Concussions in Youth Sports: Preventing and Healing the Invisible Wounds
Report by the National Council on Youth Sports Safety

Concussions in Youth Sports: Preventing and Healing the Invisible Wounds is a comprehensive, public health-oriented report developed by the National Council on Youth Sports Safety that addresses concussion prevention and management in youth sport. This report will help all sport stakeholders by enhancing the evidence base of concussion prevention and management, informing future directions for outreach and community education, and developing health policy and advocacy.

For more information visit www.youthsportssafety.org
Dear Reader,

As the co-chairs of the National Council on Youth Sports Safety, we are excited to bring you this comprehensive report, *Concussions in Youth Sports: Preventing and Healing the Invisible Wounds*. This report is a compilation of best practices collected during the Protecting Athletes and Sports Safety National Tour.

Concussions in professional, college, and youth sports, as well as traumatic brain injuries (TBI) in war, have affected large numbers of American athletes and members of the U.S. Armed Forces, causing an unprecedented number of *invisible wounds*. America’s consciousness has been heightened on this subject in recent years, stimulating new initiatives.

Over a decade of research into the long-term effects of TBI has led to an ever-growing concern over the health and safety of athletes of all ages. We are particularly concerned about the safety of youth athletes in general, and especially young women, who participate in organized and team sports more than ever before. Young women who play soccer, basketball, lacrosse, field hockey, and softball – and even those who participate in gymnastics and cheerleading – sustain concussions at a higher rate, suffer more severely from the symptoms, and have longer recovery periods than their male peers. Because it is not clear under what conditions a concussion can occur, our focus must be on preventing concussions among young athletes.

The National Council on Youth Sports Safety was formed in 2013 to advance research and education on concussion prevention. The Protecting Athletes and Sports Safety National Tour was launched in 2015 to raise awareness about the incidence of sports-related concussions among youth athletes and to collect the best available science on concussion prevention and management. The Protecting Athletes and Sports Safety Community Sports Huddles educated participants on: (1) the science of concussion; (2) changing the culture of coaching in youth sports; (3) making informed decisions about the equipment and diagnostic tools available to youth athletes and local communities; and (4) using public policy as a tool to advance concussion prevention.

This report summarizes the guiding principles and recommendations for guidelines within those four areas. Organizations and communities will benefit greatly from this report to reinforce the evidence base and inform future directions for outreach and community education, and for evolving health policy and advocacy.

Sincerely,

David Satcher, MD, PhD

Eliot Sorel, MD
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Executive Summary

*Concussions in Youth Sports: Preventing and Healing the Invisible Wounds* is a comprehensive report and compilation of best practices collected during the Protecting Athletes and Sports Safety (PASS) National Tour.

Sports-related concussions affect over 200,000 youth athletes each year, and there is growing concern that the knowledge gaps and cultural paradigms for concussion must shift to improve safety in youth sport. Youth athletes – as well as many adults surrounding them – may not be aware of the signs and symptoms of concussion and therefore simply do not know what to look for or report. Moreover, athletes recovering from concussions may not be adequately accommodated at school when they return to learning.

Sport-related concussions can also be overlooked by athletes, coaches, trainers, parents, teachers and others. This problem may be even more prevalent in areas where youth sports activities are underfunded. Athletes may be reluctant to tell their coach, trainer, or parents if they have symptoms of a concussion. Youth athletes can be influenced by a culture in sports that encourages “toughness” or “shaking it off” and that stigmatizes “weakness” for leaving the game or practice due to injury.

Research into the long-term effects of traumatic brain injury (TBI) has led to an ever-growing concern over the health and safety of athletes of all ages. In 2010, the Satcher Health Leadership Institute at the Morehouse School of Medicine (SHLI/MSM) partnered with the NFL to address the growing concerns with former NFL players who had suffered concussions while playing football. SHLI/MSM hosted Community Huddles in 15 cities nationwide that included private discussions with former players and their families, and community town-hall forums.

The National Council on Youth Sports Safety (NCYSS) was formed in 2013 to advance research and education around concussion prevention in youth sport. NCYSS assembled a panel of 18 multidisciplinary national authorities and formed five transdisciplinary work groups:
1. Research and Science
2. Coaching, Training and Officiating
3. Technology and Manufacturing
4. Policy and Legislation

In 2015, NCYSS launched the PASS National Tour, modeled after the NFL Community Huddles hosted by SHLI/MSM. PASS Community Huddles were held in Atlanta, Los Angeles, Chicago, Dallas, Pensacola, Denver and Washington, DC. The PASS National Tour sought to raise awareness about sport-related concussions among youth athletes and to collect the best available science on concussion prevention and management. There were four Focus Areas.

**Research and Science Focus Areas:**
- Guiding principles related to the science of concussion
- Short- and long-term consequences of concussions and repetitive head impact exposures that do not result in concussion symptoms
- Management and prevention of concussions
- Challenges to changing the culture of how concussions are viewed

The Research and Science Work Group sought to provide general education to attendees through “Concussion 101.” They also gathered information regarding guiding principles in the region of each Huddle, and provided education on concussion, prevention, and signs and symptoms. Finally, they discussed neuropsychological assessment, recovery, long-term effects of concussions, and return-to-participation.

**Coaching, Training and Officiating Focus Areas:**
- Guiding principles related to rules and standards to reduce occurrence of sport-related injuries
- Integrating best techniques and positive player feedback
- Link between physical activity and academic achievement
- Challenges that exist in implementing return-to-play requirements

The Coaching, Training and Officiating Work Group reached out to stakeholders (parents, athletes, coaches and administrators). The same inquiries into community practices were introduced at each Huddle. Those in Atlanta,
Los Angeles, and Chicago used breakout sessions with a scripted presentation and dialogues among community attendees. The Huddles transitioned from breakout sessions to single audience forums in Dallas, Pensacola, and Denver that focused on target audiences.

**Technology and Manufacturing Focus Areas:**
- Equipment and tools available to youth athletes and local communities
- Types of equipment available for youth engaged in organized sports
- Information on equipment certification and diagnostic devices
- Challenges to identifying innovations that can protect youth athletes from concussions and traumatic brain injuries

The Technology and Manufacturing Work Group discussed evidence for technology in each phase of concussion, from prevention to ongoing clinical management, to help Huddle participants be more informed consumers. Huddles were organized around a series of fundamental questions consumers should ask about any technology, followed by question-and-answer sessions on topics including prevention, monitoring, diagnosis, and clinical management.

