



# Concussion and long-term neurological health: *What does the science tell us?*

## BACKGROUND

Concussions are considered a public health crisis, affecting nearly 4 million adults in the United States every year. Research and clinical care have evolved exponentially over the past 20 years with focus on injury identification and management strategies. More recent efforts have centered on the association between concussion and head impact exposures and long-term neurological health. While much is understood, there is much more left to learn.

## KEY TAKEAWAYS

The University of Michigan Concussion Center invited concussion and neurodegenerative researchers, Drs. Raquel Gardner, William Meehan, and Thomas McAllister, for a roundtable discussion on [Concussion and Long-Term Neurological Health](#). The panelists described how concussions affect individuals across the lifespan and effective ways to communicate these topics with student-athletes, parents/guardians, coaches, and others.



### **Risk for Neurological Impairment after Head Impact Exposure/Concussion**

At present, current research regarding the relationship between neurodegenerative disease and head trauma is not fully resolved. Head trauma thought to be one of many factors (e.g., genetic and social factors) that may increase an individual's neurodegenerative disease risk. For those with a higher natural risk for neurological impairment, it is believed that a brain injury and/or repeated head impacts may accelerate the presentation of symptoms and other clinical features.



### **Concussion Incidence and Recovery Across the Lifespan**

Concussion incidence varies across all sports and ages. Several research groups ([CARE-SALTOS](#), [NFL-LONG](#), and [TRACK-TBI](#)) have initiated longitudinal studies to understand how concussion and/or head impacts affect individuals across the lifespan. Early findings suggest the vast majority of those with a concussion history do not have long term impairments. Findings from these groups have informed, and will continue to inform, medical care and policy for athlete health.



### **Long-term Effects from Participating in Youth Contact Sports**

There are numerous long-term health and social benefits to participating in sports, but sport participation also carries concussion risk. The scientific community has yet to resolve who may have long-term issues and the interplay between concussions, head impact exposures, and other intrinsic and extrinsic factors related to risk.



### **Implications for Stakeholders & Future Policy**

The decision to participate in any sport should be done at the individual athlete-level based on the physical and social benefits, as well as the risk for concussion and/or head impact exposure. Sporting organizations and policy makers should engage with the research community to make evidence based decisions around practice and game regulations that can reduce head impact exposure and concussion risk.

## AREAS FOR EDUCATION, RESEARCH, & POLICY CONSIDERATIONS

- **Improved Educational Efforts**

Concussions continue to be under-reported and therefore untreated, highlighting the need for continued education. Athletes, parents/guardians, coaches, and administrators should know the signs and symptoms of concussion and how to access healthcare. In parallel, improved education for care providers (e.g., primary care, nurse practitioners, etc) who manage sport and recreation concussions on returning to the classroom and returning to activity are needed.

- **Continued Support of Large Scale Research**

The impact of concussion and/or head impacts on long-term neurological health is not fully understood. Continued investment in large scale research programs is needed to clarify the relationship and develop targeted mental and physical health interventions.

- **Policy Evaluation and Change**

Sporting organizations and local regulatory bodies should continually evaluate and modify game and practice regulations in order to promote safe participation in sports. Reducing sport-related injuries increases athletes' careers and supports their long-term health.

## REFERENCES

1. Langlois JA, Rutland-Brown W, Wald MM. The epidemiology and impact of traumatic brain injury: a brief overview. *J Head Trauma Rehabil.* 2006;21(5):375-378. [doi:10.1097/00001199-200609000-00001](https://doi.org/10.1097/00001199-200609000-00001).
2. Chandran A, Boltz AJ, Morris SN, Robison HJ, Nedimeyer AK, Collins CL, & Register-Mihalik JK (2021). Epidemiology of concussions in national collegiate athletic association (NCAA) sports: 2014/15-2018/19. *Am J Sports Med*, 363546211069349. [doi.org/10.1177/03635465211060340](https://doi.org/10.1177/03635465211060340).

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*The University of Michigan Concussion Center maximizes societal and individual health through the relentless pursuit of concussion knowledge. The Concussion Center maximizes its impact by facilitating the development and sharing of groundbreaking ideas that translate laboratory, clinic, and community observations into interventions that reduce concussion risk and improve outcomes in those affected by the injury.*

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