 (ConTACT Act) called for the Secretary of Health to establish guidelines within two years to begin to address the issue of youth concussion.²⁰⁴ A committee would have been convened to establish guidelines for the prevention, identification, treatment and management of concussions, including but not limited to return-to-play standards.²⁰⁵ Notably, the Secretary of Health and Human Services would have then been authorized to make grants to the states for the purposes of inducing and subsidizing the implementations of the standards determined by the department, of which baseline neurocognitive testing was explicitly mentioned.²⁰⁶ States' receipt of department funds would be contingent upon submission of an application and full compliance with the department's guidelines. This bill died in the Senate, but would later be introduced as H.R. 3113, the Concussion Treatment and Care Tools Act of 2013.²⁰⁷

The short-lived Protecting Students from Concussions Act of 2011 contained many of the provisions required by some of the most stringent state legislative examples, but made each state's receipt of funds under the Elementary and Secondary Education Act of 1965 contingent upon full compliance with the statute. Not surprisingly, it found little support in Congress.²⁰⁸

Most recently, on September 17, 2013, the reincarnation of ConTACT was introduced in the United States House of Representatives as the Care Tools Act of 2013.²⁰⁹ The revised statute opens with the pronouncement that while many states have enacted regulations for youth concussion, "many schools lack the resources to implement best practices in concussion diagnosis and management."²¹⁰ For this reason, and consistent with some states existing practices, the statute defers to the

²⁰⁴ CONCUSSION TREATMENT AND CARE TOOLS ACT OF 2010, H.R. 1347, 111TH CONG. (2009), AVAILABLE AT

<http://www.govtrack.us/congress/bills/111/hr1347> (last visited Jan. 31, 2014).

²⁰⁵ *Id.*

²⁰⁶ *Id.*; see also *infra* Part IV.A.

²⁰⁷ See *infra* note 209.

²⁰⁸ PROTECTING STUDENT ATHLETES FROM CONCUSSIONS ACT OF 2011, H.R. 469, 112TH CONG. (2011), available at <http://www.govtrack.us/congress/bills/112/hr469>.

²⁰⁹ CONCUSSION TREATMENT AND CARE TOOLS ACT OF 2013, H.R. 3113, 113TH CONG. (2013), available at <http://www.govtrack.us/congress/bills/113/hr3113>.

²¹⁰ *Id.* Given the ubiquitous grant-issuance provisions of the proposed federal legislation, the "resources" which the bills suggest schools lack are financial as well as clinical. *Id.*

Pediatric MTBI Guideline Expert Panel²¹¹ of the CDC to determine the best practices for diagnosis, treatment and management of youth concussion.²¹² The remainder of the statute is generally comparable to the Massachusetts²¹³ and Rhode Island²¹⁴ examples, with two notable additions: (a) a requirement that schools should be adequately staffed with medical professionals to ensure the implementation of these guidelines; and (b) a requirement that all youth athletes participate in preseason baseline neurocognitive testing.²¹⁵ Like its predecessor, it authorizes the Secretary to issue grants in exchange for state compliance with its provisions.²¹⁶

4. Ohio Revised Code 3313.539: Concussions and School Athletics

On April 26, 2013, Ohio enacted its own youth concussion legislation.²¹⁷ Like those enacted in many other states, it mimics the model provisions that were made a central part of Washington's Lystedt Law. The core elements of the Ohio law are (a) education of coaches, referees, parents and athletes; (b) automatic removal from play for any athlete exhibiting symptoms of concussion or other head injury; and (c) a RTP regime under the direction of a licensed health care provider.²¹⁸

Under the educational rubric, students must submit a signed affidavit certifying that they, along with their parents or guardians, have reviewed the literature describing concussion risks and symptoms that is provided by the Ohio Department of Health through its website.²¹⁹ If coaches and referees of youth athletics wish to be granted the mandatory pupil activity permit,²²⁰ they must complete an online training

²¹¹ CDC Workgroup to Improve Clinical Care of Youth with Mild TBI, CTR. FOR DISEASE CONTROL AND PREVENTION, http://www.cdc.gov/traumaticbraininjury/MTBI_pediatric.html (last visited January 4, 2014).

²¹² CONCUSSION TREATMENT AND CARE TOOLS ACT OF 2013.

²¹³ MASS. GEN. LAWS CH. 111, § 222 (2011).

²¹⁴ R.I. GEN. LAWS §§ 16-91 (2011).

²¹⁵ CONCUSSION TREATMENT AND CARE TOOLS ACT OF 2013.

²¹⁶ *Id.*

²¹⁷ H.B. 143, 129TH GEN. ASSEMB. REG. SESS. (OHIO 2013).

²¹⁸ OHIO REV. CODE ANN. § 3313.539 (LEXIS 2013).

²¹⁹ *Id.*; see also OHIO REV. CODE ANN. § 3707.52 (LEXIS 2013).

The department of health shall create a concussion and head injury information sheet for participants in interscholastic athletics and youth sports organizations. The department shall include in the information sheet pertinent information to inform and educate coaches, athletes, and the parents, guardians, or other persons having care or charge of athletes of the signs and symptoms of concussion or head injury and the risks of continuing to practice for or compete in an athletic event or activity after sustaining a concussion or head injury. The department periodically shall review the information sheet and update it accordingly. . . . The department shall make the information sheet available on its internet web site in a format suitable for easy downloading and printing.

Id.

²²⁰ OHIO REV. CODE ANN. § 3319.303 (LEXIS 2013). Pupil activity permits are required of all coaches and referees participating in interscholastic athletics. *Id.*

program that tests recognition of the symptoms of concussion and other head injuries.²²¹ The Ohio Department of Health website provides two such courses—one from the National Federation of State High School Associations, and one from the CDC.²²² The Department's website also provides substantial materials related to concussion risks and symptoms, as well as RTP guidelines.²²³

The statute concludes with a blanket immunization from liability for all persons associated with youth athletics who may make decisions under any section of the statute.²²⁴

Since April 2013, when Ohio's law went into effect, most school districts and athletic organizations have brought their policies into compliance with its two principal components: (a) an education agenda for recognizing the dangers and symptoms of concussion, with particular training requirements for coaches and athletic trainers; and (b) protocol for removal from play for any athlete suspected of having sustained a concussion. In addition, most districts have established guidelines for who may issue the critical return-to-play decision²²⁵ according to the statutory framework. Districts and athletic leagues have also tried to interpret the provision that immunizes schools, leagues, coaches, referees, and other employees affiliated with youth athletes from all liability possibly arising under the statute.²²⁶ Taken as a whole, Ohio's law is generally equivalent to the various states' standard for this kind of legislation.²²⁷

This does not mean Ohio's law is adequate; rather, it evokes a larger idea that no state is currently regulating this public health issue in an ideal way. While the next section explores particular shortcomings in Ohio's law, the recommendations that accompany them could be extended to nearly every state in the country.