**Policy and Legislation Focus Areas:**
- Implementing public policy to advance concussion education and prevention
- Local concussion laws, considerations, and lessons learned
- Barriers to implementation
- Strategies for implementing federal legislation

The Policy and Legislation Work Group included advocates from the community who discussed moving forward with public policy measures. Discussions included expanding the coverage of existing return to play laws, measures limiting hits in contact sports, and establishing “return-to-learn” procedures—a protocol for restricting an athlete from, and returning an athlete to, educational and cognitive activity following a concussion.

The Satcher Health Leadership Institute and Milken Institute School of Public Health will continue the momentum generated at PASS Community Huddles through the National Alliance on Youth Sports Safety. Alliance members will be drawn from communities visited during the PASS National Tour and will act as “champions” who are committed to children’s safe participation in sports. Alliance members will develop strategies that promote safety, activity and nutrition for youth; disseminate a set of guiding principles for management of youth sport concussions; and work with local coaches and trainers to incorporate effective models of injury prevention.

Community-based participation to educate, motivate and mobilize residents is a proven method for implementing effective public health interventions because it inspires a sense of ownership, direct investment and tangible results.

We believe that the PASS Community Huddles, in addition to what we communicated and what we learned, set a very important tone for the work of the National Council on Youth Sports Safety and the future of the National Alliance on Youth Sports Safety that will become a leadership model for years to come.
Introduction

Sport-related concussions affect over 200,000 youth athletes each year. There is growing concern that the knowledge gaps and cultural paradigms for concussion must shift to improve safety in youth sport. The Centers for Disease Control and Prevention (CDC) report that emergency department visits due to youth sports injuries increased by 57 percent from 2001-2009.1 Furthermore,

- More concussions occur in high school than any other level;
- Children and adolescents are at risk for concussions in football, soccer, basketball, and other sports, including cheerleading; and
- The rate of concussion and the severity of concussion symptoms may be greater in girls, especially in soccer and basketball.

Despite these trends, sport-related concussions can be overlooked by athletes, coaches, trainers, parents, teachers and others. Athletes may be reluctant to tell their coaches, trainers or parents if they have symptoms of a concussion. Youth athletes can be influenced by a culture in sports that encourages “toughness” or “shaking it off” and that stigmatizes “weakness” for leaving the game or practice due to injury. Moreover, youth athletes – and many adults surrounding them – may not be aware of the signs and symptoms of concussion, and therefore simply do not know what to look for or report. Importantly, athletes recovering from concussions may not be adequately accommodated at school when they return to learning.

Unlike a broken bone where the outward appearance of physical injury is obvious, the student with a concussion may look perfectly “normal” yet may be experiencing difficulties with sensory stimulation. These invisible wounds are often the most frustrating part of recovering from concussion.

Over the past few years, participation has decreased in team sports such as football, baseball/softball, basketball and soccer. The fear of concussions contributes to this trend. As sports participation decreases, sedentary time for youth is on the rise. Parents and educators promote increased physical activity in children for many reasons, including avoiding the risks associated with inactivity (obesity and physical illiteracy). Children’s involvement in team sports improves relationships and communication, and builds character and leadership skills. In 2014, approximately 20 percent of children and adolescents reported getting no physical activity within the last 12

months, a rate that has steadily increased over time\(^2\). Yet a growing body of evidence shows that even short periods of moderate physical activity (e.g. 20 minutes of walking), along with proper nutrition, can greatly improve discipline and behavior in schools and enhance learning, including performance on standardized exams\(^3,4\).

The questions raised are important. We must focus on how to:

- Promote physical activity and support involvement in team sports but prevent injury (including concussions);
- Assure appropriate management when concussions occur;
- Stimulate appropriate return-to-play and return-to-learn protocols;
- Update the rules of athletic contests; and
- Measure the impact and enforcement of existing and new policies.

**The cost of not allowing children to play is too great.**

We need to find a way to encourage youth participation in sports, and we must have the education, research, technology, coaching and overarching policies in place that make sports as safe as possible.

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**Background**

Beginning in 2009, a series of articles in the *New York Times* raised awareness of the increasing concerns over former National Football League (NFL) players who had suffered concussions while playing football. Players experienced problems with memory, anger management, sleep, depression, and even suicide. A study commissioned by the NFL reported that former NFL players were 19 times more likely than the general population to have dementia, Alzheimer’s disease, or other memory-related diseases.

In 2010, the Satcher Health Leadership Institute at the Morehouse School of Medicine (SHLI/MSM) partnered with the NFL to address the growing concerns with former NFL players who had suffered concussions while playing football. The NFL and NFL Player Care Foundation established the NFL Neurological Care Program, in which former players could visit participating sites and receive comprehensive baseline physical and mental health assessments. Participating sites included Morehouse School of Medicine in Atlanta, Mount Sinai School of Medicine in New York, Washington University in St. Louis, Tulane Institute of Sports Medicine in New Orleans, the University of California, San Francisco, the University of Southern California, and the University of California Los Angeles.

For 18 months, SHLI/MSM also hosted Community Huddles that included private discussions with former players and their families, and town-hall forums in 15 cities nationwide. From those forums emerged a strategy for promoting evaluation, care, and support for former players and their families. The strategy includes **NFL LifeLine**, a free, confidential, and independently operated resource that connects callers with trained counselors who can help individuals work through any personal or emotional crisis. SHLI/MSM decided to look further at where concussions were beginning and the implications of a history of concussions.

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**The National Council on Youth Sports Safety**

In November 2013, the National Council on Youth Sports Safety (NCYSS) was formed to advance research and education around concussion prevention. NCYSS formed four transdisciplinary work groups:

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\(^{3}\) Action for Healthy Kids (2013). *The Learning Connection: What You Need to Know to Ensure Your Kids are Healthy and Ready to Learn.* Chicago, IL: Action for Healthy Kids.

NCYSS participated in four Congressional hearings, collaborated with the Congressional Kids’ Caucus on a briefing on sports safety, and participated in the White House Healthy Kids and Safe Sports Concussion Summit. NCYSS hosted events featuring FIFA Chief Medical Officer Dr. Jiri Dvorak and Women’s World Cup Champion and Olympic Gold Medalist Briana Scurry. NCYSS participated in the Making Play Safe for Kids event at the Arthur M. Blank Family Foundation, which was co-hosted by Atlanta Falcons owner Arthur Blank and NFL Commissioner Roger Goodell, and moderated by Dr. Sanjay Gupta, CNN Chief Medical Correspondent.

