



Olfaction, Diet and Cognition in US Older Adults

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INTRODUCTION

Olfactory loss is **common** in older adults and signifies their risk of dementia, which may be partially mediated by **unhealthy dietary choices**. However, there are limited empirical data supporting this connection.

METHODS

Participants

2211 older adults from the Health Aging and Body Composition Study (ages 75.6±2.9 years, 51.8% women, 35.2% Black)

Measures

Olfactory Function (Year 3 visit, 1999-2000): Brief Smell Identification Test, dichotomized into non-anosmia (7-12 correct identifications) *versus*. anosmia (0-6).

Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) diet score (Year 2 visit, 1998-1999): calculated using the 108-item Block Food Frequency Questionnaire.

Cognition (Year 3 visit, 1999-2000): Modified Mini-Mental State Examination (3-MS).

Covariates

Age, sex, race, clinical sites, body mass index, smoking status, alcohol consumption, appetite, total calorie intake, and socioeconomic status (SES), including educational attainment, annual family income, and health literacy measured by Rapid Estimate of Adult Literacy in Medicine (REALM).

Statistical Analysis

Multivariable linear regression to estimate cross-sectional relationships between:

- 1) Olfaction and cognition;
- 2) MIND diet adherence and cognition;
- 3) Olfaction and MIND diet adherence;
- 4) Olfaction and MIND diet adherence in relation to cognition.