IV. PARTICULAR DEFICIENCIES IN OHIO'S LEGISLATION AND RECOMMENDATIONS FOR IMPROVEMENT

While Ohio's law represents the fairly standard commitment to the public health issue of youth concussion, it nevertheless would benefit from a few key adjustments and additions. No law is perfect, and it is certainly a worthy argument that no law, by its very nature, can completely prevent all incidence of concussion.²²⁸ Equally

²²¹ § 3313.539.

²²² *Concussion in Youth Sports: Ohio's Return-to-Play Law*, OHIO DEPT. OF HEALTH, <http://www.healthy.ohio.gov/vipp/concussion.aspx> (last visited Dec. 4, 2013).

²²³ *Id.*

²²⁴ § 3313.539. "This section does not eliminate, limit, or reduce any other immunity or defense that a public entity, public official, or public employee may be entitled to under Chapter 2744, or any other provision of the Revised Code or under the common law of this state." *Id.*

²²⁵ *See supra* note 83.

²²⁶ § 3313.539. An exception would be made for willful or wanton misconduct. *Id.*

²²⁷ *See generally supra* Part III.

²²⁸ This is true of many things. Criminal statutes fail to prevent murder, theft and underage drinking. Despite vast regulation by the SEC, "creative" accounting is ubiquitous in the business world. Statutes are rarely if ever created in the delusion that the negative element will

compelling, however, is the overwhelming consensus in the scientific and medical community that adolescents who sustain traumatic brain injury are particularly vulnerable to short- and long-term cognitive and behavioral problems.²²⁹ Not only is this issue serious, but quite common: the U.S. Centers for Disease Control estimates that each year there are almost 23,000 non-fatal traumatic brain injuries resulting just from football.²³⁰ These statistics, considered in conjunction with the many years during which some adolescents will engage in contact sports, enhances the concern that the negative effects of concussion are persistent and cumulative.²³¹

Bearing those details in mind, if Ohio's legislature endeavors to have a meaningful impact on the safety of youth athletics, especially with regard to traumatic brain injury, the following topics should be reconsidered.

A. Failure to Require Pre-season Baseline Neurocognitive Screening

One of the most significant shortcomings of the Ohio law is that it does not require—nor even mention—preseason baseline neurocognitive testing for youth athletes. While neuropsychological testing generally has been used for many years in response to traumatic or persistent brain injuries as an *assessment* mechanism, only recently has it been employed as a tool for establishing a baseline marker for neurocognitive scores.²³² Especially in cases involving adolescent athletes whose brains are consistently changing through development, comparing a post-concussion neurocognitive screening with a pre-season baseline assessment is widely thought to

be eliminated altogether. Instead, society recognizes a problem about which something needs to be done, and legislation is enacted to that end.

²²⁹ Gerry H. Taylor et al., *A Prospective Study of Short- and Long-Term Outcomes After Traumatic Brain Injury in Children: Behavior and Achievement*, 16 NEUROPSYCHOLOGY 15 (2002). A long-term study of 189 children from northeast Ohio hospitals over a period of 4 years found persistent effects of mild to severe traumatic brain injury during that time, resulting in academic and behavioral defects. *Id.* While cognitive functions partially or completely recovered for most during that time, follow-ups indicated that in many cases academic and behavioral problems did not. *Id.* In some of the more severe cases, no evidence for complete recovery was indicated during the follow-up period. *Id.*

²³⁰ Karlin *supra* note 104. Another study estimates that in sum, high school varsity athletics results in nearly 63,000 concussions annually. J.W. Powell & K.D. Barber-Foss, *Traumatic Brain Injury in High School Athletes*, 282 J. AM. MED. ASS'N 958, (2001).

²³¹ R.S. Moser, et al., *Prolonged Effects of Concussion in High School Athletes*, 57 NEUROSURGERY 300 (2005).

Athletes with recent concussions performed significantly worse on measures of attention and concentration than youth athletes with no concussion history. Symptom-free athletes with a history of two or more concussions performed similar on testing to youth athletes who had just experienced a recent concussion. Similarly, cumulative academic grade point averages were significantly lower not only for youth athletes with two or more previous concussion groups, but for youth athletes who experienced recent concussions, suggesting that athletes with lower grade point averages may be more prone to concussion.

Id.

²³² Putukian, *supra* note 83.

be an essential component of evaluating the status of an athlete's recovery from traumatic brain injury.²³³

Study after study underscores the importance of using neuropsychological testing both to establish a preseason baseline for comparison, and as a post-injury assessment tool—neuropsychological testing routinely reveals defects in cognitive function even when traditional clinical symptoms associated with concussion have resolved.²³⁴ Once again, making a proper determination about whether concussive injury persists is critical to making appropriate return-to-play decisions, and such a determination cannot be made without incorporating neuropsychological testing.

Ohio's law reflects almost every other state's in this particular deficiency—only a handful of laws even mention baseline testing in their respective statutes.²³⁵ Nevertheless, the importance of baseline testing is recognized at all levels of gameplay. Since 2001, the NFL has been using a computerized testing system called ImPACT to test the severity of athlete concussions.²³⁶ And for the first time ever, professional automobile racing league NASCAR will require baseline neurocognitive testing for all drivers in 2014.²³⁷

In addition, certain individual youth school districts, even in the absence of statewide legislation, have initiated their own policies mandating pre-season and post-injury neurocognitive screening. This trend stretches from Florida,²³⁸ to Maryland,²³⁹ to Pennsylvania, and beyond.²⁴⁰ Even in light of the potential difficulty

²³³ *Id.* “The ideal situation, based on a careful review of the literature as well as clinical experience, is to consider using [neuropsychological] testing as part of the comprehensive evaluation of the athlete with concussion.” *Id.*

²³⁴ See, e.g., R.J. Echemendia et al., *Neuropsychological Test Performance Prior to and following Sport-Related Mild Traumatic Brain Injury*, 11 CLINICAL J. SPORT MED. 23, (2007); S.N. Macciocchi et al., *Neuropsychological Functioning and Recovery After Mild Head Injury in Collegiate Athletics*, 39 NEUROSURGERY 510, (1996).

²³⁵ Tomei et al., *supra* note 159.

²³⁶ Tracy L. Ziemer, *New Test Helps NFL Teams Detect Concussions*, ABC NEWS (Jan. 26, 2001), <http://abcnews.go.com/Sports/story?id=99901>. Ironically, at the time, the American Academy of Neurology recommended a 15-minute wait for before returning to play for the mildest concussions. *Id.* This detail illustrates how quickly and how recently concussion awareness has developed.

²³⁷ NASCAR Official Release, *NASCAR Mandates Baseline Concussion Testing*, NASCAR (Oct. 24, 2013), http://www.nascar.com/en_us/news-media/articles/2013/10/24/nascar-mandates-baseline-concussion-test.html.

²³⁸ Marsy Smith, *Broward County Public Schools Among First in State to Require Baseline Neurocognitive Testing*, WESTSIDE GAZETTE (March 22, 2012), <http://www.highbeam.com/doc/1P3-2653889871.html>.

