

Evaluating sex and race differences in hearing loss and cognition in midlife: A CARDIA Study

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Background

- Hearing loss is associated with cognitive decline and higher risk of dementia in late-life.
- Few studies have investigated whether this association emerges in midlife.
- It is unclear whether associations are similar across race and sex strata; hearing loss is typically less prevalent in Black adults and women, groups with higher prevalence of dementia.
- We evaluated the association between audiometric hearing loss and cognition in Black and White men and women in a middle-aged cohort.

Methods

- Participants: Coronary Artery Risk Development in Young Adults (CARDIA) study, CARDIA Ear ancillary study, Cognitive function ancillary study
- Began in 1985-6 with participants aged 18-30 years, followed for >35 years in Birmingham, AL; Chicago, IL; Minneapolis, MN; Oakland, CA
- Analysis restricted to 1,548 participants who attended the Year 35 visit and completed hearing and cognitive testing

Measures

Hearing Loss:

- Pure-tone average (PTA) across 500Hz, 1000Hz, 2000Hz, 4000Hz (speech range frequencies) from audiometry at Year 35
- Hearing loss defined as a sound detection threshold of ≥25 dB PTA in better hearing ear

Cognition at Year 35:

- Montreal Cognitive Assessment (MoCA)
- Composite Score: Z-score of Digit Symbol Substitution, Rey Auditory Verbal Learning Test delay recall score, Stroop, Letter/Category Fluency

Covariates: age, sex, education, race, study site, body mass index, smoking, alcohol use, high intensity physical activity, medical history based on medications/laboratory values (diabetes, elevated blood pressure, elevated cholesterol) and validated cardiovascular disease events.

Statistical Analysis

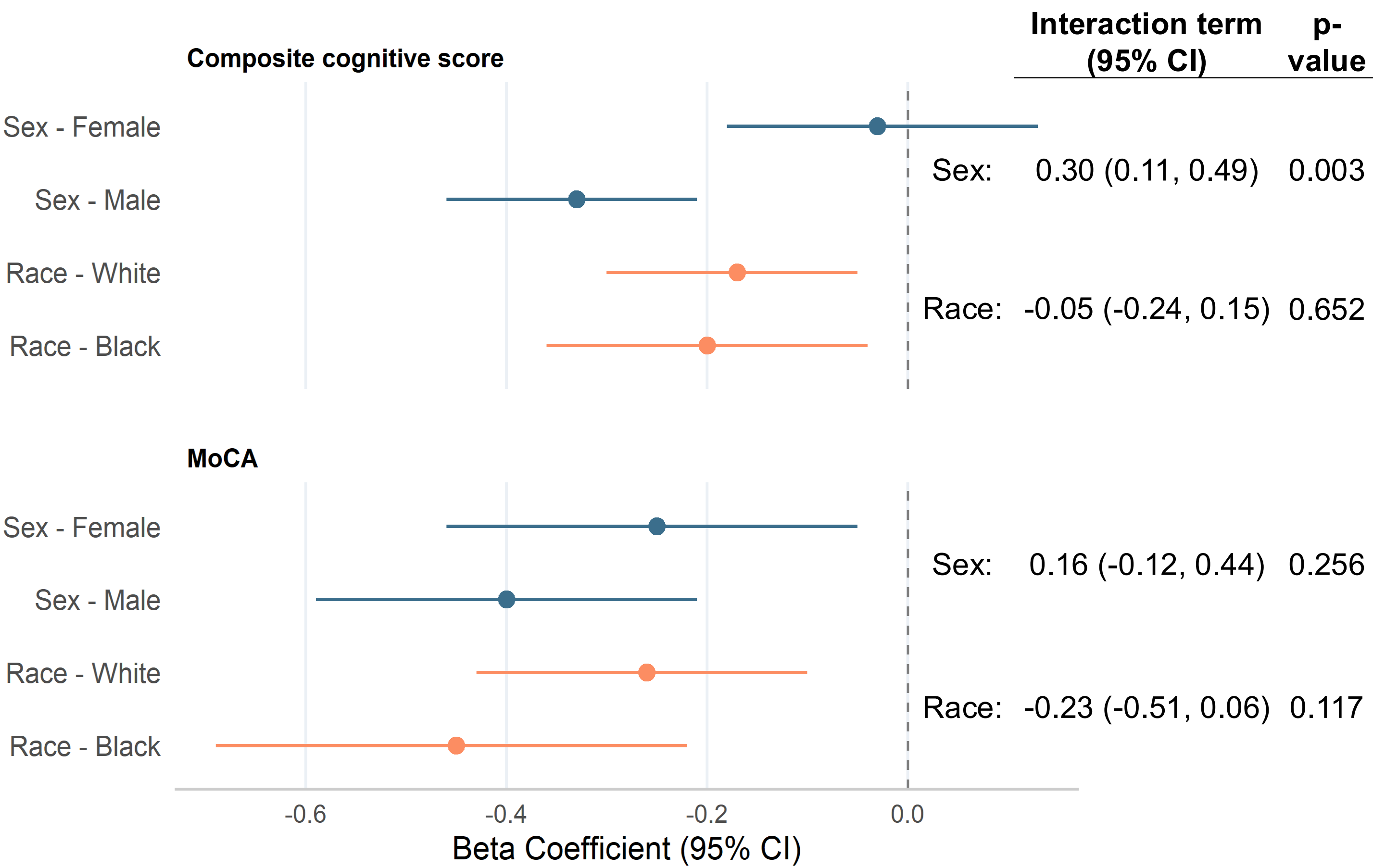
- Linear regressions with cognition as the outcome and hearing loss measures as separate predictors
- Evaluated associations stratified by race and sex; tested for interactions

Results

Table 1. Participant Characteristics		
	None	Hearing loss
n	1,381	167
Age, mean (SD)	61.0 (3.6)	62.7 (3.3)
Female	827 (59.9)	75 (44.9)
Black	625 (45.3)	73 (43.7)
White	756 (54.7)	94 (56.3)
Postsecondary education	1246 (90.2)	15.6 (2.8)
Elevated blood pressure	929 (67.3)	121 (72.5)
Cardiovascular disease	83 (6.0)	12 (7.2)
Diabetes	247 (17.9)	38 (22.8)
Sound detection PTA, dB, mean (SD)	8.3 (4.8)	34.1 (9.0)

Table 2. Multivariable-adjusted associations of hearing loss and cognition (z-scores)		
	Composite Score β (95% CI)	MoCA β (95% CI)
Hearing loss, all participants	-0.18 (-0.28, -0.08)	-0.34 (-0.48, -0.20)

Figure 1. Association of hearing loss with cognitive measures by sex and race



Results

Overall

- 11% of participants had any hearing loss in the speech frequency range. Lower prevalence in women than men, similar by race.
- Hearing loss was associated with worse cognition in participants overall.
- Results were similar with additional adjustment for reported hearing aid use (23% of those with hearing loss) in a sensitivity analysis (not shown).

By sex

- Associations were similar by sex for the MoCA. Female participants had a weaker estimated association hearing loss with composite cognition than men (p for interaction: 0.003).

By race

- Associations were similar for Black and White participants using both the composite cognition measure and the MoCA.

Conclusions

Cross-sectional findings suggest associations between hearing loss and cognition are detectable by midlife.

Associations were generally present even for subgroups with a typically lower prevalence of hearing loss including women and Black participants.

This work, if replicated in longitudinal studies, may help raise the priority of hearing screening in midlife.

Midlife is a time window when mitigation may be most effective in preventing or reducing cognitive decline in later years.

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