

Introduction

- Hearing loss and tinnitus can develop at any time during the life course.
- Military personnel experience hearing loss and tinnitus at higher rates, and at the earlier average age of onset, than the general population.
- These disorders can affect long-term physical health and mental well-being.
- A longitudinal framework is needed to understand the roles that hearing loss and tinnitus play in healthy aging.
- The Noise Outcomes in Servicemembers Epidemiology (NOISE)¹ study examines the effects of early auditory dysfunction on health and aging.**
- The NOISE study was designed to:
 - elucidate the relationship between noise exposures and the natural history of hearing loss and tinnitus; and
 - determine the long-term risk of early-onset hearing loss and tinnitus.

Study Design

Study Sites:

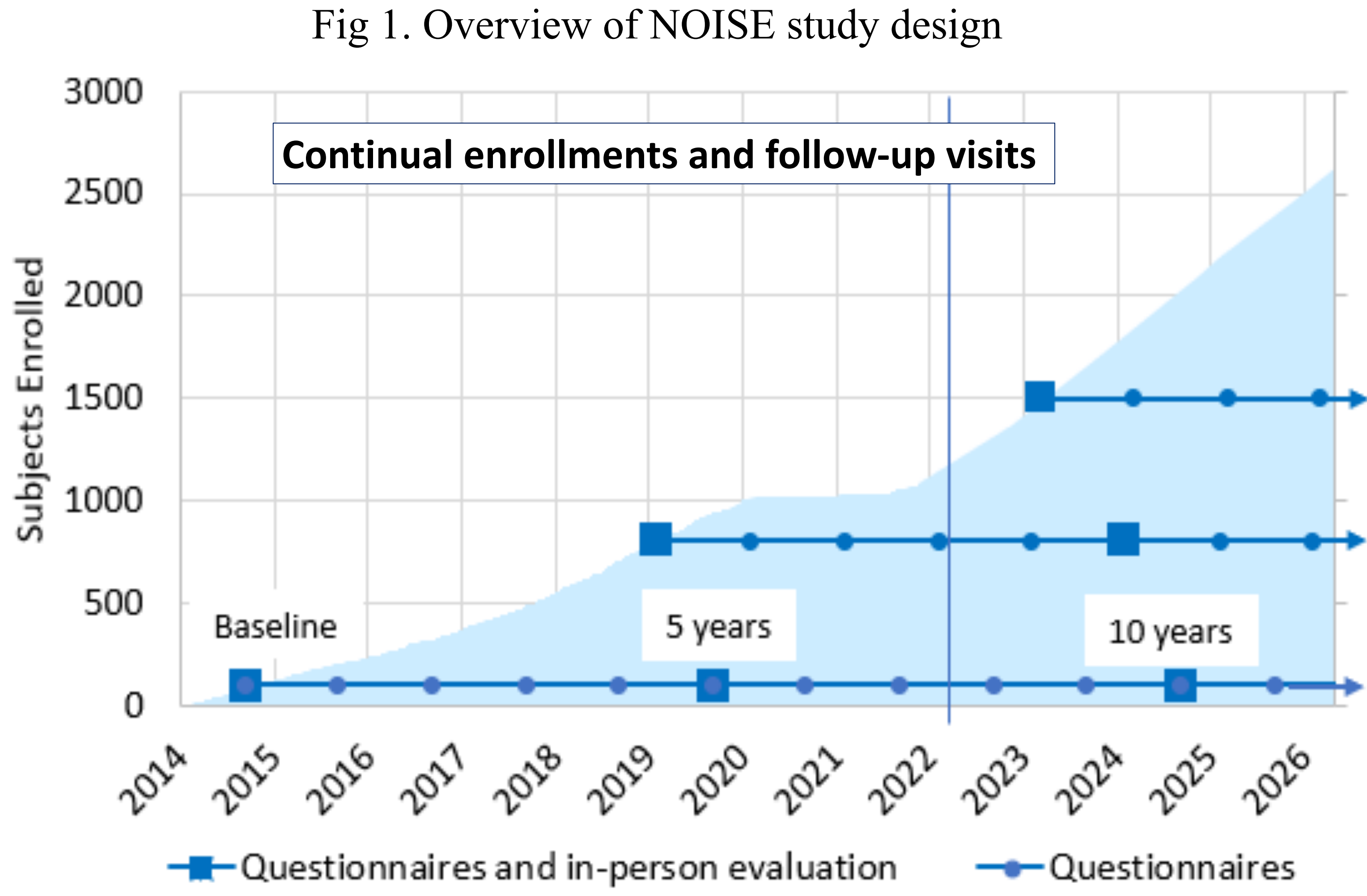
- National Center for Rehabilitative Auditory Research (NCRAR), Portland, Oregon
- DOD Hearing Center of Excellence (HCE), San Antonio, Texas
- Southern California military medical centers (SoCA)

Eligible study participants:

- Any Veteran separated from military service within approximately the last 2.5 years
- Any active-duty Service member

Study Procedures:

- Comprehensive in-person assessment (baseline and 5-year intervals)
- Self-report questionnaires (baseline and annual follow-up): demographics, occupational history, tinnitus status, subjective hearing difficulty, TBI, blast; physical and mental health



Study History:

- Data collection (enrollment and follow-up) underway since 2014
- Funded by DoD Congressionally Directed Medical Research Programs and VA Merit awards, continued support beyond 2025 will allow 20+ years of follow-up

Future Goals and Directions

Future analysis goals for the NOISE study include:

- Assess associations between auditory disorders (tinnitus, hearing loss) and non-auditory (physiologic and psychologic) comorbidities.
- Investigate short- and long-term effects of tinnitus and hearing loss on overall function and quality of life.
- Estimate disability and clinical care burdens.
- Inform resource planning to improve preventative and clinical care services for individuals who experience auditory dysfunction.
- Contextualize NOISE study findings amidst larger global health initiatives.