With the welfare of student athletes in mind, the District established guidelines on concussion management for the 2011/12 school year. An additional measure will go into effect with the beginning of spring football season on May 1. In order to participate in any BCPS high school interscholastic sport, male and female students will be required to have a baseline neurocognitive test.

Id.

²³⁹ Jennifer Beekman, *Baseline Concussion Testing Starts in County*, GAZETTE.NET (Aug. 21, 2013), <http://www.gazette.net/article/20130821/SPORTS/130829858/0/>

creating a statewide system for screening all youth athletes, and the possible financial difficulties some institutions might have, if individual school districts and county boards of education recognize a necessity and have taken action, the state has an opportunity and an obligation to do the same.²⁴¹

Because the importance of neuropsychological testing is recognized both at the professional level and among a growing number of independent youth athletic jurisdictions, as well as the fact that the testing continues to grow more accessible,²⁴² Ohio's law should incorporate a statewide mandate.

B. Failure to Clarify Who May Issue Return-To-Play Decisions; Failure to Adequately Control That Decision Making

Compounding the difficulty of making an appropriate return-to-play decision is another shortcoming in Ohio's law—the ambiguous language regarding *who* may make that decision.²⁴³ As discussed in III(b), *supra*, the strongest examples of

gazette&template=gazette. In June 2013, a proposal was adopted by the Montgomery County School Board that would provide baseline testing to high school athletes countywide. *Id.* In fall of 2013, the program was implemented and thousands of county high school athletes underwent the test. *Id.*

²⁴⁰ *Baseline Testing Program: Heads Up Pittsburgh*, UNIV. OF PITTSBURGH MED. CTR., <http://www.upmc.com/Services/sports-medicine/services/concussion/baseline-testing/Pages/hockey-baseline-program.aspx> (last visited Dec. 11, 2013).

HEADS UP Pittsburgh is a partnership between UPMC Sports Medicine, the Pittsburgh Penguins Foundation, the Community College of Allegheny County (CCAC), the Community College of Beaver County (CCBC), and the Center for Disease Control. Beginning August 4, neurocognitive baseline testing will be available to athletes ages 7 and older in western Pennsylvania.

Id.

²⁴¹ Advancements in medical technology continue to make concussion management cheaper and more accessible than in the past. *Concussion Game Plan*, APPLE YOUR VERSE STORIES, <http://www.apple.com/your-verse/concussion-game-plan/>. The Cleveland Clinic's Lerner Research Institute released an iPad app it had developed, which can be used by coaches, doctors or athletic trainers right on the field or in the locker room. *Id.* The app, called C3 Logix, measures a player's balance, reaction time, memory and vision after a suspected concussion, and compares results with baseline measurements taken at the beginning of the season. *Id.* This app was tested by a few schools in 2011, and is gaining momentum in 2014 after being featured on Apple's home page. *Id.* For a related story on one high school's use of the app, see Rachel Abbey McCafferty, *Cleveland Clinic Hopes New iPad App Helps Diagnose Concussions*, BRECKSVILLE PATCH (Nov. 18, 2011), <http://patch.com/ohio/brecksville/cleveland-clinic-hopes-new-ipad-app-helps-diagnose-concussions>. Two other examples of technology developed by the Cleveland Clinic to study and manage concussions are a blood test that looks for evidence in the blood-brain barrier that may indicate concussion, and a "smart" mouth guard, which allows coaches and trainer to measure the head impacts a player may sustain during a game. See *Concussion Center: Research and Innovations*, THE CLEVELAND CLINIC, <http://my.clevelandclinic.org/concussion-center/research-innovations.aspx> (last visited May 22, 2014).

²⁴² Putukian, *supra* note 83.

²⁴³ OHIO REV. CODE ANN. § 3313.539 (LEXISNEXIS 2013). The law states that an athlete suspected of having a concussion may not return to play until:

individual states' concussion legislation draw the narrowest field for who may issue these return authorizations.²⁴⁴ Considering the Massachusetts example, *only* a licensed physician trained in concussion management, by written authorization, may clear an athlete for return to play. This is in contrast to Ohio law, which permits "another licensed health care provider" who is "in consultation with a physician," "under the supervision of a physician," or perhaps most dubiously, "pursuant to the referral of a physician," to authorize returns.²⁴⁵

The original concussion bill faced opposition in the Ohio House of Representatives because of the very narrow definition regarding who was qualified to make RTP decisions. Accordingly, in 2012 the Ohio House reached a compromise and passed the bill by allowing each school district to authorize which licensed health care providers could make RTP decisions for its respective district and athletes. Ohio Representative Michael Stinziano, one of the original sponsors of the bill, acknowledged that although doctors were disappointed with the more relaxed standard, it was necessary to move the legislation forward.²⁴⁶

The student's condition is assessed by either of the following: (i) A physician; (ii) Any other licensed health care provider the school district board of education or governing authority of the chartered or nonchartered nonpublic school, pursuant to division (E)(2) of this section, authorizes to assess a student who has been removed from practice or competition under division (D) of this section. (b) The student receives written clearance that it is safe for the student to return to practice or competition from a physician or from another licensed health care provider authorized pursuant to division (E)(2) of this section to grant the clearance. (2) A school district board of education or governing authority of a chartered or nonchartered nonpublic school may authorize a licensed health care provider who is not a physician to make an assessment or grant a clearance for purposes of division (E)(1) of this section only if the provider is acting in accordance with one of the following, as applicable to the provider's authority to practice in this state: (a) In consultation with a physician; (b) Pursuant to the referral of a physician; (c) In collaboration with a physician; (d) Under the supervision of a physician. (3) A physician or other licensed health care provider who makes an assessment or grants a clearance for purposes of division (E) (1) of this section may be a volunteer.

Id.

²⁴⁴ See, e.g., R. I. GEN. LAWS § 16-91 (2011). This law is quite clear: "A youth athlete, who has been removed from play, may not return to play until the athlete is evaluated by a licensed physician and until the athlete receives written clearance to return to play from that licensed physician." *Id.* See also Pa. S.B. 200, Pa. Gen. Assemb. Reg. Sess. (Pa. 2011). Under the Pennsylvania law, an "appropriate medical professional" for purposes of evaluating concussions is defined as:

1.) A licensed physician who is trained in the evaluation and management of concussions or a licensed or certified health care professional trained in the evaluation and management of concussions and designated by such licensed physician; 2.) A licensed psychologist neuropsychologically trained in the evaluation and management of concussions or who has postdoctoral training in neuropsychology and specific training in the evaluation and management of concussions.

Id.

²⁴⁵ § 3313.539.

²⁴⁶ Maggie Clark, *States Find Laws Against Sports Head Injuries Tricky to Enact*, STATELINE (July 19, 2012), <http://www.pewstates.org/projects/stateline/headlines/states-find->

As an illustration, the Bay Village School Board, which supervises the athletic programs of the Bay Village City Schools in a suburb of Cleveland, interprets the return-to-play provision in the following way: “. . . standardizes who may make the medical decision related to return to play following a concussion. This clearance, according to HB143, is from an MD, DO or other licensed healthcare professional who is in referral from, consultation or collaboration with or supervised by a physician. In addition to physicians, athletic trainers are able to make return-to-play decisions. . . .”²⁴⁷ This inclusion of athletic trainers in the category of individuals authorized to make these decisions is not limited to Bay Village. School districts around the state, from Toledo²⁴⁸ to Zanesville,²⁴⁹ include the same. The widespread inclusion of athletic trainers in the category of individuals who may make return-to-play decisions necessarily raises the question of whether they are in fact qualified to do so.

