The Noise Outcomes in Service Members Epidemiology Study – A 10-Year Cohort Profile Update

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INTRODUCTION

The **NOISE Outcomes in Service members Epidemiology (NOISE) Study** is a multi-site longitudinal epidemiology study following Service members and Veterans to understand how noise and other military exposures affect hearing health.[1,2]

Study sites include: (1) Veterans Affairs, National Center for Rehabilitative Auditory Research (NCRAR) in Portland, Oregon, (2) Defense Health Agency, Hearing Center of Excellence (HCE), in San Antonio Texas; and (3) Naval Medical Center San Diego and Camp Pendleton near San Diego, California (SoCA).

METHODS

Study Sample (n=1420):

- 48% Service members; 52% Veterans
- % Male, % Female
- % White, % Minority
- XX% Army, XX% Air Force, XX% Navy, XX% Marine Corps

Audiometric Test Battery (baseline and every 5 years):

- Pure-tone and speech audiometry (in quiet & noise)
- Distortion product otoacoustic emissions (dp-gram)
- Immittance (tympanometry & acoustic reflex thresholds)
- Central auditory processing testing *(new)*
- Auditory brainstem response testing *(new)*
- Tinnitus psychoacoustic assessment (if present)

Questionnaires (14-17, Baseline and annually):

- Self-report hearing health/function/disability
- Noise and other ototoxiciant exposures
- Blast exposures and traumatic brain injury
- Physical (e.g. sleep) and psychiatric (e.g. PTSD) comorbidities
- Other exposures and outcomes related to auditory function

Baseline	Annually	Every 5 Years
• Questionnaires • In-person audiologic & tinnitus evaluation	• Repeat questionnaires	• Repeat questionnaires • In-person audiologic & tinnitus evaluation

RESULTS

TIMELINE/MILESTONES

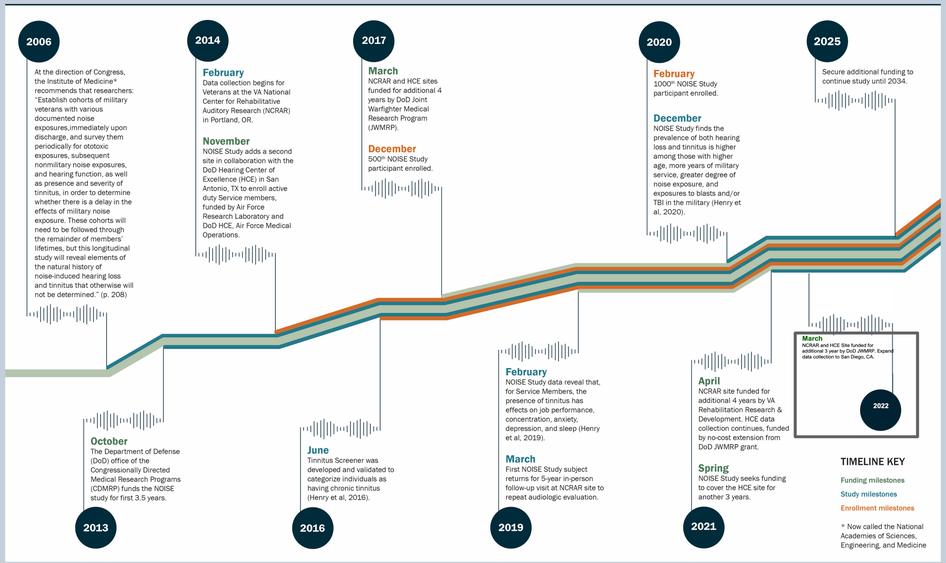


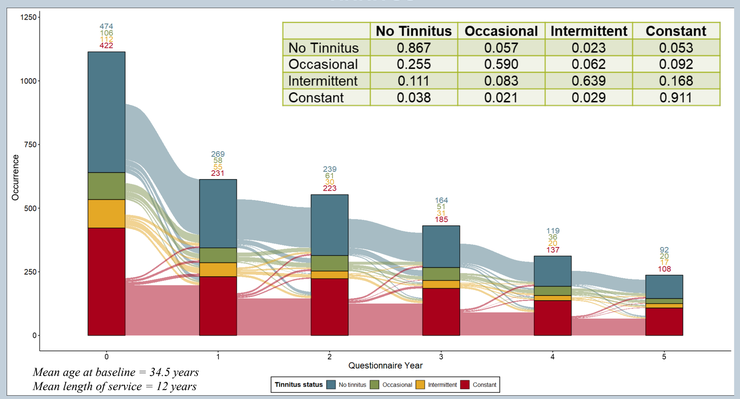
Figure 1. Study timeline highlighting significant milestones from 2006 to 2025 including the expansion of data collection across different sites.[3]