Study Achievements and Findings

Demographics of currently enrolled participants (n=1062)

Age (years)	mean (SD)
	34.4 (9.0)
Sex	n (%)
Male	800 (75.3)
Female	262 (24.7)

Questionnaire Development

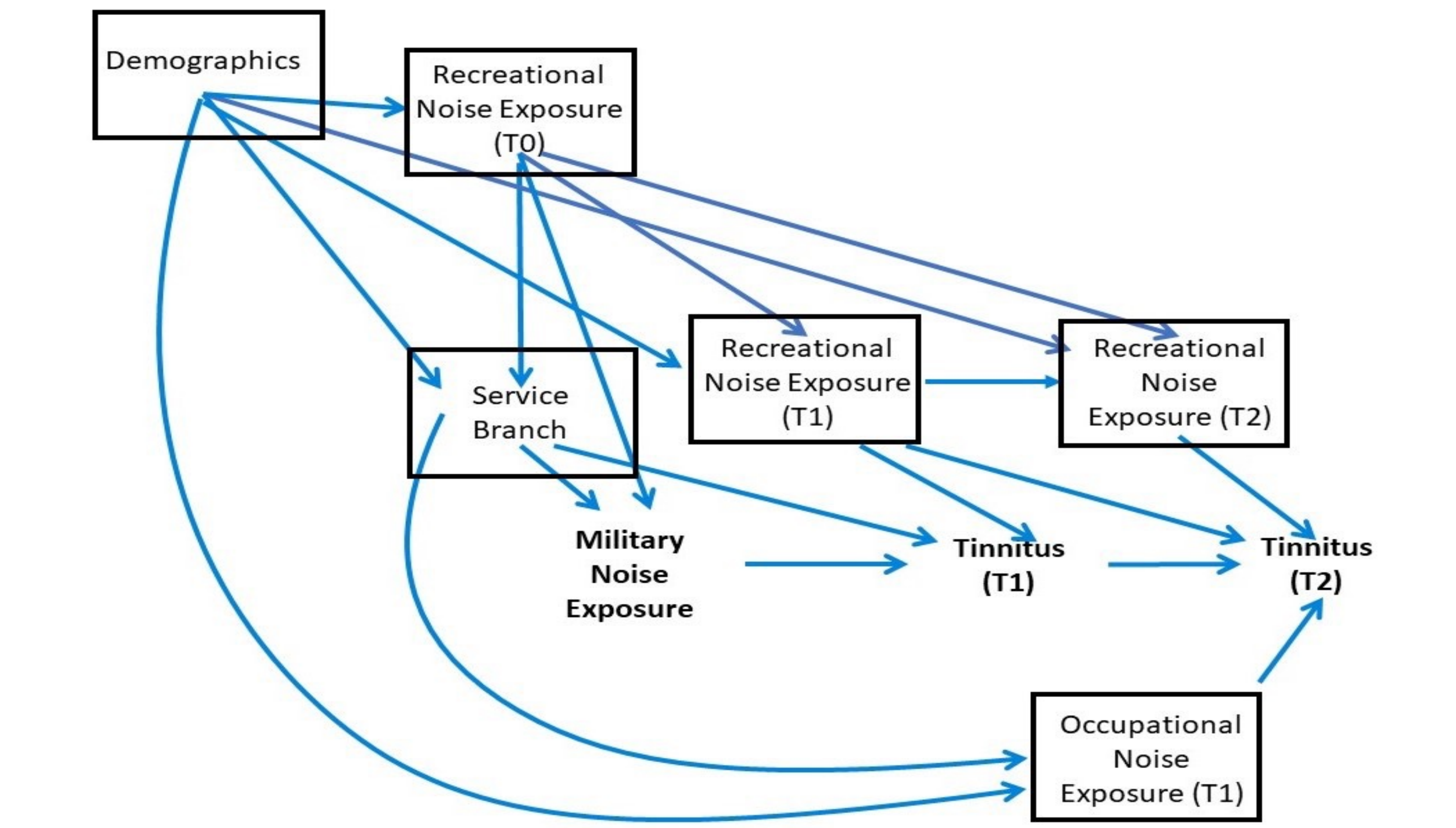
Two questionnaires were developed by the NOISE study team:

- Tinnitus Screener²: a 6-item questionnaire designed to determine tinnitus temporal characteristics and chronic (≥ 6 mo) versus acute (< 6 mo) classification
- Lifetime Exposure to Noise and Solvents Questionnaire (LENS-Q)³: captures overall lifetime history of noise and chemical exposures including duration, frequency, and use of protective equipment

Findings

- Occupational noise exposure during the initial period of military service was associated with the average annual rate of hearing threshold change (Reavis et al., 2021)⁴
- For both Active-Duty Service members and Veterans, the presence of tinnitus has adverse effects on job performance, concentration, anxiety, depression, and sleep (Henry et al., 2019)⁵

Fig. 2: Example causal model examining longitudinal effects of noise exposure sources on tinnitus.



References

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