The most recent position statement released by the National Athletic Trainers Association on the subject of concussion management was in 2004, through which guidelines were issued for recognizing symptoms of concussion, evaluating player removal, and return-to-play protocol.²⁵⁰ The statement stresses a collaborative approach conducted between the athletic trainer and physician, and includes special

laws-against-sports-head-injuries-tricky-to-enact-85899405995. “This issue is not necessarily resolved,” he later said. *Id.*

²⁴⁷ *Activities Handbook*, BAY VILLAGE CITY SCH., <http://www.bayvillageschools.com/DocumentCenter/Home/View/112> (last visited Dec 22, 2013); According to the revised code:

Athletic training’ means the practice of prevention, recognition, and assessment of an athletic injury and the complete management, treatment, disposition, and reconditioning of acute athletic injuries upon the referral of an individual authorized under Chapter 4731 of the Revised Code to practice medicine and surgery, osteopathic medicine and surgery, or podiatry, a dentist licensed under Chapter 4715 of the Revised Code, a physical therapist licensed under this chapter, or a chiropractor licensed under Chapter 4734 of the Revised Code. Athletic training includes the administration of topical drugs that have been prescribed by a licensed health care professional authorized to prescribe drugs, as defined in section 4729.01 of the Revised Code. Athletic training also includes the organization and administration of educational programs and athletic facilities, and the education of and consulting with the public as it pertains to athletic training.

OHIO REV. CODE ANN. § 4755.60(A) (LEXISNEXIS 2013). To qualify for a license, an applicant must be of good moral character, have completed an approved baccalaureate program, obtained clinical experience, and passed the entrance exam. OHIO REV. CODE ANN. § 4755.62(C) (LEXISNEXIS 2013).

²⁴⁸ See, e.g., *Ohio Department of Health Concussion Information Sheet for Interscholastic Athletics*, ST. FRANCIS DE SALES SCH., https://drive.google.com/folderview?id=0B5B-FHUANhWUbtFfWVI5LXFkYUk&usp=drive_web (last visited Sept. 1, 2014).

²⁴⁹ See *Athletics*, ZANESVILLE CITY SCH., <http://www.zanesville.k12.oh.us/Downloads/Eligibility%20Guide%2013-14%20High.pdf> (last visited Sept. 1, 2014).

²⁵⁰ Kevin M. Guskiewicz et al., *National Athletic Trainers’ Association Position Statement: Management of Sport-Related Concussion*, 39 J. OF ATHLETIC TRAINING 280 (2004).

considerations for dealing with youth athletes.²⁵¹ It also emphasizes the use of a multitude of tools for determining whether an athlete is asymptomatic, including but not limited to neurocognitive testing.²⁵² These are encouraging standards, but it is critical to examine how standards manifest themselves in practice.

A study undertaken after the release of the above position statement found that only 3% of certified athletic trainers were in compliance with proposed guidelines from the National Athletic Trainers Association.²⁵³ Instead of the multiplicitious approach recommended by the position statement, athletic trainers used a battery of tests at their discretion. Almost all trainers use a personal clinical examination, return to play guidelines, and symptom checklists.²⁵⁴ But only 15% of athletic trainers reported the use of neuropsychological testing when evaluating concussion.²⁵⁵ Taking the assumption that neuropsychological testing is a necessary component of a proper return-to-play decision, an inference therefrom is that any concussion management that does not incorporate it is inadequate.

While the report acknowledges accessibility is likely a factor in this low usage, it maintains that in the event of a concussive injury, a neuropsychologist *must* be consulted when making return to play decisions.²⁵⁶ This imperative echoes throughout the research community,²⁵⁷ and even athletic trainers themselves agree: in a survey of athletic trainers, nearly 73% of respondents said that the team physician or the individual's primary care physician (more commonly the case for youth sports) is the most important person in making return to play decisions.²⁵⁸

There is agreement that certified athletic trainers lack the medical training and experience to unilaterally evaluate concussions and make cogent decisions about when an athlete is ready to return to play.²⁵⁹ Once again, the NATA position

²⁵¹ *Id.*

²⁵² *Id.*

²⁵³ Andrew J. Notebart & Kevin M. Guskiewicz, *Current Trends in Athletic Training Practice for Concussion Assessment and Management*, 40 J. ATHLETIC TRAINING 320 (2005). To be considered "in compliance" with the position statement, an athletic trainer would have had to use symptom checklists, neuropsychological testing, and balance testing when making return-to-play decisions. *Id.*

²⁵⁴ *Id.*

²⁵⁵ *Id.* This is unsurprising given the fact that only 25% of respondents said they even had access to a neuropsychologist if they wanted one. *Id.*

²⁵⁶ *Id.*

²⁵⁷ See, e.g., Collie & Maruff, *supra* note 197. "Ideally, a neuropsychologist would administer and interpret the results of every neuropsychological test conducted in sports medicine." *Id.*

²⁵⁸ Guskiewicz et al., *supra* note 250.

²⁵⁹ In enacting its youth concussion law, the Pennsylvania legislature deleted provisions that would have authorized athletic trainers and physical therapists from making return-to-play decisions. S.B. 200, Pa. Gen. Assemb., Reg. Sess. (Pa. 2011). The enacted definition of "appropriate medical professional" is:

(1) A licensed physician who is trained in the evaluation and management of concussions or a licensed or certified health care professional trained in the evaluation and management of concussions and designated by such licensed physician.

statement itself acknowledges the need for outside clinical input.²⁶⁰ The use of athletic trainers in this capacity is a direct result of the relaxed language in Ohio's law, and precipitates a need for revision.

Ohio has considered the problem of over-inclusion already in the law's young lifespan: in summer 2013, Governor Kasich used his line-item veto to extract a provision that was dropped into the annual state budget that would have allowed chiropractors to issue return-to-play decisions.²⁶¹ This veto was called for by the Ohio Academy of Family Physicians (OAFP), which asserted that chiropractors were not qualified to make independent assessments of concussion without physician consultation, stressing that concussion management was "outside of the chiropractic scope of practice."²⁶² Interestingly, the OAFP statement emphasized that "*athletic trainers, physical therapists, chiropractors, and other non-physician practitioners must work with a physician during the return to play timeline; this requirement is in line with standards of care for a concussion and is ultimately in the best interest of the child.*"²⁶³ If Governor Kasich agreed with the OAFP to the extent that non-physician practitioners *must* work with physicians when making return to play decisions, it is inconsistent that Ohio's law provides otherwise. The state legislature should correct this inconsistency by revising the law to mandate that only physicians trained in the management of concussion be permitted to make return-to-play authorizations.