Protecting Athletes and Sports Safety

In January 2015, NCYSS launched the Protecting Athletes and Sports Safety (PASS) National Tour, modeled after the NFL Community Huddles. The PASS tour had four goals:
1. Launch an all-out effort to reduce and prevent concussions in youth sports;
2. Enhance appropriate concussion management and recovery;
3. Stimulate new research; and
4. Educate and influence policymakers on these issues based on the evolving scientific evidence.

PASS Community Sports Huddles involved over 400 participants in Atlanta, Los Angeles, Chicago, Dallas, Pensacola, Denver, and Washington, DC. Each Huddle targeted parents, youth athletes, coaches, athletic trainers, youth league administrators, policy-makers, medical and health professionals, educators, the media, and funding agencies. Participants were educated on the science of concussion, revolutionizing the culture of coaching and training in youth sports, using public policy as a tool to advance concussion prevention, and making informed decisions about the equipment and diagnostic tools available to youth athletes and local communities.

NCYSS promoted Community Sports Huddles to local school districts, sports leagues, departments of parks and recreation, PTAs, YMCAs, Boys and Girls Clubs, children’s hospitals, local and state government, and youth centers. Participants were targeted through direct contact, the NCYSS website www.youthsportssafety.org, and social media platforms. In each city, NCYSS formed partnerships with local community organizations that served or worked on behalf of youth athletes. NCYSS was committed to ensuring that the audience at each Huddle was representative of a diverse cross-section of the local community and that geography and socioeconomics did not pose barriers to access.

PASS Community Sports Huddles initiated local conversations about youth sports safety; promoted primary prevention, public health orientation, and early intervention; and sought to influence policy at the local and state levels. Participants were educated on the science of concussion, using public policy as a tool to advance concussion prevention, revolutionizing the culture of coaching and training in youth sports, and making informed decisions about the equipment and diagnostic tools available to youth athletes and local communities. PASS Community Sports Huddles raised awareness about sports-related concussions among youth athletes and promoted research and best practices on the management of those injuries. The events also featured professional athletes and community leaders who support continued efforts to raise awareness and educate communities about prevention and treatment of sport concussion.

NCYSS also learned from parents and athletes about their experiences in youth sports before and after concussions. A PASS Student Ambassador (a youth athlete impacted by sports-related concussion) addressed participants at each event. Many had been outstanding athletes and suffered repeated concussions, which
incapacitated them from future performance in the sport they loved. And sadly, we heard from parents who had lost a child following repeated concussions.

What Needs to be Done: Research and Science Work Group Summary

- We need to change the culture because players continue to be reluctant to report concussion. Players voiced concerns about letting teammates down if they are removed from play. Continued efforts at education need to remain a critical focus in the hopes of further changing the sports culture regarding concussions. Through such education, players may be more willing to tell a coach if they think a teammate has a concussion.
- Primary care and urgent care physicians (often the initial entry point for youth with concussions) may not know best practices for the identification or management of concussions.
- We need more uniform guidelines. Improvement is needed in knowledge translation, translational research, and dissemination of the evolving research information to the medical and athletic communities and to the public.
- Athletic trainers should be available at high-risk games and practices.

What Needs to be Done: Coaching, Training and Officiating Work Group Summary

- There should be state-by-state resolutions to mandate comprehensive education for prevention of all youth sports injuries, to better manage liability exposure created by untrained volunteer coaches.
- We need a voice to encourage government and/or stakeholder stimulus for a comprehensive technology platform using a mobile app shared by parents, coaches, athletic trainers, caregivers, and administrators (at no cost) that delivers education in prevention and care, and collects injury reporting data for research.
- Determine the scientific basis for best practices for each demographic group through data collection from such a common technology platform, ideally assessing underserved groups and communities.

What Needs to be Done: Technology and Manufacturing Work Group Summary

- Helmets should be new or reconditioned/recertified every 1-2 years.
- All helmets should be carefully fitted by a qualified person. The CDC Heads Up for Parents app offers tips for helmet fitting (http://www.cdcfoundation.org/HeadsUp).
- Helmet fit should be checked regularly throughout the season, after any changes in head covering (dorags or bandannas), or after any substantial haircut.
- Bike and snow sports helmets should be replaced after any accident.
- Sensor technology is evolving rapidly. Ask for evidence of accuracy via independent testing.
- Concussion apps vary widely with respect to function and quality; an app cannot replace an evaluation by health care personnel.
- Train the coaches or athletic staff on the use of apps before the season starts.
- Systematic recording of injuries across a season is key for any organization to set rules, policies and procedures.

What Needs to be Done: Policy and Legislation Work Group Summary

- Significant policy changes should be evidence-based.
- Non-school-based youth sports should be encouraged to adopt best practices such as return-to-play protocols. Such progress can be tied to the use of public facilities for non-school sports play.
- Changes in how games are played can have a significant role in preventing concussions, such as limiting contact during practices.
- Coach education is key, and coaches should be certified in concussion continuing education.
- Now that every state has passed some form of a return-to-play law, similar protocols are needed about return-to-learn after a concussion.
Introduction

The primary goals of the Research and Science work group were to provide general education to attendees through “Concussion 101,” and to gather information regarding guiding principles for Huddle communities. Attendees were from the lay public, and often had limited knowledge and understanding of local research and science.

Community Huddles

The Research and Science focus of the Huddles were called “Concussion 101.” We provided education on the signs and symptoms of concussions and discussed best practices in education and prevention. Panelists included pediatricians, sports medicine physicians and clinical psychologists. Presentations during the “Concussion 101” portion of the Huddles focused on the following:

- Guiding Principles – We hoped to better understand the common practices regarding reducing concussion risk in the community and talk with community members about the state of the science.
- Sports Culture – We hoped to learn more about the current culture regarding concussion recognition (i.e., are athletes trying to hide symptoms?) and who is responsible for athlete safety (e.g., coach, athletic trainer, parent).
- Education – We hoped to get a better idea of where different segments of the public receive their information (parents, athletes, coaches, trainers and media) to determine how best to disseminate findings.

Concussion education focused on several aspects of concussion diagnosis and concussion prevention, including our current understanding of concussion burden; concussion risk factors; concussion prevention; concussion signs and symptoms; measures to assess cognitive abilities and neuropsychological assessment; long-term effects of concussion; and return-to-play and return-to-learn following concussion.

Guiding Principles

Understanding the Burden

- Concussions can and do occur across all physically active sports and recreation activities.
- Both the risk and mechanisms of concussion vary by sport/type of recreation activity.
- Understanding such differences can help parents make informed decisions regarding participation in sports/recreation activities, including wearing protective equipment and assuring that coaching and education interventions can help keep their children as safe as possible.

