

Kathleen Burns
James Madison University
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Title: *Distractions in Hearing: Measuring Impulsivity in Service Members with mTBI*

Abstract/Summary

Objective: The purpose of this initial pilot study is to measure the false alarm rates and thresholds of Service Members with mTBI during contralateral and informational masking tests and compare their outcomes to adults without mTBI.

Rationale: Service Members who have experienced traumatic brain injury (TBI) typically experience heightened levels of impulsivity and distractibility (U.S. Department of Veterans Affairs, 2015). Large numbers of blast-injured personnel returning from active duty report difficulties with concentration, auditory memory, and understanding speech in noise, without any peripheral auditory deficits (Silverman et al., 2015). Since 2000, ~339,462 Service Members have been diagnosed with TBI (DVBIC, 2015). Contralateral and informational masking tasks both involve different levels of uncertainty and different forms of central masking. These two tasks will be used to quantify the participants' accuracy in identifying the target stimulus and their associated levels of distractibility and impulsivity. These test methods have previously been used, without any adverse effects, with children with attention deficits as well as adult controls and now in a small sample of Service Members.

Design: Each group, Service Members with mTBI or controls, is composed of individuals between the ages of 18 and 65. The dependent variables are thresholds and false alarm rates in two masking tasks. Each session takes no longer than 45 minutes and includes: tympanometry, an automated audiogram, and the two auditory signal detection tasks (contralateral and informational masking). For the contralateral masking, participants detect a 500 Hz tone while there is an 80 dB, 500 ms octave-band noise presented to the opposite ear. Informational masking involves the detection of a 500 Hz tone, but the masker is 10 randomly selected tones between 1000 Hz and 2500 Hz, presented at an overall level of 80 dB. Following brief procedural training, a 40-trial maximum-likelihood adaptive track estimates the 60% point on the psychometric function. Twenty randomly interspersed no-signal trials estimate false alarm rate.

Results: The contralateral masking and informational masking tasks were used to quantify the participants' accuracy in identifying the target stimulus. The preliminary data obtained from the Service Members diagnosed with mTBI suggest that there is likely an effect of mTBI on the masking measures. The results illustrate that Service Members with mTBI are distracted, but their "profile" for distraction is different, compared to the children with ADHD. In future work it is important to consider the high-stress environments Service Members, including those without an mTBI diagnosis, are exposed to.

Conclusion: The eventual goal of this research is to train the participants to be less distracted and to strengthen their ability to focus on a set task. Preliminary data indicate that the Service Members with mTBI perform with significant variability between subjects.