C. Two Small But Significant Steps: Equipment Standards and Rule Changes

Two other ways in which Ohio's law could enhance the protection afforded to youth athletes are by establishing mandatory baseline equipment standards for all youth athletes in the state, and by imposing certain rule changes such as hit counts.

~~(2) A certified athletic trainer who is trained in the evaluation and management of concussions and is working under the direction of a licensed physician.~~

(3) (2) A licensed psychologist neuropsychologically trained in the evaluation and management of concussions or who has postdoctoral training in neuropsychology and specific training in the evaluation and management of concussions.

~~(4) A licensed physical therapist trained in the evaluation and management of concussions.~~

Id. (stricken text left in footnote for emphasis)

²⁶⁰ Guskiewicz et al., *supra* note 250.

A team approach should be used in making RTP decisions after concussion. This approach should involve input from the ATC, physician, athlete, and any referral sources. The assessment of all information, including the physical examination, imaging studies, objective tests, and exertional tests, should be considered prior to making an RTP decision.

Id.

²⁶¹ *Governor Vetoes Provision in State Budget that Allows Chiropractors to Assess Concussions*, OHIO ACAD. OF FAMILY PHYSICIANS (July 2, 2013), <http://www.ohioafp.org/wfmu-article/governor-vetoes-provision-state-budget-allowing-chiropractors-assess-concussions/>.

²⁶² *Id.*

²⁶³ *Id.*

While it is certainly implicit in the argument that no safety equipment can completely prevent concussion,²⁶⁴ headgear nevertheless reduces the risk of serious head injury.²⁶⁵ In fact, while most state statutes are largely silent on this issue,²⁶⁶ position statements from various interest groups emphasize the need to enforce minimum equipment standards.²⁶⁷ Despite this consensus, a 2010 ESPN survey revealed disparate opinions around the nation on the issue of whether schools' athletic safety equipment was adequate.²⁶⁸ Ohio's concussion statute, like most other states, fails to address the issue of safety equipment, possibly resulting in many young athletes around the state relying on outdated or inadequate protective equipment.

As equipment ages, not only is there a reduction in effectiveness of the materials inside the helmet which protect against injury,²⁶⁹ but a helmet's ability to properly fit is affected, thereby increasing the risk of serious injury.²⁷⁰ New, state-of-the-art helmet designs can yield a significant increase in player safety,²⁷¹ but many youth organizations and school districts may struggle to finance routine overhaul of expensive equipment.²⁷² Nevertheless, the burden of constantly renewing top-of-the-line equipment and the continued use of severely outdated equipment are two distinct problems; the Ohio statute could easily regulate the latter, even if the former would be unfeasible in statewide application. While it would be foolhardy to attempt to write specific equipment specifications into the statute, especially given the rate at which equipment technology improves and changes, the statute could instead empower the Department of Health to consult with experts and neurologists to establish renewable baseline standards, which would be enforceable against non-compliant school districts and athletic organizations. In this way, the state could

²⁶⁴ See, e.g., Harmon et al., *supra* note 26. "Protective equipment has not yet shown a role in concussion reduction." *Id.*

²⁶⁵ *Id.* "There is a potential for improve helmet designs and for sports-specific helmets to decrease concussions in sports." *Id.*; see also Daneshvar et al., *supra* note 106.

²⁶⁶ See, e.g., S.B. 200, Pa. Gen. Assemb., Reg. Sess. (Pa. 2011).

²⁶⁷ For a discussion of equipment concerns in youth athletics, including a recommendation that all equipment should meet the standards promulgated by either the National Operating Committee on Standards for Athletic Equipment, or the American Society for Testing and Materials, see, e.g., Guskiewicz et al., *supra* note 250.

²⁶⁸ See Matt Beardmore et al., *Concussion Confidential*, ESPN THE MAGAZINE (December 19, 2010), available at <http://sports.espn.go.com/espn/news/story?id=5925876>. One linebacker from Michigan told the magazine "I have the same beat-up helmet I had last year." *Id.* In part of the survey in which players were asked to "grade" the schools equipment quality, players themselves handed out the most F's, and generally assigned the lowest grades. *Id.*

²⁶⁹ See *supra* Part II.D.

²⁷⁰ Kevin Brandwein, Goals and Obstacles in Legislating Concussion Management in Youth Sports, 10(2) WILLAMETTE SPORTS L. J., 28, (2013).

²⁷¹ For one such study involving a top-of-the-line helmet, the Riddell Revolution, see Ray W. Daniel, *Head Impact Exposure in Youth Football*, 40 ANNALS BIOMEDICAL ENGINEERING 976, (2012).

²⁷² Brandwein, *supra* note 270.

certify that, if nothing else, a young athlete sustaining hundreds²⁷³ of potentially-concussive hits in practices and games each season would at least have a minimum degree of protection by way of decent equipment.

But good equipment can be both a blessing and a curse. Helmets, which were originally implemented to avert fatal head injuries,²⁷⁴ are also known to create a false sense of security.²⁷⁵ This has resulted in more aggressive and less conscientious conduct by players on the field.²⁷⁶ For this reason, it is widely agreed that when elevating equipment standards are presented alongside certain rule changes, the net benefits to athletes are the greatest.²⁷⁷

In addition, experts have worried about the cumulative effect of repeat concussions,²⁷⁸ and the long-term effects associated with head impacts generally.²⁷⁹ Some of these cumulative and long-term risks were explored in section II-B, *supra*, but at the forefront today is the risk for development of chronic traumatic encephalopathy (CTE) or similar long-term degenerative neurological disorders.²⁸⁰

²⁷³ Daniel, *supra* note 264.

²⁷⁴ Reed Albergotti, *Is It Time to Retire the Football Helmet?*, Wall St. J. (Nov. 11, 2009), available at <http://online.wsj.com/news/articles/SB10001424052748704402404574527881984299454?mg=reno64-wsj&url=http%3A%2F%2Fonline.wsj.com%2Farticle%2F%2FSB10001424052748704402404574527881984299454.html>

The first hard-shell helmets, which became popular in the 1940s, weren't designed to prevent concussions but to prevent players in that rough-and-tumble era from suffering catastrophic injuries like fractured skulls. But while these helmets reduced the chances of death on the field, they also created a sense of invulnerability that encouraged players to collide more forcefully and more often.

Id.

²⁷⁵ Daneshvar et al., *supra* note 106. "Often, the helmet itself may be used to initiate contact. This tendency to promote a more reckless style of play may help explain the higher rate of injury in children and adolescents, as compared to adults." *Id.*

²⁷⁶ *Id.*

²⁷⁷ Michael L. Levy et al., *Birth and Evolution of the Football Helmet*, 55 NEUROSURGERY 656 (2004).

²⁷⁸ Margot Putukian, *Repeat Mild Traumatic Brain Injury: How to Adjust Return to Play Guidelines*, 5 CURRENT SPORTS MED. REP. 15 (2006).