Prevention

- Promote good sportsmanship and fair play.
- Officials should enforce the rules of the game.
- Athletes should wear appropriate equipment that is properly fitted and in good repair.
• Encourage coaches and coaching staff to be knowledgeable about concussion recognition and removal from play when concussions are suspected.
• Coaches should incorporate safe play into practices and competition.
• Promote a culture that makes it acceptable and expected for athletes and teammates to step forward if a concussion is suspected.

Signs and Symptoms
• Be aware of concussion signs/symptoms. Identifying concussion symptoms can be done by the athlete, teammates, athletic personnel, family or teachers. If concussion is suspected, then REMOVE THE PLAYER from play. Signs and symptoms of concussion vary but may include:
  o Headache
  o Dizziness
  o Difficulty thinking clearly, feeling in a fog
  o Difficulty remembering concentrating
  o Amnesia
  o Confusion
  o Sleeping either more or less than usual, trouble falling asleep
  o Feeling slowed down, delayed responses
  o Headache
  o Blurred vision
  o Nausea or vomiting
  o Sensitivity to noise or light
  o Ringing in the ears
  o Problems with balance
  o Irritability
  o Nervousness or anxiety
  o Depression
  o Fatigue

Measurement of Cognitive Abilities
• Neuropsychological assessments measure the brain's “thinking” (cognitive) abilities such as learning, memory, attention/concentration, processing speed, and reaction time; these are often disrupted by concussions.
• “Baseline” testing that measures these cognitive abilities before injury is often routine. They are measured again after an injury, with the difference in scores being one way to measure recovery (or continuing deficits).
• These tests must be interpreted by someone well-trained in them – ideally by, or in consultation with, a neuropsychologist.
• Although very useful, these tests should NOT be used in isolation to make return-to-play decisions.

Recovery and Long-Term Effects
• We cannot predict exactly what symptoms someone will experience from concussion.
• Concussions can change temperament, and may lead to depression, irritability, mood swings, memory impairment, change in sleep patterns, poor concentration, poor balance, slowed reaction time, and sensitivity to light/sound. Not everyone presents with all symptoms, and most symptoms will resolve over 7-14 days. Younger athletes may take longer to recover, with most recovering within three weeks.
• Long-term effects of concussion and/or repetitive head impact exposure are potentially cumulative and likely the result of changes in brain functioning. It is important to protect the brain from sport-related injury.

Return-to-Play and Return-to-Learn
• Return-to-play includes and is preceded by return-to-learn and return-to-socialization.
• There is a gradual process for return-to-learn, return-to-school, return-to-socialization, and return-to-play participation. Individuals with sport-related concussions should have their return-to-play monitored by medical personnel with expertise in concussion.
• Return-to-play should be individualized – there is no set time frame for recovery.
  o The Remove/Reduce, Educate, Adjust/Accommodate, Pace (REAP) protocol, developed by Karen McAvoy, PsyD, is a comprehensive, community-based model for concussion management. REAP uses a team approach to concussion management that includes the family, school athletics (e.g., coaches, trainers), school academic staff (e.g., teachers, school psychologists, neuropsychologists, social workers), and the medical team (e.g., doctors, nurses, concussion specialists). It provides a suggested timeframe for management and everyone’s role. The timeframe emphasizes continued assessment,

5 For more information on REAP go to: http://rockymountainhospitalforchildren.com/service/concussion-management-reap-guidelines
and gradual return-to-school and activity. Return-to-play and return-to-learn are driven by assessment of symptoms. There is an emphasis on educating everyone about symptoms and how to adjust cognitive demands to better accommodate symptoms. Cognitive rest is defined as reduction of cognitive demands, not complete elimination of activity.

- The American Academy of Pediatrics (AAP) Return-to-Learn guidelines are individualized. An online module to assist school administrators with developing a return-to-learn policy can be found at: http://luriechildrens.peachnewmedia.com/store/seminar/seminar.php?seminar=45893

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**Coaching, Training and Officiating Work Group Report**

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**Introduction**

The PASS Community Huddles in Atlanta, Los Angeles, and Chicago used breakout sessions with a scripted presentation and dialogues between attendees and each panel of subject-matter experts. Panelists included local sport medicine physicians, certified athletic trainers, football coaches trained in the prevention and care of concussions, and a former professional football player. The Huddles transitioned from breakout sessions to single audience forums in Dallas, Pensacola, and Denver. The guiding principles that follow are the Advisory Committee’s revisions from the recommendations of the Youth Sports Safety Alliance, based on input from the Huddles.

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**Community Huddles**

The Community Huddle attendees covered the target population of stakeholders (parents, athletes, coaches and administrators). The sports and socio-economic diversity was generally represented, albeit each of the Community Huddles had a different majority of stakeholders. The same inquiries into community practices were introduced in each venue. The process followed two phases in order to initiate a consensus summary. After the Huddles in Atlanta, Los Angeles and Chicago (each of which had a representative cross-section of stakeholders in breakout sessions), a summary of similar community stakeholder statements was determined. Then those statements were vetted in more focused (single audience) meetings in Dallas, Pensacola, and Denver.

In the first three Community Huddles, a model for sports injury preventive practices was introduced by a team of medical experts. The model introduced the concept that a continuum of prevention extends beyond the team of medical experts to include coaches, parents, administrators and athletes. The dialogue that followed was directed by a moderator to find existing trends and confirm practices.

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**Guiding Principles**

**Coaches**
- Administrators at the youth recreational and club level felt that the current sports injury prevention policies regarding the coach’s responsibility for safety (such as making the decision to take an athlete suspected of injury out of the game) have had little or no effect on coaching behavior.

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Administrators said that they lack the tools and resources to properly train coaches in preventive methods. Experienced coaches advocated for the principles of injury prevention to be integrated into teaching of performance of skills, as motivation for coaches to change counterproductive methods. Many coaches do not believe that viewing videos is an effective means of gaining preventive knowledge (leading to a behavior intervention). Most say that they do not feel qualified in injury prevention.

Parents

Parents are growing more fearful of sports injuries but are reluctant to discuss their concerns about injuries with their child’s coach. Physicians report a major increase in office visits (most medically unsubstantiated) for concussions by highly sensitized parents. Administrators consider the legal liability of sports injuries that is emerging in parental consciousness. Youth coaches (most of whom are also parents) reported that pressure to win from parents is a factor in return-to-play decisions.

Athletic Trainers

Sports medicine practices, through providing outreach programs supported by athletic trainers, are the primary source of prevention at the community sports level. Athletic trainers (AT) are under-represented in recreational and club sports.

