The Effects of Simulated Hearing Loss on Aviator Performance and Cognitive Workload during Simulated Flight

Heath Jones, Kyle Hale, Kichol Lee, Paula Henry, JR Stefanson, Ryan Mackie, & Jennifer Noetzel

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Army aviators require a level of hearing acuity to communicate in high operational tempos, which includes the use of multiple radios while performing flight operations. Military operations, including rotary-wing aircraft noise, present short-term risks to the communication abilities of Army aircrews and long-term risks to aviator hearing health in the form of hearing loss, which can be temporary or permanent. Hearing loss can render an aviator more susceptible to the adverse effects of degraded communication signal quality and consequently lead to an increased allocation of mental resources to hear, referred to as ‘listening effort.’ Army aviation hearing standards, which are primarily based on pure tone testing and speech recognition scores in quiet, do not necessarily predict the functional impact of hearing loss. Given this, the current study aimed to first determine the scope of hearing loss in Army aviators over the past five years and analyze the impact of current threshold requirements on in-flight performance data from pilots presented with simulated hearing loss.

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The Effects of Simulated Hearing Loss on Aviator Performance and Cognitive Workload During Simulated Flight
Heath Jones¹, Kyle Hale¹,², Kichol Lee¹,², Paula Henry¹,², JR Stefanson¹,², Ryan Mackie¹,² and Jennifer Noetzel¹
¹U.S. Army Aeromedical Research Laboratory, Fort Novosel, AL
²Goldbelt Frontier, LLC, Alexandria, VA

Background
Aviators face several challenges when listening to communications during flight.
• Aircraft are extremely loud environments.
• Multiple radio and internal communication channels are continually monitored.
• Understanding the hearing requirements needed in the aircraft can help identify and improve fitness-for-duty standards and guide aircraft communication systems design.

Scope of Hearing Loss in Army Aviators
1. Quantify the impact of hearing standards on the current force of aviators. The Army recently adopted a new Military Operational Hearing Test (MOHT) to assess the functional impact of hearing loss.
2. Quantify the number of pilots recommended for hearing-related waivers.
3. Determine if hearing-related waivers are granted based on meeting a certain criterion.
4. Identify and validate the correlation between clinical practices and performance measures.
5. Assess the impact of simulated hearing loss on aviator performance and cognitive workload.

Hearing Loss Simulator
- Current Army Hearing Profiles
- Audiometric Testing Using Current Clinical Practices
- Flight Performance Tested in NH407 Flight Simulator

Study Aims
1. Quantify the impact of hearing standards on the current force of aviators.
2. Evaluate the predictive value of Military Operational Hearing Test (MOHT) scores on flight performance for varying degrees of hearing loss and increasing workloads.

Results
Simulated hearing loss decreased all speech scores and increased the fail rate on the Modified Rhyme Test (MRT).
Missed calls increased for hearing loss but not workload.
Flights during high workload were impacted more by simulated hearing loss.
Subjective assessments captured hearing loss and workload effects.

Comparing flight performance and cognitive workload measures against audiometric testing and MOHT scores.

Conclusion. (To be continued)


References
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