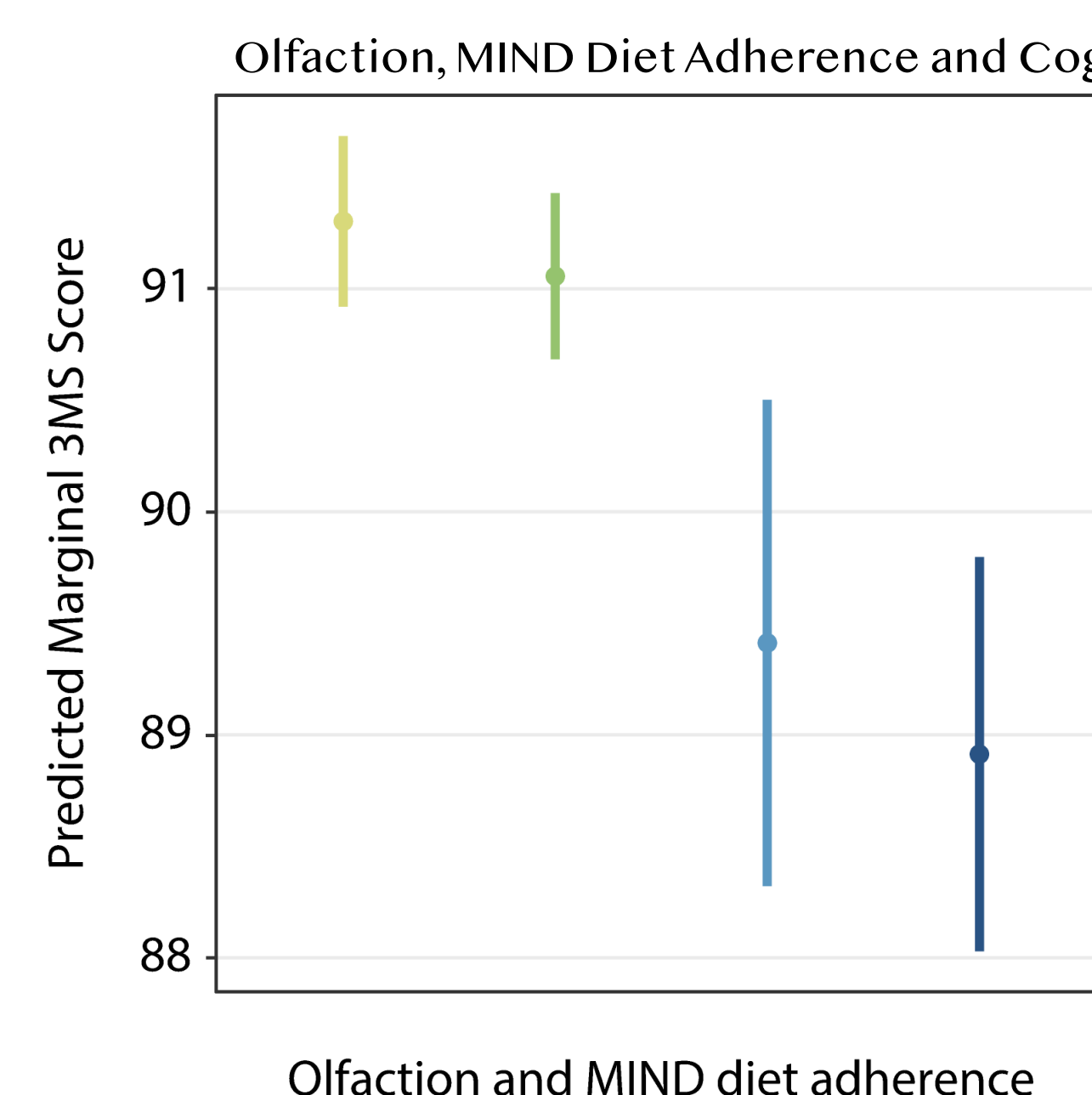
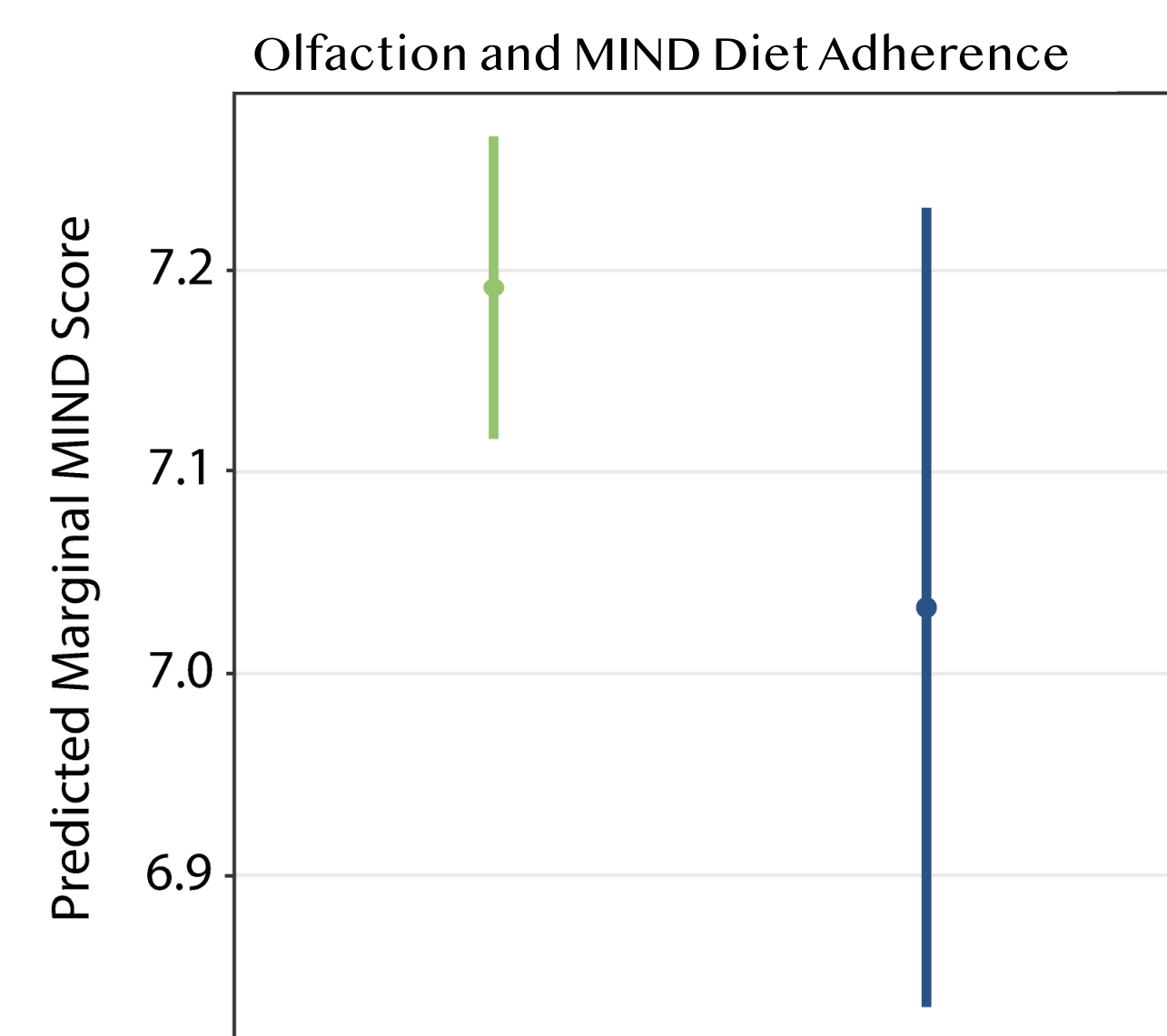
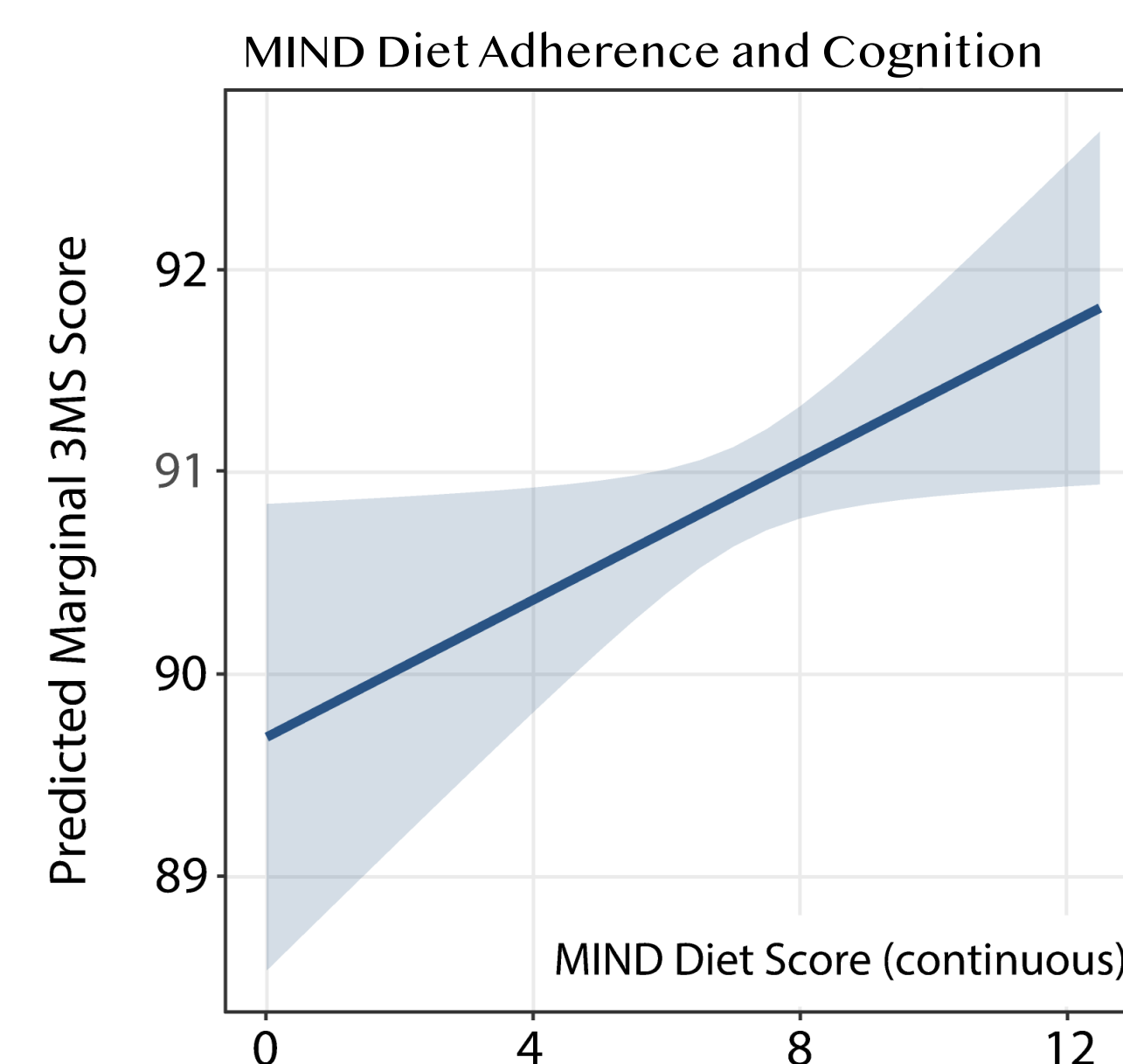