- When an AT is covering a sports activity, protocols exist. However, even then, the AT’s coverage for assessing concussions rarely reaches all sports and all practice venues.
- The role of ATs and the recognition of their role in injury prevention by policymakers vary greatly from state to state, making it difficult for injury protocols to be standardized.

Athletes

- Administrators reported that “talented” athletes are overexposed to all risks in the name of winning.
- Coaches stated that most athletes under-report injuries.

The clear majority of athletes said that they know a peer who has hidden an injury and a peer whose parents do not allow them to participate in organized sports because of injury fears. Coaches stated that unless there were clearly-stated medical protocols and on-site safety personnel, they believed that return-to-play was a coach’s decision.

Officiating

- Coaches reported that only a minority of officials were unaware of the rules of safety.
- Coaches reported, overall, that most officials had become much more aware of player safety, but were in some instances reluctant to enforce penalties for “rough play” because of pressure from fans.

Administrators

- Representatives of underserved communities report less medical oversight, more peer pressure, and more “quality of coaching” issues.

Stakeholders

- Coaches, parents, and administrators reported that effective education about concussions for coaches, administrators, players, and parents will effectively reduce sports injuries.
- All attendees agreed that effective education for coaches regarding post-concussion injury and proper methods and techniques of playing the sport in question was the most critical tool to address the problem.

Guiding Principles in Youth Sports Injury Prevention for Youth Sports Administrators (based on recommendations from the Youth Sports Safety Alliance)
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1. Offer seasonal orientations that educate parents on the regimens and procedures, specific to each sport, on related risks, signs of injuries, and how to respond appropriately in the event of an injury.
2. Develop confidential lines of communication between parents, coaches, and administrators to discuss personal health-related issues such as injuries and pre-existing conditions related to sports.
3. Require youth coaches to complete a course(s) which focuses on prevention, recognition and understanding of common athletic injuries and immediate first aid.
4. Hold an orientation on the use and sizing of sport equipment prior to the start of the sport season.
5. Require a standard Pre-Participation Examination (PPE). The American Heart Association’s 14-point checklist consists of a detailed personal and family medical history and physical examination, and is recommended for use to assess the potential for congenital and genetic heart disease.
6. Establish a training recovery schedule to prevent overuse injuries.
7. Create a concussion protocol that includes recognition of signs and symptoms and management protocol. The information is to be disseminated to players, coaches and parents/guardians.
8. Monitor hydration and disseminate hydration requirements to players, coaches and parents/guardians.
9. Develop an Emergency Action Plan (EAP) that includes environmental factors such as heat and humidity and lightning, in addition to possible traumatic injuries such as concussions, cardiac arrest and spinal injuries.
10. A sports organization should schedule an annual enactment to rehearse the EAP, including response by the local medical team.
11. Include sports officiating services as part of the EAP.
12. Adopt and gain national utilization of a digital database that tracks the injury history of each athlete.
13. Create a return-to-play policy that parents are to sign at the beginning of the season.
14. Schedule an annual review of all facilities for risk factors.

Technology and Manufacturing Work Group Report

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Introduction

The goal of the Technology and Manufacturing Work Group at each PASS Community Sports Huddle was to discuss facts and evidence for technology in each phase of concussion, from prevention to ongoing clinical management, to help Huddle participants be more informed consumers of technology. The presentations centered on a series of fundamental questions consumers should ask about any technology. These were followed with question-and-answer periods that covered the evidence on topics including prevention, monitoring, diagnosis and clinical management. Finally, we concluded by offering questions for discussion.

Figure 1: Aspects of concussions in which technology can be used. The Work Group presentations focused on reviewing the state-of-the-science regarding technology in each phase.

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Community Huddles

The Community Huddles varied from city to city, and included parents, children, parks administrators, coaches, physicians and other clinicians, and key sport stakeholders. Everyone had an interest in technology, and parents seemed more engaged in researching this phenomenon than others. There was broad consensus that technology application was in its infancy, and all agreed on the need to develop uniform technology standards. No one in the audience at any of the Huddles was using technology other than helmets due to cost, so the focus of the questions and discussion was on helmets and concussions. The audiences were most engaged on the topic of football helmet facts and myths. Our primary point of discussion centered on the fact that helmets and other products may state that they reduce the force of impact by a given percentage, but that does not directly relate to reduced risk for concussion. Another common theme from the audiences was the limited resources all the programs had to invest in basic equipment, much less extra technology. There was no established vetting and approval process for new technology in any of the schools or leagues that attended our presentations. The only program that reported using head impact sensors was a college program in Los Angeles. We learned that injuries were not being logged in a systematic way using technology. Only serious injuries were generally logged, and primarily via a paper accident form.

Guiding Principles

Fundamental Questions to Ask About any Technology
When navigating technology, the following questions can help guide consumers and other key stakeholders to make the most informed decisions possible to protect youth athletes:

- What is the technology designed to do?
- Does the tool measure what we think it measures, and does it do that accurately?
- Is there good-quality scientific evidence?
- Is a given technology effective (i.e., does it accurately prevent/monitor/diagnose/track recovery)?
- Is a given technology reliable (i.e., does it perform the same way every time across all users)?
- If a technology is effective and reliable, for what scenarios does it apply (e.g., age, sport, stage of recovery)?

Technology for Prevention

- Helmets, soft headgear, and mouth guards prevent injuries other than concussions and therefore must be worn.
- There is no good-quality scientific evidence that protective equipment can reduce the risk of concussion. Moreover, reducing the force/severity of impact does not automatically translate to lower risk of concussion.

Technology for Monitoring

- Sensors are used to estimate the impact forces to the head and can collect data that may contribute to an evaluation by a medical professional, in a sense serving as another set of “eyes” for those who need further assessment.
- Sensors cannot diagnose a concussion, and the accuracy and reliability of sensors has been questioned.
- The relationship between the magnitude of impact as measured by the sensors and concussion risk has not been established for youth across all sports.
- Concussion apps are computerized versions of signs and symptoms checklists. An app can help a coach or parent remember the full list of symptoms to evaluate when responding to a possible head injury. Apps also

“I hope by sharing my story I can give an insight into what it is like to struggle after a serious head injury. Being a medical mystery is a struggle, but I hope that I can help educate others to make sports safer for my generation, and all generations to come.”

Isabella Oishi, PASS Student Ambassador
Senior, Seattle Preparatory School
Seattle, Washington
allow the coach or athletic trainer to log symptoms systematically and share information with parents and healthcare providers. Like sensors, though, an app cannot diagnose a concussion. Injury-reporting software is used to monitor injuries on a team/school basis. It can help coaches and athletic staff systematically record and document injuries over time and pinpoint scenarios in which injuries are occurring. Data from injury reporting software can be useful for rules and policy changes.