²⁷⁹ L. Syd M. Johnson, *Return to Play Guidelines Cannot Solve the Football-Related Concussion Problem*, 82 J. SCH. HEALTH 180 (2012). In this research article, Dr. Johnson details some of the long-term effects of traumatic brain injury of youth athletes, including but not limited to chronic traumatic encephalopathy (CTE). *Id.*

²⁸⁰ Ann C. McKee et al., *Chronic Traumatic Encephalopathy in Athletes: Progressive Tauopathy Following Repetitive Head Injury*, 68 J. NEUROPATHOLOGY & EXPERIMENTAL NEUROLOGY 709 (2009). Characterized as a degenerative disorder, the symptoms of CTE progress from confusion, disorientation, dizziness or lack of insight (common post-concussive symptoms), to impeded speech, tremors, deafness, psychosis, full-blown Dementia or Parkinson's disease. *Id.* Following the suicides of several high-profile professional athletes such as Junior Seau, Terry Long, Andre Waters and Ryan Freel, all of whom were found during autopsy to be suffering from CTE, there is growing public awareness of the significant risks associated with this disease, and its link to concussion and other traumatic brain injury continues to be investigated. *Id.*

The question of whether a single traumatic brain injury can cause CTE in an athlete remains speculative,²⁸¹ but there is more conclusive evidence that consecutive concussions, or even a lengthy history of subconcussive head injuries,²⁸² may be responsible.²⁸³

1. The Merits of a “Hit Count” System

Certain rule changes have been promoted to mitigate the risks of cumulative and long term brain injury, the most popular being a “hit count” system similar to pitch count restrictions imposed on youth baseball players.²⁸⁴ These rule changes are not designed to eliminate the risk or incidence of concussion in youth athletes; they are intended to make the game *safer*, rather than safe.²⁸⁵ In addition, they supplement return-to-play protocol in its role of preventing or reducing the likelihood long-term brain injury. After all, Ohio’s law permits a cycle by which an athlete could sustain a concussion, sit out for the legally mandated period, then return and afterward sustain another concussion, and so on, resulting in a lengthy history of serious brain injury that is technically permissible under the law.

A hit count system would affect the game to a considerably lesser extent than removing contact elements altogether, and already has a foothold in another popular youth sport of baseball.²⁸⁶ For these reasons, it would more likely be acceptable to football fans, circumventing the generalized objection to rule changes discussed above. Many experts and health advocacy organizations, including the Sports Legacy Institute (SLI),²⁸⁷ endorse the implementation of a hit count system.

²⁸¹ *Id.*

²⁸² Julian E. Bailes et al., *Role of Subconcussion in Repetitive Mild Traumatic Brain Injury*, 119 J. NEUROSURGERY 1235 (2013).

There are both established and emerging clinical and laboratory data that indicate that subconcussive impacts to the brain may lead to detrimental effects on neurological function, both short- and long-term, including the potential for chronic neurodegenerative syndromes. Our understanding of these phenomena is still in its infancy and evolving, but will probably determine the ultimate risk for those exposed to repetitive mTBI in athletic endeavors or military service.

Id.

²⁸³ McKee et al., *supra* note 280.

²⁸⁴ For a discussion on the use of pitch count systems and their effectiveness in preventing injury in youth baseball players, see Lyman, Stephen et al., *Effect of Pitch Type, Pitch Count, and Pitching Mechanics on Risk of Elbow and Shoulder Pain in Youth Baseball Pitchers*, 30 Am. J. Sports Med. 463, (2002). To a lesser extent and subject to more opposition and criticism are suggested policies eliminating contact elements altogether for football players below a certain age, or at least during practices. Daneshvar et al., *supra* note 106.

²⁸⁵ Christopher Nowinski, *Better Rules Can Help*, N.Y. TIMES (Oct. 2, 2010),

<http://www.nytimes.com/roomfordebate/2010/10/03/can-pro-football-be-made-safe/better-game-rules-can-help>.

²⁸⁶ *Id.*

²⁸⁷ *Our Story, About the Sports Legacy Institute*, SPORTS LEGACY INST., <http://www.sportslegacy.org/about/> (last visited Jan. 22, 2014). The Sports Legacy Institute is

The purpose of this system is not only to reduce the likelihood of multiple concussions by way of reduced contact over the course of a season, but also to address the known risk of neurological degeneration such as CTE, which results from cumulative subconcussive injuries.²⁸⁸ A hit count system tracks and limits the number of hits²⁸⁹ a player is allowed to sustain in a given day, week, month and season.²⁹⁰ A good example of such a system is being promulgated by SLI,²⁹¹ and has recently gained some traction with athletic groups.²⁹² Its initial proposal, which it hopes to see adopted by individual youth athletic groups or scholastic leagues, is that no athlete under age 18 would be exposed to more than 1,000 hits to the head per season that exceed 10 g's of force per hit.²⁹³

Of course, a statutory requirement would bypass the slow acceptance of a hit count system on an individual basis by school districts and athletic organizations (many of which may not be aware of such a system or its benefits). The system would present only minor obstacles to coaches and players managing a given season, but could yield tremendous, potentially life-saving benefits for young athletes. Ohio's statute should be revised to instruct the Department of Health to work with brain health experts or outside groups such as SLI to create and implement a rational hit count system to be applied statewide.

*D. Immunization From Liability and Lack of Enforcement Mechanisms:
Incentivizing Non-Compliance at Every Turn*

This section has identified particular shortcomings in Ohio's youth concussion legislation, including its failure to require baseline neurocognitive testing prior to the beginning of each season, its lack of clarity regarding who may issue return-to-play authorizations, its failure to require youth leagues and school districts to maintain adequate and up-to-date safety equipment, and finally, its failure to mandate hit counts or other gameplay modifications which would reduce the risk of successive or long-term brain injury.

a major Boston-based nonprofit which "is dedicated to 'solving the concussion crisis' by advancing the study, treatment, and prevention of the effects of brain trauma in athletes and other at-risk groups. [It] achieves this mission through advocacy, education, policy development, and medical research." *Id.*

²⁸⁸ Long-term exposure to subconcussive injury can lead to neurological degeneration. Brandon E. Gavette et al., *Mild Traumatic Brain Injury: a Risk Factor for Neurodegeneration*, 2 ALZHEIMER'S RES. & THERAPY 1 (2010).

²⁸⁹ A minimum threshold would be created for what constitutes a "hit."

²⁹⁰ Cantu & Nowinski, *supra* at note 86.

²⁹¹ *Id.*

²⁹² Conrad Wilson, *Football's John Gagliardi: Winning With Limited Contact*, "Only a Game," WBUR.ORG (Sept. 8, 2012), <http://onlyagame.wbur.org/2012/09/08/john-gagliardi-football>.

²⁹³ Cantu & Nowinski, *supra* at note 86. Sensors that could be inserted into helmets to measure these forces do exist, but implementing this on any large scale is a conundrum even for proponents. *Id.* For perspective on how g-forces relate to the actual strength of it hit, it is said that a concussion may be induced when the head is subjected to roughly 100 g's of force. See Jeremy Repanich, *Helmets Alone Won't Save Football From Concussion*, SI.COM (Dec. 19, 2012), <http://sportsillustrated.cnn.com/nfl/news/2012/12/19/nfl-concussions-helmet/>.

