Number of years in NFL, certain positions portend greater risk for cognitive, mental health problems

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Longer NFL careers and certain playing positions appear to each spell greater long-term risk for serious cognitive problems such as confusion, memory deficits, depression and anxiety in former football players,

according to a new report published Aug. 30 in The *American Journal of Sports Medicine*.

The study is believed to be the first to explore the interplay between career length, position and cognitive and mental health outcomes among professional football players.

The analysis—based on a survey of nearly 3,500 former NFL players—was conducted by investigators at the Harvard T.H. Chan School of Public Health and Harvard Medical School as part of the ongoing Football Players Health Study at Harvard University.

The study results show that players who experienced concussions had elevated risk for serious cognitive problems, depression and anxiety, which persisted over time, as long as 20 years following injury. The investigators caution that their analysis relied on players' memories of experiencing concussion rather than on diagnosis at the time of injury. And the findings do not mean that everyone with concussion will necessarily experience cognitive or mental health problems, they add. Contrary to previous reports, the new research did not find a link between starting football at a young age and cognitive problems in adulthood.

On one level, the researchers say, many of their findings make intuitive sense and confirm what some might have already suspected: The longer players remain in the game, the more likely they are to suffer a head injury, which increases the risk for neurocognitive problems. It also affirms that certain positions are more prone to concussions and, therefore, players in them face greater risk for experiencing the downstream of effects of head injury.

Nonetheless, the researchers said, the analysis is the first to document and quantify the risk that stems from lengthier careers and certain high-

impact positions.

Specifically, the analysis showed that players who reported the most concussion symptoms had 22-fold risk of reporting serious long-term cognitive problems and six times the risk of having symptoms of depression and anxiety, compared with those who reported the fewest symptoms.

"Our findings confirm what some have suspected—a consistently and persistently elevated risk for men who play longer and who play in certain positions," said study lead investigator Andrea Roberts, a research scientist at the Harvard T.H. Chan School of Public Health. "Our results underscore the importance of preventing concussions, vigilant monitoring of those who suffer them and finding new ways to mitigate the damage from head injury."

For the study, former players, average age 53, were asked about the number of seasons played in the NFL, their positions and any history of blows to the head or neck followed by symptoms of concussion such as dizziness, confusion, vision problems, loss of consciousness, nausea, headaches and seizures, among other symptoms. Based on the number and severity of symptoms, players were given a concussion score.

Overall, one in eight players (12 percent) reported signs of serious cognitive problems. By comparison, about 2 percent of people in the general population in the United States report such problems. Age made no difference in the interplay between concussion and cognitive problems, the study showed. Those under age 52 reported serious cognitive problems at a similar rate as the rest (13 percent), a finding that suggests neurocognitive decline was likely not a function of mere aging. Alarmingly, that risk remained magnified even in those 45 and younger. Indeed, 30 percent of players 45 and younger who had the most concussions reported serious cognitive problems.

To gauge whether the number of seasons played and position type were linked to depression, anxiety and cognitive problems, the researchers used standard questionnaires commonly used to screen for the presence of such disorders. The researchers compared the proportion of players with serious cognitive problems among individuals with various career lengths—one season, two to four seasons, five to six seasons, seven to nine seasons and 10 seasons or more. Overall, those with the longest careers—10 seasons or more—were twice as likely to report severe cognitive problems compared with players who'd played a single season—12.6 percent in the 10-plus season group reported signs of severe cognitive problems, compared with 5.8 percent in the single-season category. The risk crept up proportionally with the number of seasons played, growing progressively higher as the number of years increased. Every five seasons of play carried a nearly 20 percent increase in risk for serious cognitive problems.

Which position one played also mattered. To evaluate the risk-position link, the researchers divided players into three groups based on the average concussion symptoms per year that players reported in each position. Kickers, punters and quarterbacks had the fewest symptoms per year, followed by wide receivers, defensive backs, linemen and tight ends. The groups with the highest number of symptoms included running backs, linebackers and special teams.

Those in the group with the most concussion symptoms had twice the risk for serious cognitive problems—15 percent of those in this group had cognitive difficulties—compared with those reporting the fewest concussion symptoms (6 percent). Those with the most concussions also had a nearly 50 percent greater risk for depression and anxiety, compared with those playing in the group with the fewest concussion symptoms. One in four in the first group had symptoms indicative of depression, compared with 15 percent of players reporting problems in the latter one, while 27 percent had signs of anxiety, compared with 16

percent in the group with the fewest concussions. Those who played in the mid-range group had a 75 percent higher risk of cognitive problems and a 40 percent elevation in risk for depression and anxiety, compared with players in the group with the fewest symptoms.

Nearly one in four players reported symptoms of anxiety (26 percent) and depression (24 percent), and nearly one in five (18 percent) reported symptoms of both conditions. Career length influenced risk for depression, with every five seasons boosting the risk by 9 percent. The number of seasons, however, was not linked to greater anxiety risk.

The age at which an individual started playing organized football did not affect risk. Indeed, outcomes were similar between those who began playing the game before age 12 and those who began later. The findings, however, pertain solely to former NFL players and not necessarily to the general population, the researchers caution. The question of when a child should start playing organized football remains very much open, and should be made by each individual family, the researchers said.

"The overarching goal of the Football Players Health Study is to unravel risk factors and disease mechanisms and to inform interventions that preserve and optimize player health and wellness," said study senior author Marc Weisskopf, the Cecil K. and Philip Drinker Professor of Environmental Epidemiology and Physiology at the Harvard T.H. Chan School of Public Health. "These latest findings confirm much of what we know but they add much needed granularity and specificity to risk magnitude by career length and position."

"Clearly, not everyone who sustains a concussion is destined for cognitive trouble, but the results of the research highlight just how critical it is to continue to find ways to prevent head injuries from occurring in the first place because of the many downstream and long-lasting effects on physical, cognitive and mental health," said Ross

Zafonte, the Earle P. and Ida S. Charlton Professor of Physical Medicine and Rehabilitation and head of the Department of Physical Medicine and Rehabilitation at Harvard Medical School. Zafonte is also principal investigator of the Football Players Health Study.

Provided by Harvard Medical School