

Characterizing the Mental Health and Sleep Burden of Multimorbid Tinnitus and Hearing Loss in Service Members

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Introduction

- Previous studies have reported independent associations between tinnitus and mental health (depression and anxiety) and between hearing loss and mental health, but few have investigated how comorbid tinnitus and hearing loss affects mental health in young populations.
- While tinnitus is known to disrupt sleep, less evidence exists concerning the relationship between hearing loss and sleep or whether hearing loss moderates the association between tinnitus and sleep.
- When they occur early in life, these conditions may influence long-term health and are important to understand.

Purpose: To explore the mental health and sleep burdens of both tinnitus and hearing loss, using cross-sectional analysis of baseline data from a longitudinal study.

Methods

Study: The Noise Outcomes in Service members Epidemiology (NOISE) study is ongoing to longitudinally study the effects of noise and other exposures on auditory function in military personnel.

Participants: The sample of NOISE study participants included 464 Service members and 545 Veterans with a combined average age of 34 years (standard deviation = 7 years). Participants completed audiologic testing and self-report instruments to assess tinnitus and other health conditions, including:

- Tinnitus Screener¹
- Hospital Anxiety and Depression Scale²
- Epworth Sleepiness Scale³
- World Health Organization Disability Assessment Schedule (WHODAS) 2.0.⁴

Design: Based on their audiologic tests and questionnaire responses, participants were divided into four exposure groups: (1) no tinnitus or hearing loss (referent), (2) hearing loss only, (3) tinnitus only, and (4) tinnitus and hearing loss.

Analysis: Unadjusted odds ratios (OR) were used to explore associations between exposure groups and probable depression, probable anxiety, and daytime sleepiness, as well as potential additive and multiplicative interactions between tinnitus and hearing loss on these conditions. Mean WHODAS scores were used to compare self-reported quality of life (QoL) between exposure groups.

Results

Figure 1. Prevalence of tinnitus (Tinn) and hearing loss (HL) by service status.

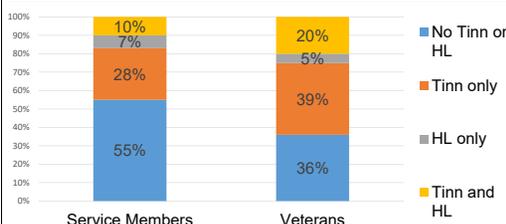


Figure 2. Odds ratios between exposure group and other conditions in Veterans.

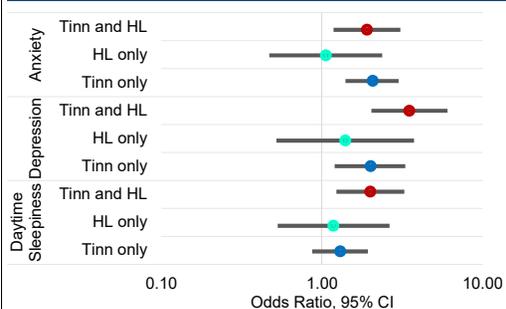


Figure 3. Odds ratios between exposure group and other conditions in Service members.

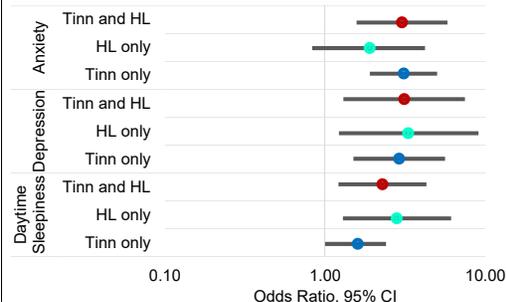


Table 1. Relationship between hearing loss and tinnitus on daytime sleepiness in Veterans.

Exposure group	Odds Ratio (95% CI)
No tinnitus or hearing loss	1.00
Tinnitus only	1.30 (0.87, 1.93)
Hearing loss only	1.18 (0.53, 2.63)
Tinnitus and hearing loss	2.00 (1.23, 3.25)
Observed OR HL+Tinn: 2.0	
Expected OR HL+Tinn: Additive Model: 1.3 + 1.18 - 1.00 = 1.48	

Table 2. Relationship between hearing loss and tinnitus on probable depression in Veterans.

Exposure group	Odds Ratio (95% CI)
No tinnitus or hearing loss	1.00
Tinnitus only	2.01 (1.20, 3.30)
Hearing loss only	1.40 (0.52, 3.74)
Tinnitus and hearing loss	3.50 (2.03, 6.03)
Observed OR HL+Tinn: 3.50	
Expected OR HL+Tinn: Additive Model: 2.01 + 1.40 - 1.00 = 2.41	

Table 3. Relationship between hearing loss and tinnitus on probable anxiety in Veterans.

Exposure group	Odds Ratio (95% CI)
No tinnitus or hearing loss	1.00
Tinnitus only	2.07
Hearing loss only	1.06
Tinnitus and hearing loss	1.91
Observed OR HL+Tinn: 1.91	
Expected OR HL+Tinn: Additive Model: 2.07 + 1.06 - 1.00 = 0.90	

Table 4. Mean (SD) WHODAS scores by service status.

Veterans			
No Tinn or HL	HL only	Tinn only	Tinn and HL
14 (13.2)	19 (18.4)	21 (17.1)	25.1 (17)
Service Members			
No Tinn or HL	HL only	Tinn only	Tinn and HL
6.6 (9.2)	11.4 (14.6)	14 (13.1)	17.4 (17.8)

Discussion

- This preliminary analysis demonstrates that young Service members and Veterans with tinnitus and/or hearing loss also report poorer mental health (see **Figures 2-3**).
- Among Veterans, the effect of having both tinnitus and hearing loss on the prevalence of probable depression, probable anxiety, and daytime sleepiness was greater than the sum of the effects of having each condition alone (see **Tables 1-3**).
- Service members and Veterans with both hearing loss and tinnitus also reported poorer QoL (see **Table 4**).

Conclusions: These results highlight hearing loss and tinnitus as factors that may drive variation in sleep and mental health. Given the importance of sleep and mental health to overall health and cognitive function throughout life, this supports the case for early management of tinnitus and hearing loss.

References & Acknowledgements

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