

Limiting Head Impacts Among Youth Is Smart, Overstating Scientific Consensus Is Not

On January 18, 2018, an article by Dr. Lee Goldstein of Boston University and colleagues in *Brain*, a leading neurological journal, was released and touted as proving the link between subconcussive hits to the head and chronic traumatic encephalopathy (CTE). That same day the CTE advocacy group - the Concussion Legacy Foundation - announced a national campaign called F14G Football to convert all under-14 football into flag football, thereby eliminating tackle football.

The message sent to assembled media and onlookers was that eliminating tackle football for youth is the key to securing the brains and futures of America's youth.

The truth is not so simple.

The scientific evidence linking casual sports play to brain injury, brain injury to CTE, and CTE to dementia is not strong. We believe that further scientific research and data are necessary for accurate risk-benefit analysis among policymakers for two reasons.

First, evidence-based science calls for research to be conducted under generally accepted principles. The case series presented by the Boston University group, primarily due to its ascertainment bias, is weaker than the evidentiary standard sufficient to demonstrate an association or causation and conflicts with pathologic findings in other studies. CTE pathology in the brain has been shown by British pathologists to be present in approximately 12% of normal healthy aged people who died at an average age of 81 years (Ling et al *Acta Neuropathologica*). The presence of CTE pathology in the brain on autopsy has not been shown to correlate with neurologic symptoms prior to death. To be clear, CTE pathology could be present in a normal person.

Indeed, even Dr. Goldstein's article was more measured than his press. His article speaks in terms of likelihoods and qualifiers in noting that, "... the causal mechanisms, temporal relationships, and contextual circumstances that link specific brain pathology to a particular antemortem insult are impossible to ascertain with certainty based solely on post-mortem neuropathology."

There is a disconnect between the categorical rhetoric in media and press releases describing "concussion" research with the muddled and contentious scientific reality. Medical professionals are still debating the long-term effects of head impacts. As noted by Dr. Goldstein's own research, the pathology and link between head impacts and long-term neurological conditions such as CTE is still unclear with questions of causation yet to be settled. This is not to say that head impacts or injuries are desirable - far from it. But there is scientific ambiguity about the prevalence of CTE in the general population in comparison to professional athletes and also about the significance of its presence. In fact, after reviewing all available evidence, the consensus statement from the International conference on concussion in sports states: "A cause-and-effect relationship has not yet been demonstrated between (CTE) and sport-related concussions or exposure to contact sports. As such, the notion that repeated concussion or subconcussive impacts cause CTE remains unknown."

Nothing in Dr. Goldstein's recent study changes this ambiguity, which brings us to our second point. Before enacting sweeping legislation or policy spurred by fears of CTE, policymakers must also conduct a risk-benefit analysis based on a holistic survey of public health concerns. American youth are currently more sedentary than ever before. Compelling evidence from multiple sources shows that organized sports offers youth a way off the couch and promotes the adoption of an active lifestyle thereby mitigating the risks of, among other conditions, obesity, high blood pressure, diabetes, depression, osteoporosis, cardiovascular disease, stroke, drug use, teen pregnancy, and, ironically, dementia. The uncomfortable truth is that tackle football is the number one participation sport among high schoolers in America, it is accessible to children with diverse physiology in ways that other sports are not, and greater public consultation should take place to see if participation rates would remain as high for alternatives to tackle football. Three recently published major studies found no increased risk for later-in-life brain diseases in men who played high school football (Jannsen et al, Mayo Clinic Proceedings; Savica et al, Mayo Clinic Proceedings, Deshpande et al, Jama Neurology). One might also speculate that children who engage in football would seek other less organized risk-taking behaviors if football were not an option.

Setting legislation and public policy is already a tricky process and overstating the degree to which scientific consensus exists may lead to pyrrhic victories. What we seek to establish are meaningful and durable standards based on validated and replicated diagnostic criteria so that the public health response to head impacts and CTE are not emotive or political, but data-driven. The political winds being as fickle as they are, laws and policies enacted without such scientific support will be vulnerable to backlash from those with deep economic and cultural ties to contact sports such as tackle football, rejection by the scientific community, and general confusion and misunderstanding by the public.

In the drive to protect young brains, there are not just two sides. Not everyone is a moral crusader or an NFL stooge. No reasonable person, least of all the professionals signing this letter, want to see youth injured. But when arguing for intervention based on public health or scientific principles, the data must inform the recommendation.

Additional data is required to make a truly informed decision regarding banning of sports. To do so, what is desperately needed is (1) funding from federal and private sources to launch longitudinal, multi-center statistically sound studies, (2) consistent coordinated measures and standards, and (3) facilitation from either government or a consortia of concussion research centers.

Only then will we know whether the perceived neurological risks of tackle football outweigh the benefits. And only then can we more confidently say that we are acting in the public interest.

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