May 2024

Neurocognitive Performance Differences Between Athletes who are Deaf or Hard-of-Hearing and Athletes who are Hearing

Matthew P. Brancaleone  
*School of Health and Rehabilitation Sciences, The Ohio State University*,  
matthew.brancaleone@osumc.edu

Jaclyn Caccese  
*Chronic Brain Injury Program, The Ohio State University*

James Onate  
*School of Health and Rehabilitation Sciences, The Ohio State University*

Follow this and additional works at: https://scholarworks.bgsu.edu/jsmahs

Part of the Biomechanics Commons, Exercise Science Commons, Motor Control Commons, Other Kinesiology Commons, Rehabilitation and Therapy Commons, Sports Medicine Commons, and the Sports Sciences Commons

How does access to this work benefit you? Let us know!

---

**Recommended Citation**

Brancaleone, Matthew P.; Caccese, Jaclyn; and Onate, James (2024) "Neurocognitive Performance Differences Between Athletes who are Deaf or Hard-of-Hearing and Athletes who are Hearing," *Journal of Sports Medicine and Allied Health Sciences: Official Journal of the Ohio Athletic Trainers Association*: Vol. 10: Iss. 1, Article 2.  
DOI: https://doi.org/10.25035/jsmahs.10.01.02  
Available at: https://scholarworks.bgsu.edu/jsmahs/vol10/iss1/2

This Professional/Faculty Abstract is brought to you for free and open access by the Journals at ScholarWorks@BGSU. It has been accepted for inclusion in Journal of Sports Medicine and Allied Health Sciences: Official Journal of the Ohio Athletic Trainers Association by an authorized editor of ScholarWorks@BGSU.
Neurocognitive Performance Differences Between Athletes who are Deaf or Hard-of-Hearing and Athletes who are Hearing

Matthew P. Brancaleone‡ PhD, DPT, PT, AT; Jaclyn Caccese‡ PhD; James Onate‡ PhD, AT, ATC, FNATA
‡School of Health and Rehabilitation Sciences, The Ohio State University, Columbus, OH; ‡Chronic Brain Injury Program, The Ohio State University, Columbus, OH

OBJECTIVE
There are over 71,000 college students in the United States who are deaf or hard-of-hearing (D/HoH), with many participating in athletics. Athletes who are D/HoH have similar concussion rates to athletes who are hearing at the collegiate level. Differences in neurocognitive baseline performance between athletes who are D/HoH and athletes who are hearing may exist due to misunderstanding of written English instructions or differences in sensory processing. Therefore, the purpose of this study was to compare neurocognitive performance between athletes who are hearing and athletes who are D/HoH.

STUDY DESIGN AND SETTING
Retrospective cross-sectional study. Group computerized baseline setting.

PARTICIPANTS
There were 128 NCAA Division III student-athletes included in these analyses, including 64 student-athletes who are D/HoH (21±3 years, 40 male, 24 female) and 64 student-athletes who are hearing (20±1 years, 40 male, 24 female). The groups were matched by sport contact level (i.e., collision/contact and non-contact).

INTERVENTION
Participants included in the study completed a baseline assessment of the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) between March 2023 and January 2024.

MAIN OUTCOME MEASUREMENT
The ImPACT composite scores, including verbal memory, visual memory, visual-motor processing speed, and reaction time were compared between athletes who are D/HoH and athletes who are hearing using independent t-tests. Alpha level was set a priori p≤0.05. Cohen’s d statistics were also calculated to estimate the magnitude of the effect.

RESULTS
There was a significant difference between athletes who are D/HoH and athletes who are hearing for verbal memory (D/HoH=83.13±11.75; hearing=90.61±9.71; t=3.93, p<0.001, d=0.69), visual memory (D/HoH=70.11±13.82; hearing=79.13±12.84; t=3.82, p<0.001, d=0.68), and visual-motor processing speed (D/HoH=37.33±7.24; hearing=40.90±6.12; t=3.01, p<0.003, d=0.53). However, there was no significant difference between athletes who are D/HoH (0.63±0.08) and athletes who are hearing (0.63±0.11) for reaction time (t=0.08, p=0.94, d=0.01).

CONCLUSIONS
Athletes who are D/HoH had lower ImPACT verbal memory, visual memory, and visual-motor processing speed scores when compared to athletes who are hearing; however, there were no differences in reaction time. These results are consistent with prior work observing lower ImPACT scores in adolescents who are D/HoH compared to adolescents who are hearing. Worse neurocognitive performance in athletes who are D/HoH may be due to misunderstanding of instructions resulting from poor English reading ability, a lack of practice or teaching trials, or differences in sensory processing. Health care providers should consider one-on-one baseline assessment, examination of reading comprehension prior to administration of the assessment, or translation of all English instructions to American Sign Language in order to ensure comprehension of the ImPACT tasks. Overall, baseline neurocognitive assessments of athletes who are D/HoH may be necessary for preseason assessment due to existing differences in performance.

KEY WORDS: Disability, Concussion, ImPACT, Baseline Assessment
REFERENCES

