



Balance in Deaf & Hard of Hearing Adults vs. Typically Hearing Adults: A Cross-Sectional Study

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Background

- >30 million deaf or hard of hearing (DHH) individuals in America¹
- DHH individuals face unique challenges: health inequities, communication barriers, higher chance of concerns related to vestibular dysfunction^{2,3}
- Vestibular function helps maintain balance when the head/body change position
- When the vestibular system isn't functioning properly individuals are at a higher risk for falls⁴
- Deaf children have balance deficits, but no rigorous studies have looked at balance in deaf adults⁵

→ Is there a significant difference between balance in deaf adults and typically-hearing adults?

Research Design & Methods

- Participants:
 - $N_{DHH}=10$, $N_C=10$
 - Age: $M_{DHH}=62$ years old ($SD=13.7$), $M_C=28$ ($SD=8.2$) years old
 - DHH dx: Deaf (4), Bilateral Sensorineural Hearing Loss (5), Bilateral High Frequency Hearing Loss (1), 5/10 have cochlear implants
 - Recruitment: Dane County ODHH and Southwest WI/Dane County Aging and Disability Resource Center. Controls: UW-Madison OT Program
- Cross-sectional design: DHH vs. Controls
- Data collection sessions completed at UW-Madison
- Mini-Balance Evaluation Systems Test
 - Video recorded
- Inclusion Criteria: 1) deaf or HoH, 2) vision at or better 20/40, 3) can walk for ≥ 10 min continuously, 4) ages 18+ 5) MMSE score ≥ 26 , 6) informed consent
- Exclusion Criteria: 1) age-related hearing impairment
- Nonparametric statistics: Shapiro-Wilk ≤ 0.001
- Statistical Analysis: Independent Samples Mann-Whitney U Test

Results

- MiniBESTest total and subcategory scores were analyzed separately
- DHH adults were found to have lower total balance scores on average ($M=23.2$, $SD=3.55$) than controls or typically hearing adults ($M=26.0$, $SD=1.15$). Scores are out of 28 possible points.
- There was a significant difference in balance scores between the two groups, $p=0.043$**
- Two of the four subcategory scores were significantly different: Anticipatory Transitions, $p<0.023$; Postural Responses $p=0.796$; Sensory Orientation, $p=0.023$; Dynamic Gait, $p=0.143$**
- The effect size d of 1.06 indicated a large effect
- There was not a significant difference in balance scores in the subcategories of reactive postural control or dynamic gait
- Tasks that isolated the vestibular sense by removing other mechanisms for maintaining balance (eg. Closing eyes while standing on foam, incline) appeared to challenge DHH participants' balance the most