ENROLLMENT

	NCRAR		HCE		SoCA	Total
	Previous DoD Funding (2013 – 2021)	Current VA Funding (2021 – 2025)	Previous DoD Funding (2014 – 2022)	Current JWMRP Funding (2022 – 2025)	Current JWMRP Funding (2022 – 2025)	**All Funding Sources**
Baselines	646	154	437	110	73	**1420**
5-Year Visits	91	133	39	46	n/a	**309**
Follow-up Q's Sent	2446	703	1231	479	n/a	**4859**
Follow-up Q's Received	1473	518	717	221	n/a	**2929**
Follow-up Rate	60%	74%	58%	46.1%	n/a	**61%**
% with Follow-up Data	81%	75%	75%	72%	n/a	**76%**

Table 1. Enrollment numbers and follow-up progress separated by site (NCRAR, HCE, SoCA) and funding cycle.

TINNITUS



	No Tinnitus	Occasional	Intermittent	Constant
No Tinnitus	0.867	0.057	0.023	0.053
Occasional	0.255	0.590	0.062	0.092
Intermittent	0.111	0.083	0.639	0.168
Constant	0.038	0.021	0.029	0.911

Figure 2. Changes in tinnitus perception captured by the Tinnitus Screener over a 5-year period (n=1,114; timepoints=3,260) presented using a Markov Analysis. Tinnitus categories are represented by different color blocks. The transition to different tinnitus categories is represented by the waterfall lines between questionnaire years, with the line thickness corresponding to the number of participants. Table inset displays probability of transitioning between tinnitus categories from year-to-year.

HEARING

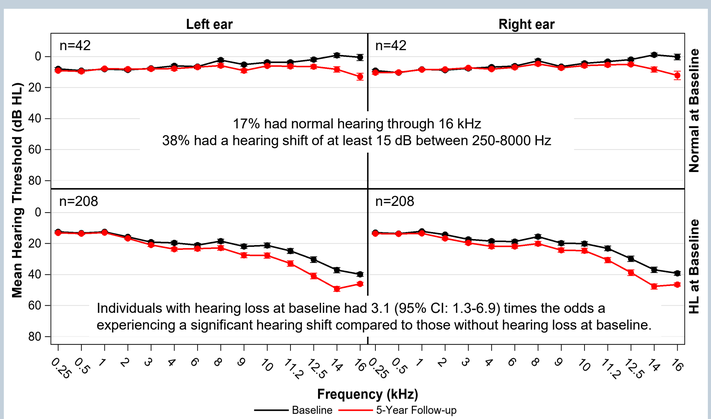


Figure 3. Baseline and 5-year follow-up hearing thresholds separated by participants with normal hearing at baseline (through 16 kHz) versus participants with hearing loss at baseline (n=250). Threshold shift is defined as ≥ 15 dB at any frequency 250-8,000 Hz.

DISCUSSION

- NOISE study continues to grow with over 1400 participants enrolled and followed over 10 years.
- Diverse sample of Service members and Veterans from every service branch.
- Annual survey response rates are high with 74% of participants returning at least one survey.
- Among participants due for their five-year in-person exam, 309 have undergone testing.
  - 10-year follow-up data collection begins 2024
- The probability of transitioning to constant tinnitus is high from year-to-year, especially among those with intermittent tinnitus.
- Those with hearing loss at baseline are at greater risk of hearing threshold shifts between 250-8000 Hz at 5-years.

CONCLUSION

- Understanding changes in hearing and tinnitus over time is crucial for the prevention and understanding of factors contributing to developing auditory issues.
- After almost 10 years of data collection, we have a greater understanding of the causes of auditory health concerns, and how they progress, which can inform future prevention and treatment options.

Download the full poster and learn more about the NOISE study at www.noisestudy.org

SCAN ME

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