More significant than each of these individual deficiencies is the very broad and generalized flaw in the legislation: a complete lack of enforcement mechanisms. The state has no authority to enforce this law, no ability to certify that the stated goals are being met, and no way to impose liability on individuals who violate the law.²⁹⁴ The casual nature of Ohio's law renders it toothless and aspirational, and there is widespread non-compliance or partial compliance in various leagues and school districts around the state. Many are not aware of their responsibilities under the law, while others are simply not complying with them. Until the law's enforcement problems are cured, it will exist as a substandard mechanism for protecting the youth of Ohio from traumatic brain injury.

The statute makes clear that liability arises only from willful or wanton misconduct.²⁹⁵ As clarified by the recent Ohio Supreme Court decision in *Anderson v. City of Massillon*,²⁹⁶ for political subdivisions (including public school districts and officials acting thereunder), willful or wanton conduct goes beyond recklessness and negligence, and requires intentional deviation from some duty to safety, in circumstances in which there is a great probability that harm will result.²⁹⁷ The court

²⁹⁴ Except in the case of willful or wanton misconduct. See OHIO REV. CODE ANN. § 3313.539 (LEXISNEXIS 2013).

²⁹⁵ *Id.*

A school district, member of a school district board of education, or school district employee or volunteer, including a coach or referee, is not liable in damages in a civil action for injury, death, or loss to person or property allegedly arising from providing services or performing duties under this section, unless the act or omission constitutes willful or wanton misconduct.

Id. Another section extends this immunity to private institution actors as well. *Id.*

²⁹⁶ *Anderson v. City of Massillon*, 134 Ohio St.3d 380 (2012). See also Frank H. Scialdone, *Willful and Wanton Worse than Reckless: Ohio Supreme Court Clarifies When Political Subdivisions and Employees May Be Liable in Emergency Run Cases*, DECISIVE DEFENSE POST (Jan. 7, 2013), <http://www.mrrlaw.com/pdf/2139.pdf>.

The *Anderson* case arises out of City of Massillon firefighters responding to a car fire. One of the fire engines responding to the fire approached an intersection travelling in excess of the 25- mph posted speed limit. A tree and utility pole as well as bushes and cars partially obstructed the view of approaching traffic. Unfortunately, the firefighters did not see the driver of a mini-van enter the intersection. The fire truck broadsided the mini-van. The driver and his passenger sustained fatal injuries. The Estate of the driver sued the City and the two firefighters involved for willfully, wantonly and recklessly causing the deaths of her husband and grandson.

Id.

²⁹⁷ *Id.* The court established these definitions for willful, wanton, and reckless:

Willful misconduct implies an intentional deviation from a clear duty or from a definite rule of conduct, a deliberate purpose not to discharge some duty necessary to safety, or purposefully doing wrongful acts with knowledge or appreciation of the likelihood of resulting injury....wanton misconduct is the failure to exercise any care toward those to whom a duty of care is owed in circumstances in which there is great probability that harm will result.... reckless conduct is characterized by the conscious disregard of or indifference to a known or obvious risk of harm to another that is

delivered additional clarification and protection to public employees by finding that “the violation of a statute, ordinance, or departmental policy enacted for the safety of the public is not per se willful, wanton, or reckless conduct but may be relevant to determining the culpability of a course of conduct.”²⁹⁸

The practical effect of this very high standard, as applied to concussion prevention, is that under the current law it would be quite difficult to hold any coach, trainer or medical professional liable for injuries that result from a decision they made.²⁹⁹ Ohio’s original concussion bill included a provision that would have made criminal negligence charges available for coaches who made inexcusable decisions related to student safety, but that provision did not make the final cut.³⁰⁰

Aside from the possibility of reckless conduct on the part of athletic supervisors, there is also the possibility of negligence on the part of the doctors or trainers making the RTP decisions. The question of whether to hold these individuals to a negligence standard has been long-debated. While it may be said that imposing liability upon those who make return authorizations would create a strong disincentive for volunteer participation, total immunity creates a separate disincentive for exercising maximum care in making the decision.³⁰¹

Exacerbating this problem is the lack of any meaningful impetus by the state to see that the law’s other goals, such as the educational requirements and training for coaches, are being met.³⁰² When the bill was passed in the spring of 2013, the Ohio Department of Health said neither it, nor any other state department, had enforcement responsibility.³⁰³

This is unsettling, given the evidence of a lack of volunteer practices among school districts in a study conducted by Kent State University at the time the law was passed.³⁰⁴ The survey of high schools found that many schools either did not have a policy for tracking and management of concussions, or had some vague

unreasonable under the circumstances and is substantially greater than negligent conduct.

Id.

²⁹⁸ *Id.*

²⁹⁹ Even if they were perhaps a bit reckless by, for example, sending the star quarterback back into the championship game.

³⁰⁰ Benjamin Lanka, *New Law Regarding Youth Sports Concussions Raises Questions*, MARION STAR (Apr. 21, 2013),

http://www.marionstar.com/article/20130420/NEWS01/304200002/New-law-regarding-youth-sports-concussions-raises-questions?gcheck=1&nlick_check=1.

³⁰¹ Jones, *supra* note 167.

³⁰² While the completion of a brief online concussion evaluation course is required for coaches and referees when applying for an initial pupil activity permit, the procedures for updating those permits and the corresponding periodic completion of concussion management courses is less certain.

³⁰³ OHIO REV. CODE ANN. § 3313.539 (LEXISNEXIS 2013).

³⁰⁴ School of Journalism and Mass Communications, Kent State University, *Concussion*, KENT STATE UNIV., <http://concussion.jmc.kent.edu/> (last visited Jan. 14, 2014).

policy, of which the particular spokesperson was unaware.³⁰⁵ This relatively small-scale project surveyed 26 high schools in the state, and found that 7 of them (27%) had no concussion policy whatsoever.³⁰⁶ For the ones that did, considerable inconsistency was identified among them.³⁰⁷ In one school, the failure to properly record and manage concussions was reflected in the impossible statistic asserted by its district records officer: the Youngstown City School District, with approximately 7,000 students enrolled,³⁰⁸ had not had a single reported concussion in the nine years leading up to 2013.³⁰⁹

Although this study was undertaken at the time of the law's passage, the Ohio High School Athletics Association (OHSAA), which regulates high school athletics statewide, had theoretically been enforcing concussion management policies to which every member high school subscribed.³¹⁰ The 2013 amendments to the OHSAA concussion policy that were adopted in conjunction with the new state law boasted the "leading role" that the association had played in promulgating standards for high schools in the state,³¹¹ but the results of the Kent State study stand in contradiction. If the OHSAA, which in fact *has* the power to disqualify coaches, teams and schools from competition,³¹² cannot certify compliance with a written

³⁰⁵ *Id.* In some cases the person speaking on behalf of the program was the athletic director.
Id.