**Technology for Diagnosis**

- Various instruments are being used to evaluate and diagnose concussions, such as eye-tracking devices and quantitative balance assessment. The clinical utility of these instruments varies widely, and the reliability and validity for children are not well-established.
- Concussion-specific imaging is in the research phase. While these types of technologies have advanced our knowledge of concussions, they need to be used only by specifically trained individuals.

**Technology for Clinical Management**

- Computerized neurocognitive testing – also known as the “concussion test” – can be administered at baseline and after injury to track recovery. Like diagnostic instruments, a wide variety of technology is used in concussion management, all of which have strengths and weaknesses. Each test is considered one tool in the toolbox, and if used, must be part of an interdisciplinary approach.
- Computerized testing alone cannot tell when it is safe for a child to return to play. Specialists in these areas should be consulted to best address these issues.

**Discussion Questions**

- What is the vetting and approval process in your school or league for new technology?
- Has anyone implemented impact sensors and how are you using the data? If you aren’t using them, have you received any pressure to do so? From whom?
- How are injuries logged in your school, league, or team (e.g., paper/pencil, injury-reporting software, etc.)?
- What other technologies did we not mention in our presentation that you are hearing about?
- Have any of the technologies you have used changed practice or policy?
- If you are an athletic trainer, what kinds of technology are you being pressured to use, and which categories of technology do you find useful?

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**Policy and Legislation Work Group Report**

**Prepared by:**
Gerard Gioia, PhD, Robert Zayas, Kate Carr, Anthony Green

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**Introduction**

**Return-to-Play Laws:** As PASS began its work in November 2013, all 50 states had passed some type of “return-to-play” law. At their core, these laws require a coach to pull a youth athlete from a game or match if he or she shows the signs and symptoms of a concussion. The player can only return to the game with a signed document from a health care professional stating that the player was medically fit to return to play. In many cases, the laws also require parents and youth athletes to sign a document recognizing that they received some educational content about concussions and for coaches to engage in continuing education about the signs and symptoms of head trauma.

**Huddles Tackle the Role of Public Policy:** In Community Sports Huddles, we heard from legislators and others engaged in advocacy on best practices for moving forward with other public policy measures. Suggestions included expanding the coverage of existing return-to-play laws, measures limiting contact in contact sports, and establishing return-to-learn procedures. “Return-to-learn” is a protocol for removing and returning (often gradually) an athlete to educational and cognitive activity following a concussion.
Committed athletic associations often work in tandem with legislators, as in California, where Ron Nocetti, Associate Executive Director of the California Interscholastic Federation observed that he preferred state laws because it increases the attention paid, and draws the fire away, from coaches and others trying to enforce the rules. A coach can say, “It’s the law.” States with less vigilant associations will see laws imposed on them largely without their input.

Community Huddles

The Community Huddles addressed the wide-ranging impact – and lack thereof – of the state-by-state concussion legislation. Although all 50 states have passed concussion legislation, the ability to track and enforce the law varies widely. States such as California strengthened the law by requiring that training on concussion be included as part of first aid certification by all high school coaches. The strategic importance of athletic trainers assuring adherence to state law was emphasized. The CDC, Safe Kids Worldwide, and legislators agreed that ongoing surveillance was important in the effort to prevent and properly manage concussion.

Guiding Principles

Best Practices for Effective Return-to-Play Laws

Return-to-play laws are stronger with the following attributes.

- The medical professional making a return-to-play call should have specific training on concussions. The Los Angeles Unified School District requires a medical attendant at football games.
- A pre-clearance exam with specific medical instructions should be required. However, there are mixed views on baseline testing.
- The laws should apply to private school athletes and public middle school athletes, not just high school athletes. The new Illinois law applies down to elementary school, as does the Jake Snakenberg Youth Concussion Act in Colorado.
- The laws should apply beyond school sports to club and recreation department teams. An effective way is to tie the requirement to the use of public facilities.
- Schools should enforce the education requirements for coaches, and make the information available to the public. The coach education courses of NFHS allow this.
- Rules should apply to practice, not just to games.
- Some states require a cooling off period after an athlete is pulled from play, ranging from the same day, 24 hours, to seven days, notwithstanding the health care professional's call.
- The laws must apply the rule to all sports in which concussion is a risk, such as cheerleading and swimming.
- Washington, D.C. requires trainers at all high schools that play football but not at the several non-football schools and charter schools.
- A common theme was that future interventions should be based on evidence, including public policy.

“Youth sports are not only the largest population group of athletes, they are also the most underserved when it comes to awareness and care for head injuries.”

Rep. Tim Murphy

8 The seven-day rule of the New Mexico law was at the heart of a recent dispute in which a judge ignored the rule and allowed a youth athlete to play in a championship game, even though the student was unconscious the week before.

Other Requirements, By Law or Regulation

- Coaches should be certified to demonstrate that they have received continuing education on concussions.
- Contact practice should be limited before and throughout the season. In California, middle and high school football teams cannot hold more than two full-contact practices per week during the preseason and regular season, and the full contact portion cannot exceed 90 minutes in a day. Contact practices cannot be held in the off-season.
  - Schools must have a return-to-learn protocol in place, with gradual return to cognitive activity.
  - There should be limits on hours of practice considering heat, humidity, and the chances for sudden cardiac arrest.

Questions Raised

- Should school nurses, athletic directors, referees, and all those who oversee organized sports activity be required to receive concussion training?
- Should a trained athletic health professional (athletic trainer, medical doctor) be required to be on the sidelines at youth sports where there is player-to-player contact?
- Is a single coach capable of maintaining vigilance on the sidelines?

“I hope by sharing Jake’s story it reminds every one of our true purpose and duty—protecting our children, their future and ours.”

Kelli Jantz

Kelli Jantz is the mother of four children. In 2004, she lost her 14-year-old son, Jake Snakenberg, to an unusual complication of concussion – second impact syndrome – suffered while playing football.
Conclusion: Looking Ahead

**Sport-Related Concussions in Youth Sports: Preventing and Healing the Invisible Wounds.** The “guiding principles” learned from the Huddles will influence research, innovations in technology, and education needed to make sports safe for youth by reducing and preventing the incidence of concussions in sport. With the appropriate education, coaching, and skill-building, young people throughout our country can more safely participate in and enjoy all the benefits that sports may offer. The NCYSS report will help organizations reinforce the evidence base of its current work, inform future directions for outreach and community education, and benefit from best practices and policy recommendations based on the best available science on concussion prevention and management.

