

Youth tackle football participation linked to earlier onset of cognitive and emotional symptoms

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Starting to play tackle football before age 12 could lead to earlier onset of cognitive and emotional symptoms among athletes who were diagnosed with CTE and other brain diseases postmortem, according to a new study.

The findings, from researchers at VA Boston Healthcare System (VABHS) and Boston University (BU) School of Medicine, found that among 211 [football players](#) who were diagnosed with the neurodegenerative disease CTE after death, those who began tackle [football](#) before age 12 had an earlier onset of cognitive, behavior, and [mood symptoms](#) by an average of 13 years.

Every one year younger that the individuals began to play tackle football predicted earlier onset of cognitive problems by 2.4 years and behavioral and mood problems by 2.5 years. This study included 246 deceased football players who were part of the UNITE (Understanding Neurologic Injury and Traumatic Encephalopathy) study and who

had donated their brains for neuropathological examination to the VA-BU-CLF (Concussion Legacy Foundation) Brain Bank. Of those 246, 211 were diagnosed with CTE (with several having evidence of additional brain diseases, such as Alzheimer's) and 35 had no evidence of CTE, though several had evidence of other neuropathology. Of the 211 with CTE, 76 were amateur football players and 135 played at the professional level.

"Youth exposure to repetitive head impacts in tackle football may reduce one's resiliency to brain diseases later in life, including, but not limited to CTE," said corresponding author Ann McKee, MD, chief of Neuropathology at Boston VA Healthcare System, and Director of BU's CTE Center. "It makes common sense that children, whose brains are rapidly developing, should not be hitting their heads hundreds of times per season."

It is noteworthy that, although age of first exposure to tackle football was associated with early onset of cognitive and emotional problems, it was not associated with worse overall severity of CTE pathology, Alzheimer's [disease](#) pathology or other pathology. In addition, earlier symptom onset was not restricted to those diagnosed with CTE. The relationship was similar for the former football players without CTE who had cognitive or behavioral and mood changes that may have been related to other diseases.

"Younger age of first exposure to tackle football appears to increase vulnerability to the effects of CTE and other [brain diseases](#) or conditions. That is, it influences when cognitive, behavioral, and mood symptoms begin. It is comparable to research showing that children exposed to neurotoxins (e.g., lead) during critical periods of neurodevelopment can have earlier onset and more

severe long-term neurological effects. While participation in sports has important health and social benefits, it is important to consider contact and collision sports separately and balance those benefits against potential later life neurological risks," said Michael Alosco, PhD, an assistant professor of Neurology at BU School of Medicine and an investigator at the BU Alzheimer's Disease Center and the BU CTE Center.

The study extends research from the BU CTE Center that previously linked youth tackle football with worse later-life cognitive, emotional, and behavioral disturbances in living former amateur and professional tackle football players, as well as changes in [brain](#) structures (determined by MRI scans) in former NFL players.

Data were collected by conducting telephone interviews with family members and/or friends to determine the absence or presence, and age of onset, of cognitive, behavior and mood symptoms. The interviewers did not know the neuropathological findings and the neuropathologists did not know the individuals' histories.

Although this study supports the idea that there may be long-term consequences associated with experiencing repeated hits to the head during childhood, the researchers stress that it is unclear if their findings generalize to the broader tackle football population and that much more research, particularly prospective longitudinal studies, is needed to understand the association between youth football and long-term consequences. The findings appear online in the journal *Annals of Neurology*.

Provided by Boston University School of Medicine

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