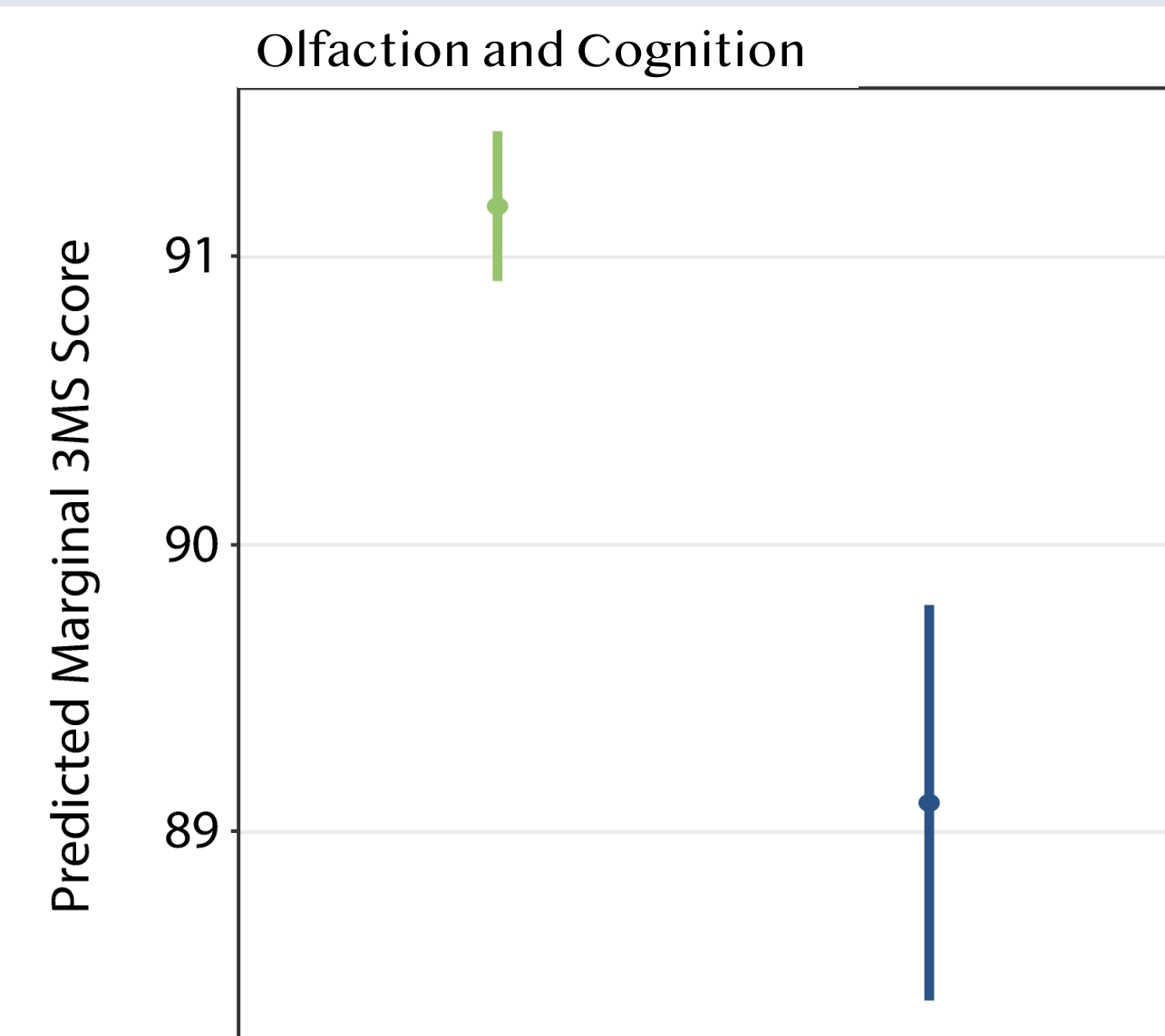
SES is closely associated with both diet and cognitive function. To examine the role of SES in these associations, we designed our analyses in three steps.