The Satcher Health Leadership Institute and Milken Institute School of Public Health are continuing the momentum generated at PASS Community Huddles by forming the *National Alliance on Youth Sports Safety*. Alliance members will be drawn from communities visited during the PASS National Tour and will act as “champions” who are committed to children’s safe participation in sports. SHLI/MSM and MISPH/GWU will travel back to the PASS national tour cities, meet with community members, and work with the Alliance to use the information gathered from the PASS Community Huddles. Alliance members will deploy the following activities in their communities:

- Promote safety, activity, and nutrition for youth;
- Disseminate a best practices and policies report for management of youth sport concussions;
- Work with local coaches and athletic trainers to incorporate effective models of injury prevention; and
- Leverage funding to continue nationwide Community Huddles and build the Alliance.

In addition, the Alliance will meet 1-2 times each year to accomplish the following:

- Report on the state of youth sports safety in their communities;
- Share innovative activities and policies that show evidence of protecting youth athletes; and
- Monitor local strategies and make recommendations to improve them as needed.

This strategy directly engages communities from within. Alliance members are the most familiar with the issues important to youth sports safety in their own areas, and the social and political climates in which they will foster and promote the recommendations from the PASS final report. Community-based participation to educate, motivate, and mobilize residents is a proven method for implementing effective public health interventions because it inspires a sense of ownership, direct investment, and tangible results.

Finally, the *National Alliance on Youth Sports* members will deploy activities in their communities that promote safety, activity, and nutrition for youth, disseminate a best practices and policies report for management of youth sport concussions, and work with local coaches and athletic trainers to incorporate effective models of injury prevention.

“Allow yourself time to completely heal before returning to play, keep the importance of the game in perspective to your life, and never lose hope.”

Allison Kasacavage, PASS Student Ambassador
Sophomore, DeSales University
Chester Springs, Pennsylvania
Special Thanks to Our Sponsors

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The Honorable Herb J. Wesson, Jr., President Los Angeles City Council
The Honorable Stacey Thomas, House Minority Leader, Georgia General Assembly
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Northside College Preparatory High School

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David Satcher, MD, PhD

Co-Chair, National Council on Youth Sports Safety

David Satcher, MD, PhD is a physician-scientist and public health administrator with an extensive track record of leadership, research, and community engagement. He is a Phi Beta Kappa graduate of Morehouse College and holds MD and PhD degrees from Case Western Reserve University.


Dr. Satcher has held top leadership positions at the Charles R. Drew University for Medicine and Science, Meharry Medical College, and the Morehouse School of Medicine. He has received over 50 honorary degrees and numerous awards from diverse organizations and agencies. Currently, Dr. Satcher is the Founder and Senior Advisor for the Satcher Health Leadership Institute at the Morehouse School of Medicine, Atlanta, Georgia.

Eliot Sorel, MD, DLFAPA

Co-Chair, National Council on Youth Sports Safety

Eliot Sorel, MD, DLFAPA is an innovative global health leader, educator, health systems performance expert and a practicing physician. At The George Washington University in Washington, DC, Dr. Sorel is Senior Scholar at the Center for Healthcare Innovation and Policy Research and the lead physician teaching Global Delivery – Health Systems and Global Mental Health. Clinical Professor of Global Health, Health Policy and Management and of Psychiatry and Behavioral Sciences in the Schools of Medicine and Public Health, he is founder and chair of the Youth Democracy Forum at the, Elliott School of International Affairs.

Dr. Sorel initiated the innovative Total health approach in 2013. This is a primary care, mental health, and public health collaborative integrated model seeking to enhance quality, access, and sustainability of care, particularly for comorbid, non-communicable diseases that lead in the global burden of disease and disability.

Dr. Sorel is a member of the Oversight Committee of the Transdisciplinary Collaborative Center for Health Disparities Research in the Satcher Health Leadership Institute, with a focus on non-communicable diseases in Region IV of the United States. He was appointed to the District of Columbia Health Information Exchange Policy Board by Mayor Muriel Bowser in 2016. Dr. Sorel has edited seven books, including 21st Century Global Mental Health (2013). He is the lead author of “Integrated Care” position statement of the American Psychiatric Association (2016).
Biographies of Work Group Members

Research and Science Work Group

Arlene Greenspan, DrPh, MPH, PT is the Associate Director for Science at CDC’s National Center for Injury Prevention and Control (Injury Center). As the Injury Center’s lead scientist, she oversees the center’s research portfolio. Previously, Dr. Greenspan was Acting Branch Chief for the Health Systems Trauma Systems Branch, directing the Traumatic Brain Injury, Prescription Drug Overdose, and Health Systems Teams. There, she developed a 5-year TBI strategic plan for the Injury Center and directed TBI surveillance, research, and programs.

Gregory W. Stewart, MD is the Chief of the Section of Physical Medicine and Rehabilitation, the W. Kennon McWilliams Professor in Sports Medicine at Tulane University School of Medicine, Director of the Sports Medicine Program and team physician at Tulane University. He is also co-director of one of the National Football League’s six Neurological Care Programs, and Executive Director of the NFLPA TRUST at the Tulane Institute of Sports Medicine. Dr. Stewart is Board Certified in Physical Medicine and Rehabilitation.

Ruben Echemendia, PhD is the Director of the National Hockey League’s Neuropsychological Testing Program and Co-Chair of its Concussion Working Group. He is also Chair of Major League Soccer’s concussion program and is the consulting clinical neuropsychologist to the U.S. Soccer Federation and the U.S. Soccer National Teams. He is the consulting neuropsychologist to Princeton University’s Department of Athletic Medicine and is also consultant to recreational, high school, college and professional sports teams. He serves on the U.S. Lacrosse Sports Science and Safety Committee, the NCAA Concussion Task Force, and the U.S. Soccer Medical Advisory Committee.

Loretta DiPietro, PhD, is Chair, Department of Exercise Science at the Milken Institute School of Public Health at The George Washington University.

Coaching, Training and Officiating Work Group

Jack Crowe, MEd, has 40 years of coaching experience, and is also the former Executive Director of the American Sports Medicine Institute (ASMI). He won championships at Auburn, Clemson, Arkansas (where he served as Head Coach), and Baylor universities. Most recently, Coach Crowe served as head football coach for 12 years at Jacksonville State University.

Shannon Shy, Esq. is the National Membership Director for American Youth Football, the nation’s largest youth football and cheer organization. He has coached youth football, baseball, and soccer and served as a youth football administrator at every level. He served with the Department of the Navy for 25 years as an active duty and reserve Marine Corps officer, and as a civilian attorney. He is presently Senior Counsel (Land Use) in the Office of the Assistant Secretary of the Navy (Energy, Installations and Environment) in the Pentagon.