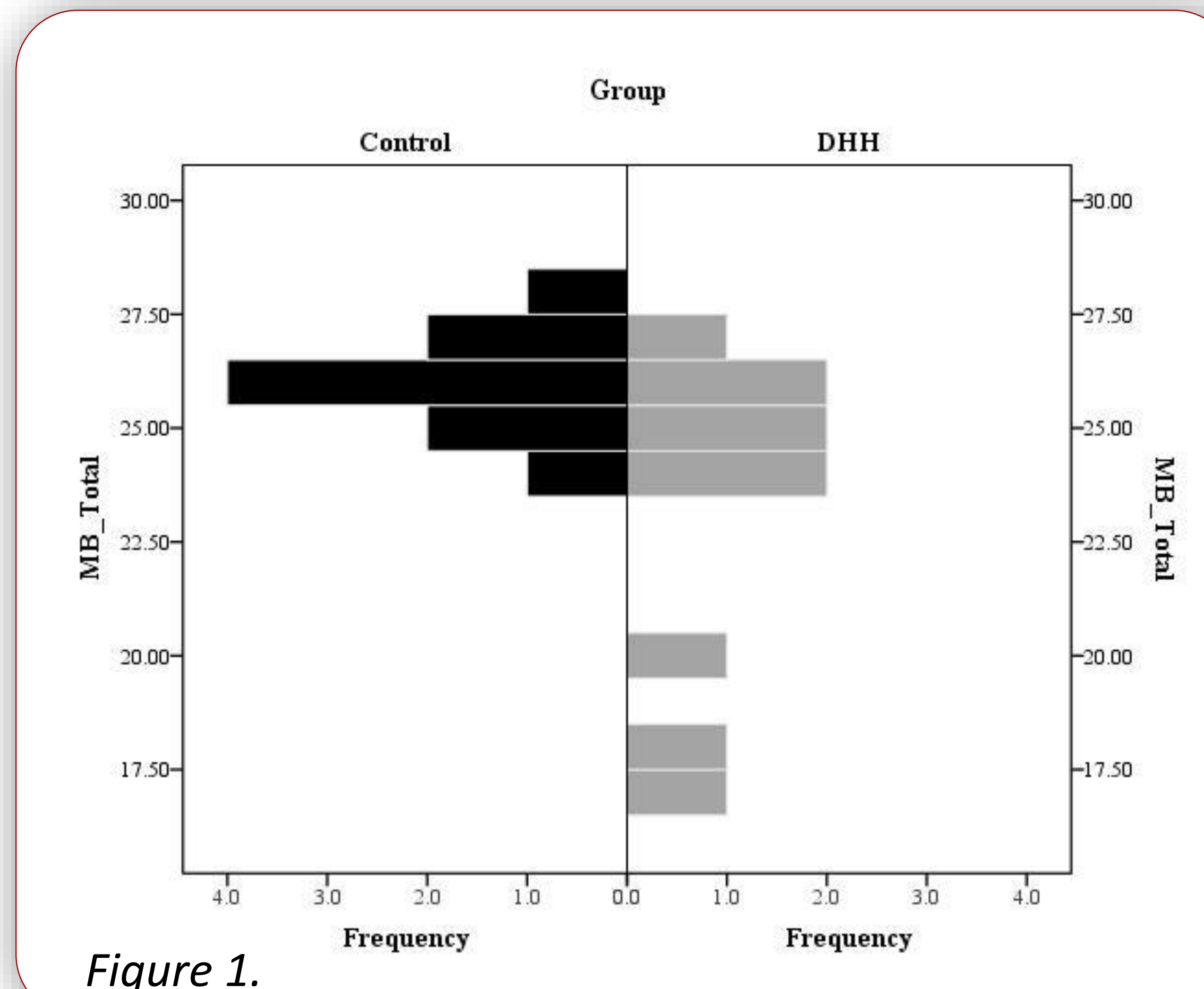
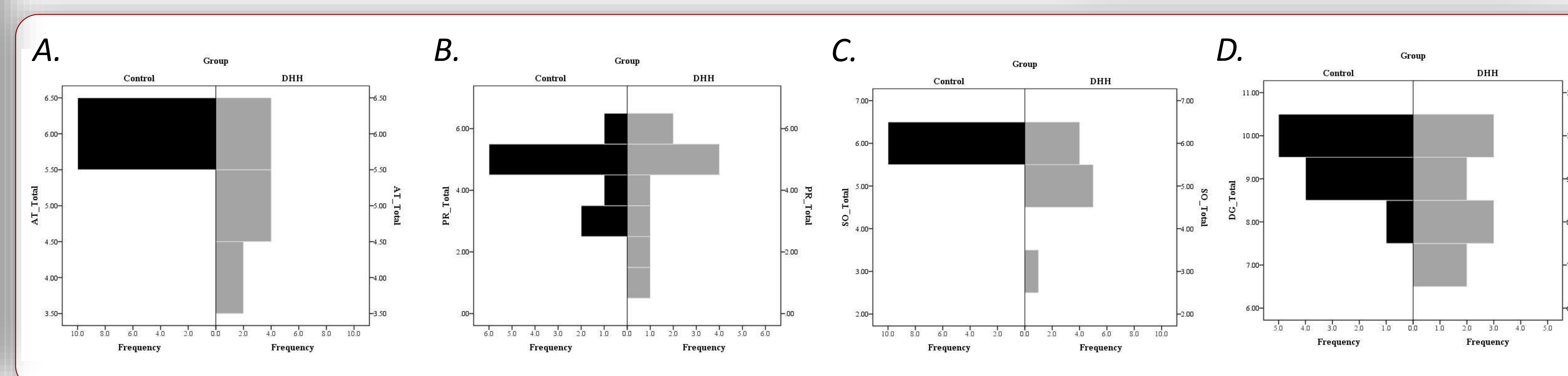


Figure 1 (left). Stem-leaf plot of MiniBESTest total scores for Controls (black) and DHH individuals (grey).

Figure 2 (below). Stem-leaf plots for the MiniBESTest subcategories of A. Anticipatory transitions; B. Postural reactions; C. Sensory orientation and D. dynamic gait. Significant differences were observed in anticipatory transitions (A) and sensory orientation (C).



Discussion/Conclusion

- Lower balance scores may indicate that DHH adults are at a higher risk for falls than their typically-hearing counter-parts
- DHH adults may be experiencing limitations in their ability to participate in ADLs particularly when vision is limited ie. Dim lighting, at night
- 5/10 participant had Cochlear implants; may be contributing to balance challenges if vestibular system disrupted in surgery⁶
- Brainstem mechanisms for balance appear to help compensate for postural changes

Implications

- DHH adults are not receiving specialized health care to address balance
- This population may benefit from OT services to address compensatory strategies and overall balance during occupations
- DHH adults at a higher risk for preventable conditions², implies a need for annual comprehensive balance assessments and health screenings
- Research needed to investigate ADL-specific balance problems

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