For each association, we first estimated it without considering SES; we then evaluated it adjusting for SES indicators.

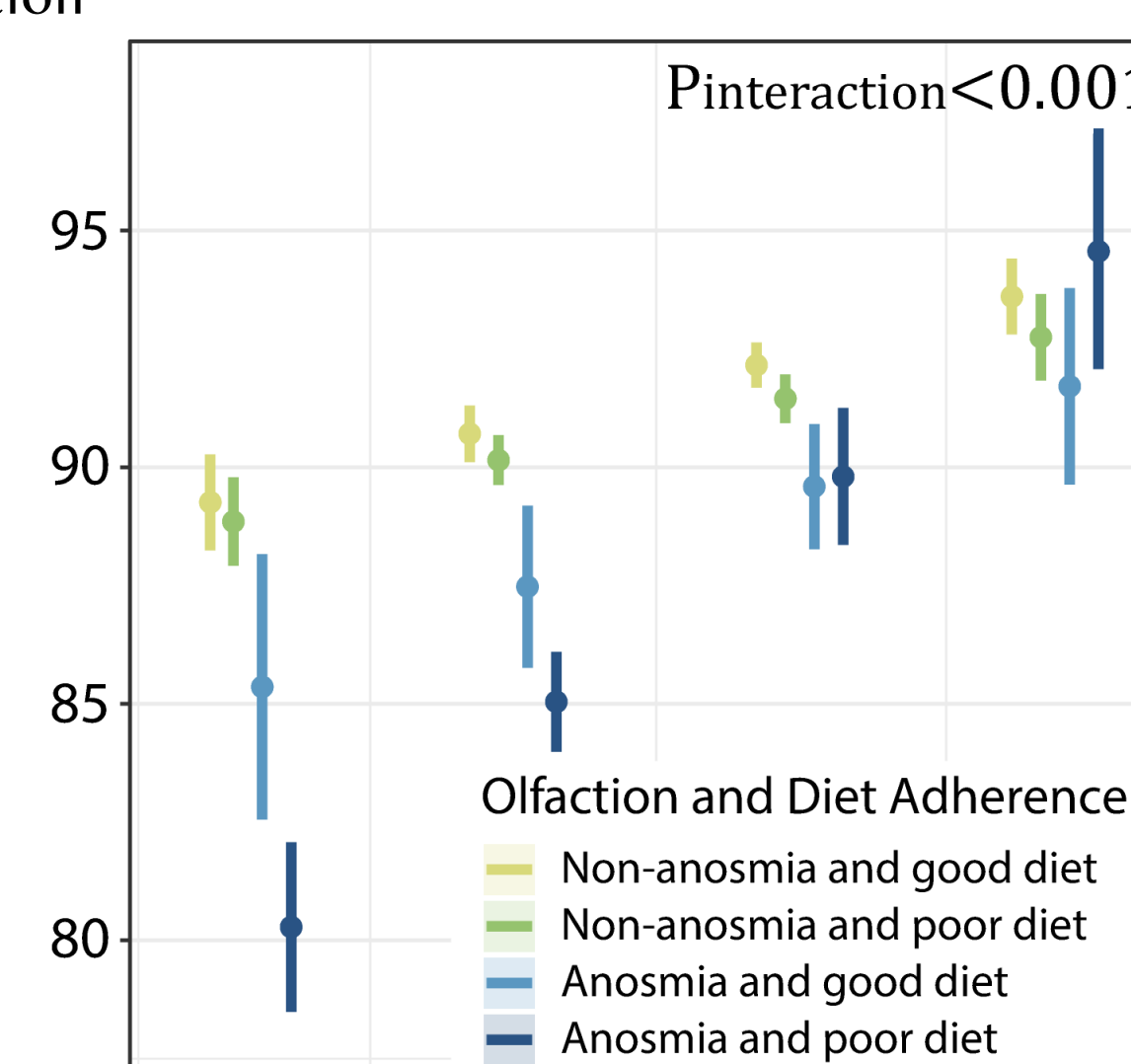
