

YOU ARE INVITED TO ATTEND THE  
DEFENSE OF THE DOCTORAL  
DISSERTATION

**“Identifying and mitigating the risk of negative  
outcomes in athletes with exposure to  
repetitive head impacts”**

by

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<https://rutgers.zoom.us/j/94541451633?pwd=RURKSmZzR1Y3bExzaTF3eVhnME9HZz09>

## **Abstract**

Soccer athletes frequently experience repetitive head impacts (RHI) through purposeful heading as well as unintentional head impacts. These head impacts can result in linear and rotational head accelerations and subsequent movement of the brain within the skull. The accumulation of head impacts, or RHI, can cause neurotrauma that can affect psychological and cognitive functioning. Since greater neck strength and symmetry of strength between opposing neck muscle groups are associated with reduced linear and rotational head accelerations during soccer heading, greater neck strength/symmetry may also help to mitigate the effects of RHI on psychological and cognitive functioning. The goal of this research was to examine the relationship between neck strength/symmetry with psychological and cognitive functioning as well as develop tools to aid in identifying athletes who are at greater risk of the potential negative consequences associated with RHI.

A comprehensive neck strength assessment protocol was developed as part of this dissertation and used to examine the relationships between neck strength/symmetry with psychological and cognitive functioning in soccer athletes compared to limited/non-contact athletes. Lower strength was associated with greater symptoms of anxiety but better performance on memory tasks in soccer athletes only, while neck strength asymmetries were associated with symptoms of depression and somatization. This suggests that increasing neck strength/symmetry may be an effective strategy in decreasing the risk of psychological distress in athletes with higher exposure to RHI. Conversely, since lower strength was associated with better cognitive performance, increasing neck strength/symmetry may not be as effective in mitigating the risk of cognitive performance decrements associated with RHI. Additionally, a tool for quantifying and characterizing RHI in soccer (the Soccer Heads-Up Checklist [SHUC]) was developed as a part of this dissertation to assist in identifying at-risk athletes. Using the SHUC it was found that defensive players were most frequently impacted, thus identifying which athletes should be prioritized when implementing protective strategies, such as neck strengthening. Overall, the results of this dissertation offer preliminary support for using neck strengthening as a strategy to mitigate the risks associated with RHI and provide valuable insight into potential strategies for increasing the safety of soccer participation.