Abstract
Little is understood about how hearing loss impacts cognition in young adults. This presentation discusses the results of an experimental study that examined these constructs in young adults with a simulated hearing loss. 80 participants from the University of Arkansas completed a two-part study that included a hearing screening, case history form, and testing of working memory and executive function through validated measures on the NIH Tootbox application. Results indicated a positive correlation between the two variables in the controlled condition. Participants were aware a simulated hearing loss would occur, therefore, were more attentive on the second day of the study.

Introduction
- The World Health Organization predicts that over 800 million people will experience some form of a disabling hearing loss by 2050. This would mean close to 10% of the world will experience some form of hearing loss.
- When the ability to hear is lost, even in a minute amount, cognitive abilities start to decline as well (Lin, 2011).
- Research has been conducted on how cognition is impacted by hearing loss in the elderly (Lin, et al., 2011; Arehart, Souza, Baca, & Kate, 2013) and in children (Cubbertson & Gilbert, 1986; Marschak & Houser, 2008).
- Hearing loss is increasingly prevalent in young adults, which could be a result of poor hearing health habits, such as noise exposure from loud music (Agrawal, 2008).

Older Adults
- In regards to working memory, research suggests that listeners with hearing loss have to focus more of their attention on processing information they missed because they could not hear it. This leaves very little processing left for identifying the linguistic information in the message (Arehart, Souza, Baca, & Kate, 2013).
- The elderly are at an increased risk for hearing loss due to age-related changes. Research shows that executive function declines with conditions such as Alzheimer’s Disease and dementia.

Children
- Cognitive deficits may be associated with deafness in children. This includes working memory and executive function. Academic achievement could be affected in deaf children based on these findings.
- Executive function is vital to adjustment throughout life and adaptation. When a child cannot hear, they miss the access to language that a normal hearing child has regularly. If a hard-of-hearing child does not meet the necessary milestones, executive function will not develop at the same rate as normal hearing peers.

Focus of the Study
- Based on the literature review, our research team asked the question, how does hearing loss affect executive function and working memory in young adults?

Materials
- National Institute of Health (NIH) ToolBox Application
- 4 assessments within the app were utilized to test executive function and working memory
- Executive Function
  1. Flanker Inhibitory Control and Attention Test (Flanker)
  2. Dimensional Change Card Sort Test (DCCS)
- Working Memory
  1. List Sorting Working Memory Test (LSMT)
  2. Picture Sequence Memory Test (PSMT)

Methodology
- 80 participants were recruited
  N = 74 female, ages 18-34
  N = 6 male, ages 19-34
- On day 1, all participants completed a medical case history, a consent form, passed a hearing screening and an otoscopy. They then completed all four assessment without a simulated hearing loss.
- On day 2, the participants were randomly placed in one of two groups to determine if a mild or moderate hearing loss would be simulated. They then took the assessments with the simulated hearing loss.
- Group 1: Mild hearing loss (hearing thresholds between 26-40 decibels) atraumatic simulated through standard ear plugs.
- Group 2: Moderate hearing loss (hearing thresholds between 41-55 decibels) atraumatic simulated through standard ear plugs with the addition of noise canceling headphones.
- The participants were aware a simulated hearing loss would occur, therefore, were more attentive on the second day of the study.

Results
- A Pearson product-moment correlation coefficient was computed to assess the relationship between executive function and working memory.
- There was a positive correlation between the two variables, r = 0.351, p = 0.029, with the correlation being between the DCCS day 1 and DCCS day 2.
- There was a positive correlation between the two variables, r = 0.331, p = 0.037, with the correlation being between Flanker day 1 and LSWM Day 1.
- There was a positive correlation for executive function, r = 0.329, p = 0.038, with the correlation being between DCCS day 1 and Flanker day 1.
- Results indicated a positive correlation between executive function and working memory in the controlled condition (no hearing loss). No correlation was determined for day 2 (hearing loss).
- It may appear as though there was a learned effect between day 1 and day 2, however, none of the day 1 and day 2 results were highly correlated.

Discussion
- The participants were aware a simulated hearing loss would occur on day 2, so it is possible participants were prepared for increased difficulty on day 2, therefore were more attentive on day 2.
- Some limitations found during this study included:
  - Predominately Caucasian females in the 18-22 age range
  - One form for each assessment
  - Small amount of time with simulated hearing loss

Conclusion
There continues to be a need to study the effects hearing loss has on executive function and working memory in young adults.

Future Research
- Several limitations were identified at the conclusion of data collection. For future studies, the following are possible modifications:
  - A more diverse sample of participants
  - Utilization of the different forms of each assessment from the NIH ToolBox app to combat a learned effect
  - Randomization of simulated hearing loss on day 1 and day 2
  - Longer period of time with simulated hearing loss

References
A comprehensive list of references is available upon request via email amel033@uark.edu

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