Concussions preventing veterans, athletes from succeeding in college

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Professor Sambit Mohapatra tests Shannon Mahoney, a second-year student in the Doctor of Physical Therapy program, as part of a study focused on identifying appropriate screening tools to detect asymptomatic concussions. Credit: Sally McCay

Many of the more than two million veterans who have taken advantage of the Post-9/11 GI Bill have struggled academically in college. Similarly, albeit for different reasons, so have many college athletes. Results of a new study focusing on the long-term effects of concussions

or mild traumatic brain injury (mTBI) in both populations offers new evidence for why they might not be making the grade.

The study in *Scientific Reports* revealed slower visual and auditory reaction times by veterans and athletes to simple environmental stimuli years after experiencing mTBIs. Participants also struggled with significant reductions in eye-tracking accuracy and were plagued by intrusive saccadic eye movements, making it difficult to focus for even short periods of time.

A discernable difference was measured in oculomotor performance between study participants, whose eyes frequently deviated from a moving laser target, and a control group. The deviation was further complicated by irregular episodic occurrences of fast eye movements known as saccadic intrusions. Consequently, veterans and athletes who displayed no post-concussive symptoms under current protocols are struggling in class due to an inability to follow lectures and retain information from readings, and are missing key parts of class presentations.

Members of the military returning to active duty too soon

The study raises serious questions about whether athletes are being cleared to return to the playing fields too soon, and more importantly, if veterans are returning to active duty while still experiencing cognitive impairments and abnormal eye movements. Current NFL concussion protocols, for example, often have players returning to action the same day or within a few weeks. Results show that veterans and athletes who had a history of concussions years later still have post-concussive symptoms similar to individuals with major traumatic brain injuries.

"Our main concern was with veterans who were getting deployed but still had concussive symptoms that were not getting picked by current protocols," says study co-author Sambit Mohapatra, assistant professor in Rehabilitation and Movement Science at the University of Vermont. "Active duty military need to make fast decisions and may not even realize concussive symptoms are affecting them. What will happen when they go back to Iraq or another war zone and you put them in a very delicate situation?"

Some of the veterans suffer from a toxic mix of post-concussive symptoms and PTSD. Some concussive symptoms, for example, are further complicated by PTSD and depression and are only seen when a student is in a high-stress environment such as academia. Making treatment more difficult is the tendency by student athletes and veterans not to report these symptoms due to social stigma and pressure to return to play or active duty. "When a soldier who has had multiple concussions is dropped into the middle of a war zone, they can experience post-concussive symptoms all over again as well as PTSD, so it's a dangerous and vicious cycle," says Mohapatra.

The study consisted of 36 veterans and athletes with a history of single or multiple mild traumatic brain events sustained during sporting events, motor cycle accidents, and military operations. The average length of time that participants experienced their last concussion was just over 43 months ago. A control group consisted of 36 healthy individuals who had never had a concussion.

Developing coping mechanisms, techniques to improve academic performance

Mohapatra and his colleagues are developing faster, more mobile screening tools that are easily portable to college and professional

sporting events and military training sights and war zones. Many of the screening tools, which are readily available, are not sensitive enough to pick various concussive symptoms. It is also important to note, adds Mohapatra, that a majority of concussions are asymptomatic and would never be picked up by any of the current off-the-shelf screening tools. "Our advanced screening methods have validated certain specific measures of balance and eye tracking that are sensitive enough to pick both symptomatic and asymptomatic individuals with a history of concussions."

Once post-concussive symptoms are identified, researchers hope to develop ways to improve academic performance for veterans and athletes. Mohapatra says some basic changes in teaching can have a major impact. For example, one veteran was missing lines in PowerPoint presentations due to poor eye-tracking ability and became frustrated when not performing well on tests. By simply printing out the PowerPoint and having the student underline each single line as the faculty member reads it solves such a problem, says Mohapatra.

"They never realized they were missing class materials because their eyes were not moving in space effectively, which led to missing lines of text in the presentations," he says. "It's a simple, but effective adjustment. Some veterans experience more serious cognitive problems, which can be further triggered by academic pressure. How to counsel and treat these individuals as well as educate faculty about such asymptomatic individuals who might be dealing with these invisible symptoms is vital to the academic success of these students, and the motivation behind the study."

More information: Alessander Danna-Dos-Santos et al. Long-term effects of mild traumatic brain injuries to oculomotor tracking performances and reaction times to simple environmental stimuli, *Scientific Reports* (2018). DOI: 10.1038/s41598-018-22825-5

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