Table of Contents

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The Effects of mild Traumatic Brain Injury in Suprathreshold Auditory Processing

Conner Corbett

Keywords

Humans; Brain Concussion; Speech; Auditory Threshold; Hearing; Cognition; Mobile Applications

Abstract

Individuals with a history of mild traumatic brain injury (mTBI) often report difficulties understanding speech in competition that are not well predicted by the pure-tone audiogram. Previous work has demonstrated relationships between suprathreshold auditory processing abilities and speech understanding in competition. The current study aimed to identify the effect of mTBI on performance for these two variables. It was predicted that participants with a history of mTBI would perform more poorly on each suprathreshold auditory processing task, including the measures of speech understanding in noise, and that performance among measures would be correlated. Participants included 62 individuals with (n=30) and without (n=32) a history of mTBI. Participants completed behavioral tests in the Portable Automated Rapid Testing iPad app that assessed spectral, temporal, and spectrotemporal modulation detection as well as diotic and dichotic frequency modulation sensitivity. Speech understanding in competition was measured in a spatial release from masking task. Regression models were used to determine the effects of mTBI on performance on each measure after accounting for variability in age and hearing sensitivity. Performance on these measures was also used to explain variability in speech understanding in competition. Results showed no significant differences in performance between those with and without a history of mTBI on any of the behavioral tasks. However, despite similar performance across participant groups, results indicate that the suprathreshold auditory processing measures were only predictive of speech understanding abilities in participants without mTBI. These findings suggest that additional factors unique to mTBI must be identified to explain variance in performance. This work will inform future studies that will examine additional factors, including cognitive performance, that likely influence speech understanding in this population.