Disclaimer: Observations, opinions, and recommendations in this report and of the National Council on Youth Sports Safety do not necessarily reflect the views of any other organization with which Shannon Shy is associated.

Buddy Curry is the Executive Director and co-founder of Kids & Pros, a non-profit organization dedicated to teaching proper football techniques and life skills to pre-high school youth. He was drafted in the second round by the Atlanta Falcons in 1980, and was named the NFL’s Defensive Rookie of the Year. He played eight seasons with the Atlanta Falcons, leading the team in tackles each year, and was named Team Captain. In 2013, Mr. Curry was certified as a Heads Up Football Master Trainer by USA Football, the official youth football development partner of the National Football League. Heads Up Football is a national initiative to help make the sport of football better and safer for youth.

Ron Courson, ATC, PT, NREMT-I, CSCS is Director of Sports Medicine for the University of Georgia Athletic Association. He joined the University of Georgia in May of 1995, after serving four years as Director of Rehabilitation at the University of Alabama and working as an athletic trainer/physical therapist at Samford University, where he played
soccer and ran track and field. He is a national registered emergency medical technician-intermediate and a certified strength and conditioning specialist by the National Strength and Conditioning Association.

Jennifer Bhalla, PhD, MS is an Assistant Professor of Exercise Science at Pacific University. Her training is in sport and exercise psychology with an emphasis in youth development through physical activity. Her research emphasizes positive youth development, cultural and parental influence on sport participation, and issues regarding young athletes. Currently, Dr. Bhalla is working on her MPH in epidemiology from the University of Minnesota.

Chad Gilliland, ATC, MSM is the Chief Operating Officer at the Andrews Institute and Andrews Research and Education Foundation in Pensacola, Florida. Chad has served various roles within sports medicine and orthopaedics, as a clinician, Certified Athletic Trainer, and administrator. He has worked with high school, college, and professional sports teams in Birmingham, Alabama and Pensacola, Florida. Chad worked for Healthsouth Corp. under Dr. Jim Andrews from 1991–1997, with four of those years as an AT.

John Hammett, PhD is the Dean of the College of Education and Professional Studies at Jacksonville State University (JSU). He was previously on the faculty at the University of South Carolina at Aiken. His administrative experiences include director of university wellness programs at University of South Carolina at Aiken and JSU; department head for Health, Physical Education, and Recreation; and both associate dean and dean roles.

National Specialists

Briana Scurry, Goalkeeper, United States Women’s National Soccer Team
Natalie Randolph, MEd, Former Football Coach, Washington, DC
Arthur Caplan, PhD, Drs. William F. and Virginia Connolly Mitty Professor, founding head of the Division of Bioethics, New York University Langone Medical Center

Technology and Manufacturing Work Group

Katherine Price Snedaker, LCSW, founded SportsCAPP in 2009, which continues to focus on youth sports and concussion education and policy through school programs, youth sports education events, and social media. In 2013, Katherine founded Pink Concussions to focus solely on female concussions from sports, military service, accidents, or abuse. Katherine has participated in the Concussion Health & Safety Youth Sports Meetings at the NFL Headquarters since 2012. In 2013, Ms. Snedaker presented and was a featured panelist in Washington, DC at the Institute of Medicine/National Research Council Committee on Sports-Related Concussions in Youth.

Mike Oliver, Esq. has been the Executive Director and General Counsel for the National Operating Committee on Standards for Athletic Equipment (NOCSAE) since 1995. As Executive Director, he manages the day-to-day operations, provides a direct resource for the public on questions regarding equipment performance, safety, and injury prevention in connection with athletic equipment certified to the NOCSAE standard. He also oversees the NOCSAE research grant program and the technical services functions of the Southern Impact Research Center. He is a trial attorney with 30 years of litigation experience in medicine and science.

Kristy Arbogast, PhD, is a Research Professor of Pediatrics at the University of Pennsylvania. Dr. Arbogast served on the Institute of Medicine Committee on Sports Concussion in Youth and led an effort at Children’s Hospital to standardize clinical care of concussion throughout the hospital’s health care network. She is the Co-Director of the National Science Foundation-sponsored Center for Child Injury Prevention Studies at Children’s Hospital, University of Pennsylvania, and The Ohio State University.

Dorothy Bedford, MBA, developed a passion for youth sports concussion safety after her daughter’s 14-month recovery from concussion. “The Unmarked Detour,” published at MomsTEAM.com, shares the family’s journey as they worked with doctors, sought promising therapeutic approaches, and struggled with educators. The case appears in Ahead of the Game, a Parent’s Guide to Youth Sports Concussion, by Rosemarie Moser, PhD.
Gerard Gioia, PhD is a pediatric neuropsychologist and the Chief of the Division of Pediatric Neuropsychology at Children’s National Medical Center, where he directs the Safe Concussion Outcome, Recovery & Education (SCORE) Program. He is a Professor of Pediatrics and Psychiatry at The George Washington University School of Medicine and directs the Neurobehavioral Core research laboratories for Children’s National’s Clinical and Translational Science Institute, and the Intellectual and Developmental Disabilities Research Center. He has developed several smartphone apps for concussion, Concussion Recognition & Response and Concussion Assessment and Response (CARE Sport), the Acute Concussion Evaluation (ACE) and ACE Care Plan, a pediatric neurocognitive test for concussion, and post-concussion symptom scales for children and parents.

Kate Carr is President and CEO of Safe Kids Worldwide, a global network of organizations dedicated to providing parents and caregivers with practical and proven resources to protect kids from unintentional injuries. Ms. Carr’s experience in leading worldwide organizations includes serving as president and CEO of the Elizabeth Glaser Pediatric AIDS Foundation. Her political experience includes serving as Special Assistant to the President, Office of Public Liaison, at the White House and working on multiple local, state, and national campaigns.

Robert Zayas is the Executive Director of the New York State Public High School Athletic Association; the third largest high school athletic association in the country. He works on behalf of nearly 800 high schools and 600,000 youth athletes in the state of New York. He began his tenure in the Empire State in September of 2012, with 10 years of experience at the New Mexico Activities Association.

Anthony Green is Director of Public Policy for Safe Kids Worldwide, and advocates for policies—legislation, regulatory measures, funding, educational programs and other means—to protect children. He oversees relationships with agencies and organizations involved in child related consumer product safety, including the Consumer Product Safety Commission and the National Highway Transportation Safety Administration. Green attended the Villanova University School of Law and clerked for a Pennsylvania Supreme Court Justice.

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