³⁰⁶ *Id.*

³⁰⁷ Aaron Kinney, *CAR-Concussion Project*, KENT STATE UNIV., http://concussion.jmc.kent.edu/stories/Con_Kinney_Final.pdf (last visited Sept. 2, 2014).

³⁰⁸ *Youngstown City School District Y-Facts*, YOUNGSTOWN CITY SCH. DIST. (Oct. 22, 2009), available at

www.youngstown.k12.oh.us/departments/superintendent/pdfs/District%20Booklet10-22-09.pdf (last visited Dec. 30, 2013).

³⁰⁹ Kinney, *supra* note 307.

³¹⁰ *Implementation of NFHS Playing Rules Changes Related to Concussion and Concussed Athletes and Return to Play Protocol*, OHIO HIGH SCH. ATHLETIC ASS'N, available at ohsaa.org/medicine/Concussions/ConcussionProtocol0111.pdf. This was the OHSAA policy as adopted in 2011, which existed until the statewide legislation was passed in April 2013. *Id.* Of particular import is the supposedly mandatory nature of the regulations, as compared with the findings of the Kent State study. School of Journalism and Mass Communications, *supra* note 310.

³¹¹ *Information on Concussion Management: Concussion Regulations—Updated for 2013-2014*, OHIO HIGH SCH. ATHLETIC ASS'N (Apr. 26, 2013), www.ohsaa.org/medicine/Concussions/ConcussionRegulations.pdf.

Notwithstanding the leading role that the Ohio High School Athletic Association has played in the area of developing policies concerning concussion prevention, recognition and management, in December of 2012, Ohio's Governor Kasich signed into law legislation that was passed by Ohio's 129th General Assembly which incorporated much of what the OHSAA regulations previously mandated.

Id.

³¹² General Sports Regulations 2012-2013, OHIO HIGH SCH. ATHLETIC ASS'N (Aug. 1, 2012), available at <http://www.ohsaa.org/sports/rglts/generalsportsregulations.pdf>.

concussion policy, why would state legislation without an enforcement mechanism yield better results?³¹³

In reality, there has been no follow-up to determine whether Ohio schools and youth athletic organizations are complying with the 2013 law. This is not all that surprising, considering no funding was appropriated for doing so,³¹⁴ and no department of the state has responsibility for enforcement or compliance. The state should not only revise the statute to designate or create a department for oversight and compliance purposes, but appropriate funding (as has been proposed in the federal legislation) to effectuate that goal. Further, the state should rethink its immunity policy for coaches, trainers and medical professionals acting under this statute. While “cracking down on folks and throwing individuals in jail for not complying”³¹⁵ is not a preferable alternative, outright immunity for negligence and recklessness only incentivizes partial- or non-compliance.

V. CONCLUSION

Throughout Ohio, young athletes take to various fields, courts, rinks and pools, engaging in some of the most enjoyable and meaningful experiences of their lives. Surrounding these activities, school and community spirit is bolstered, valuable life lessons are learned, friends are made, and in some cases, lives are changed. Sometimes, lives are changed for the better when that left fielder or cornerback from Ohio gets a scholarship to Stanford—an opportunity that would have never been presented to him without athletics. But other times, lives are changed for the worse, when a brilliant young kid with a full life ahead gets hit the wrong way, or maybe too soon since the last one, and spends the rest of his life struggling to walk or read.

The awareness of traumatic brain injury and its link to athletics grows daily. At the professional level, rule changes are being implemented in every sport, and league lawyers work around the clock to resolve existing litigation and prevent future litigation. This has, in the years since 2009, trickled down to youth athletics, and it is fair to say that around the country there exists a much higher degree of awareness and precaution with respect to concussion than in decades past. But like all systems, this can and should be improved, as research develops and lessons are learned.

In some ways, Ohio’s youth concussion legislation has done the same. A higher degree of awareness and precaution arguably exists than in decades past. But if state legislators want to have a truly meaningful impact, one that reaches even the

³¹³ For an excellent discussion of states’ inability to enforce these concussion laws, see Phoebe Anne Amberg, *Protecting Kids’ Melons: Potential Liability and Enforcement Issues with Youth Concussion Laws*, 23 MARQ. SPORTS L.

REV. 171, (2012).

³¹⁴ H.B. 143, 129TH GEN. ASSEMB. REG. SESS. (OHIO 2013). In contrast, the various iterations of proposed federal legislation trade grants and other financial incentives for compliance. See, e.g., Youth Sports Concussion Act of 2013, H.R. 2118, 113th Cong. (2013), available at <http://www.govtrack.us/congress/bills/113/hr2118>.

³¹⁵ Lanka, *supra* note 299. Nor should it be argued, necessarily, that instances of negligence on the part of coaches or trainers should create enormous liabilities for the leagues or schools that employ them. See Diehl, Erika A., Note, *What’s All the Headache: Reform Needed to Cope with the Effects of Concussions in Football*, 23 J.L. & Health 121 (2010).

smallest school districts and recreational leagues, the reforms discussed in this article should be implemented.

First and foremost, either the state Department of Health or another appropriately designated division of the state government needs to take charge of oversight and implementation of the provisions of this law. This department needs to ensure that all schools and youth athletic leagues have policies to address the education, removal-from-play, and return-to-play aspects of this legislation, and that these policies aspire to the highest possible brain health standards. These high standards should include: (1) mandatory preseason baseline neurocognitive testing, against which tests administered following a suspected or confirmed concussion can be compared; (2) rule changes, including but not necessarily limited to hit counts for youth athletes; (3) a high minimum standard for safety equipment, especially for critical components such as helmets; and (4) a requirement that physicians with clinical education and experience in concussion management or other related neurological health fields make the critical return-to-play decisions.

The department in charge of this law's enforcement should consult with brain health experts and other advocates in the field when creating these standards, and the law should provide for periodic updates, acknowledging the evolving nature of this issue. To meet all of these ends, the state should appropriate funding as deemed necessary by the responsible department and its consultants. If the state lacks the financial resources to accomplish this, federal financing should be explored, whether or not it involves the use or implementation of federal legislation. Until these necessary improvements are made to Ohio's law, its young athletes will be exposed to an unnecessarily high risk of serious brain injury.

In enacting its own youth concussion legislation, Ohio acknowledged the significant hazards related to brain injuries that are associated with contact sports. Not only is youth concussion and traumatic brain injury a public health issue, but when minors engage in hazardous activities at the advice and consent of their caretakers, ethical issues arise as well. Few would argue that youth contact sports should be substantially changed or eliminated altogether. Rather, certain adjustments can be made—many behind the scenes—that will have a profound impact on the safety of the games.

All too often, stories drift through the current of news that tell of life-changing brain injuries suffered by young athletes, many of which may have been avoidable. While Zackery Lystedt's story is unusual, it is not unique. Far more athletes than we care to admit, both young and old, share his burden. Despite longstanding athletic traditions and attitudes, there is growing agreement by experts and laypersons alike that these public health reforms are imperative. Ohio's legislature must heed this call and act accordingly, to ensure the continued benefits and legacies of our youth athletic programs while maximizing the safety of our participating youth.