**CogniAid study protocol.**

Study population: Individuals aged 65 and older attending hearing clinics at The University of Auckland, University of Canterbury will be recruited for the study.

Eligibility and baseline measures:

*Screening for enrolment:* Participants will undergo a full audiological assessment (audiological history, pure-tone audiometry, speech audiometry and tympanometry) with an NZAS registered audiologist.

Cognition screening will be administered by a study researcher using the NIH Toolbox APP. Cognition tests include measures of executive function, attention, processing speed, working memory, episodic memory and language. The age-adjusted composite fluid cognition standard score will be used to determine if an individual is a candidate for study enrolment. Additional measures will also be collected including word-in-noise test, effect of hearing on quality of life using hearing questionnaires (Hearing Handicap Inventory for Elderly, Modified Abbreviated Profile of Hearing Aid Benefit) and demographic information (age, ethnicity, education, occupation, income, marital status, living situation).

Eligible candidates for the study will be aged 65 or older with stable, aid-able hearing loss (unilateral or bilateral) and had below median age-adjusted cognition fluid composite score, with no history of stroke, traumatic brain injury (self-reported) and fast-progressing or unstable hearing loss.

Randomisation: Participants will be randomly assigned 1:1 to invention (CogniAid linear settings; NAL-R) or control (Standard settings) using blocking randomisation. Participants, research assistants and study statisticians will be blinded to allocation until study completion. Participants will be fitted with hearing aids by the study audiologist clinician according to treatment allocation.

Follow up assessments: NIH toolbox cognition tests and hearing loss questionnaires will be re-administered at 6 months and 12 months following initial hearing aid fitting. Any changes in living situation, occupational status, medical events and changes in medication since baseline screening will also be recorded. Participants will also undergo a hearing aid follow-up with study audiologists and hearing aid usage data will be recorded.

Primary outcome measure: The primary outcome measure will be the NIH toolbox age-adjusted Cognition Total Composite score at 12 months. These measures will be obtained using the iPad
based NIH APP. The age-adjusted Cognition Total Composite Score is comprised of several
components, derived standard scores are based on the composite distribution and corrected relative age-related norms. Higher scores indicate higher levels of cognitive functioning. A standard score near 100 indicates ability that is average compared with normative data (we have NZ data for comparison, but will use the larger sample standardised USA norms).

Secondary outcome measures: Secondary outcome measures will include changes in age-adjusted Cognition Total Composite score at 6 months. Measures of Executive Function, Attention, Episodic
Memory, Language, Processing Speed and Working Memory, and Word in Noise test obtained using the iPad based NIH APP and hearing questionnaires HHIE-S and MAPHAB at 6 and 12 months. Hearing aid use and preferences will be examined by comparing hours of use and environments the aids were used in across the 12-month period by evaluating the on-board datalogging recordings of the hearing aids.

Supplementary information:

Cognitive measurements collected during baseline and during follow up time points include the following NIH Toolbox Cognition instruments: Picture Vocabulary Test Age 3+, Flanker Inhibitory Control and Attention Test Age 12+, List Sorting Worming Memory Test Age 7+, Dimensional Change Card Sort Test, Pattern Comparison Processing Speed Test Age 7+, Picture Sequence Memory Test Age 8+, Oral Reading Recognition Test Age 3+, Auditory Verbal Learning Test (Rey) Age 8+, Oral Symbol Digit Test Age 8+, Words-In-Noise Test Age 6+.