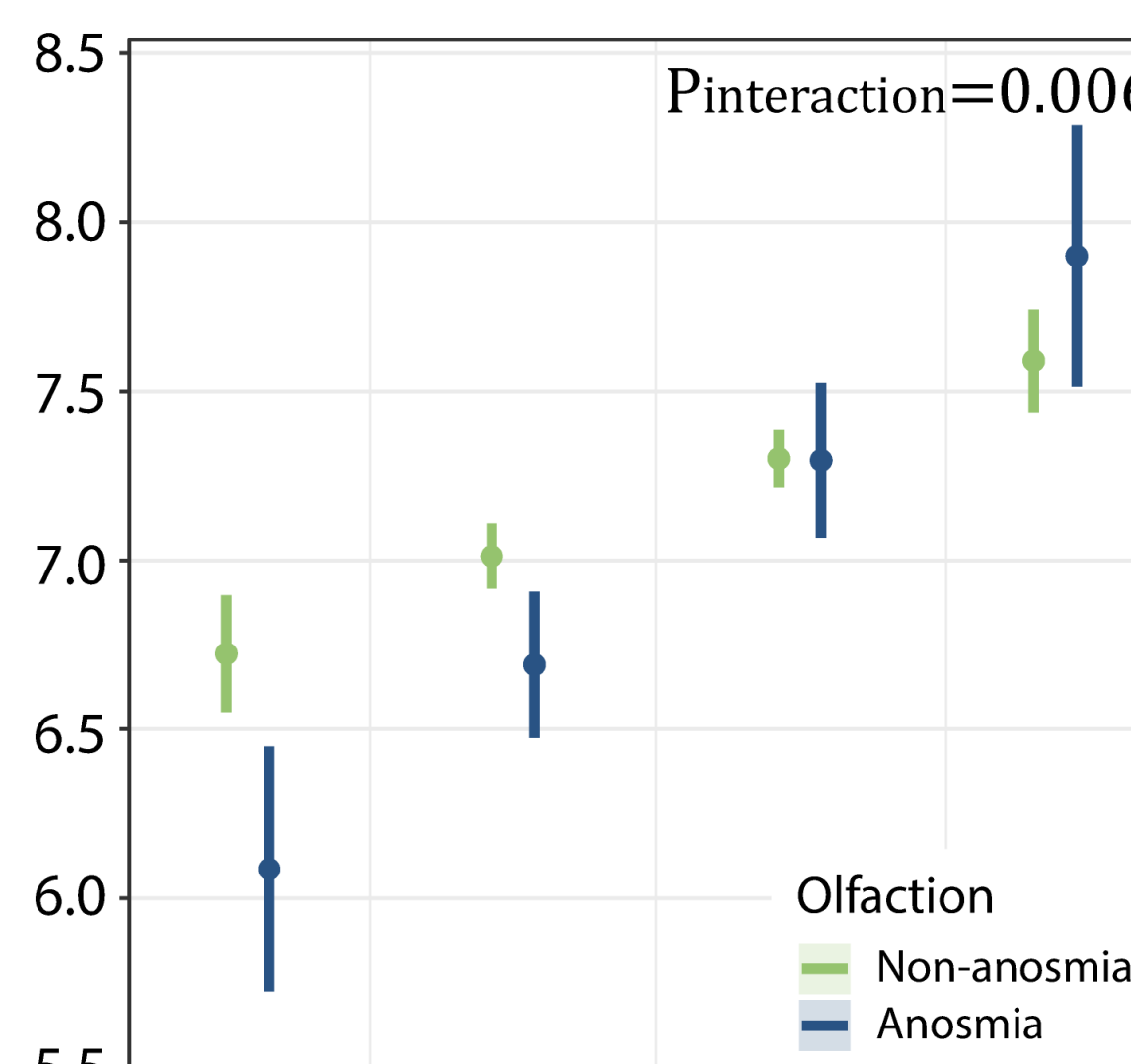
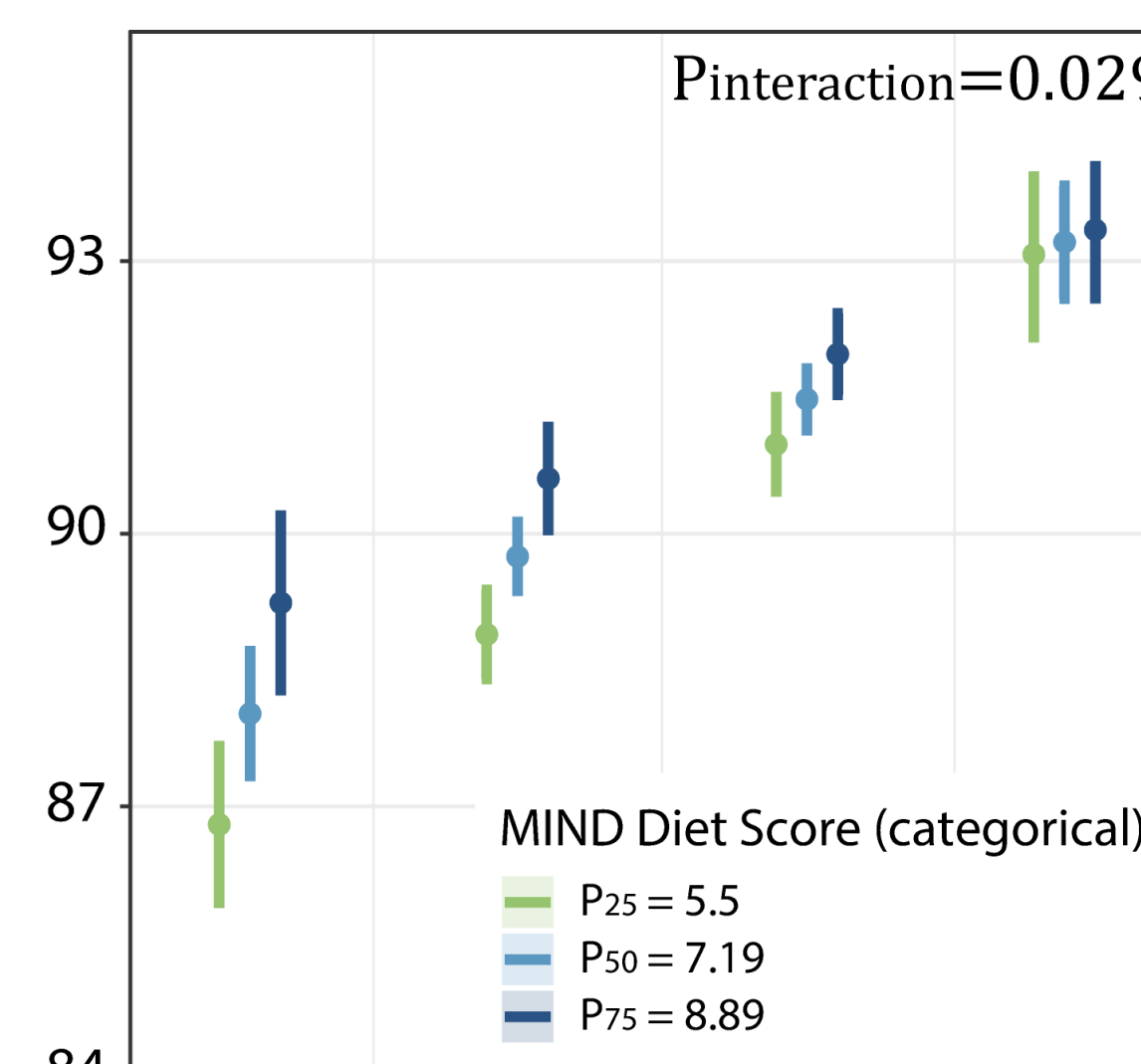
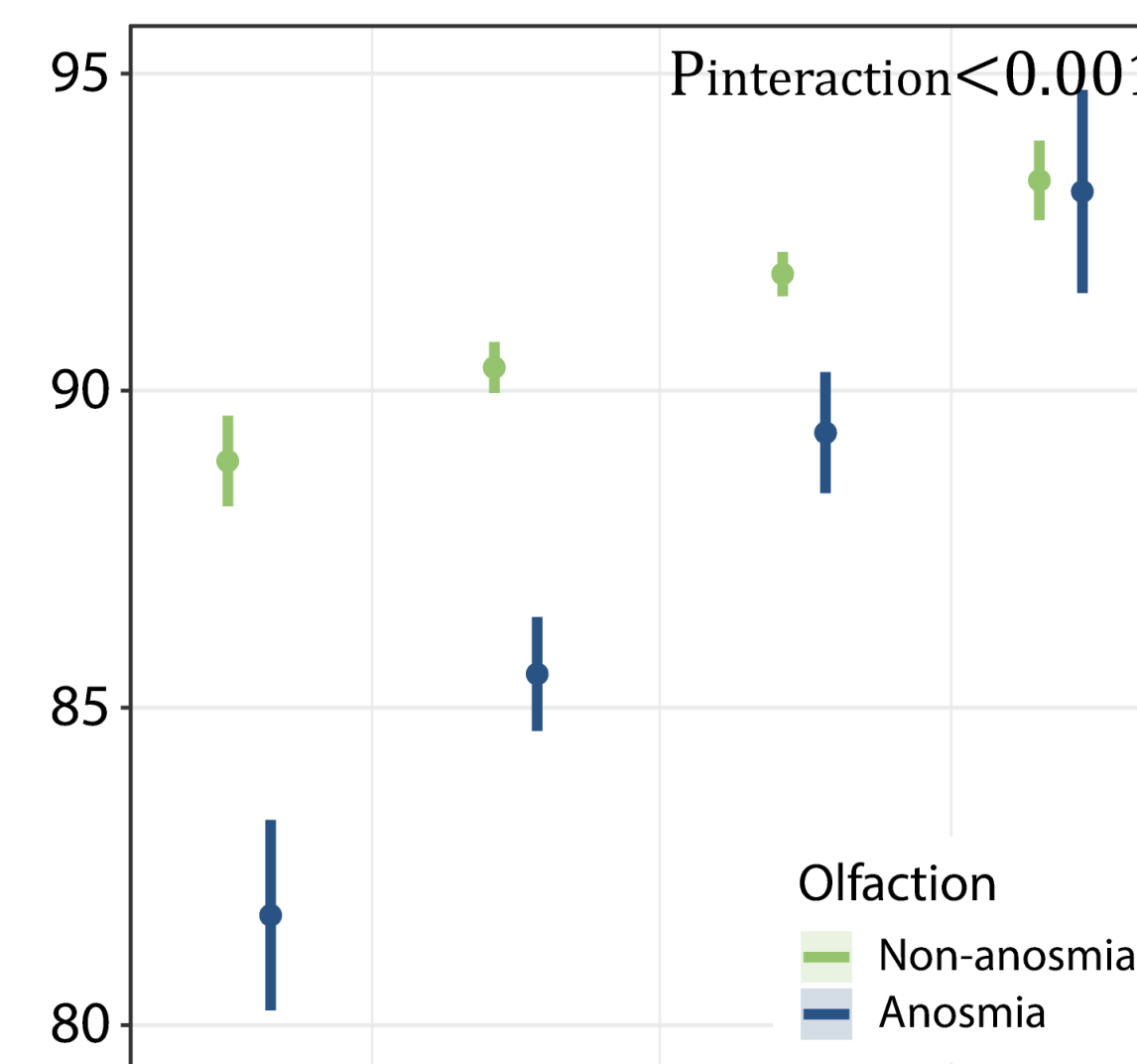
Finally, we explored the potential **effect modification by SES** in separate models by including an exposure × SES interaction term for each SES variable separately.

Results were presented as **model-estimated marginal means** of the outcome across exposure groups.

Main Associations Adjusting For Socioeconomic Status



Associations Stratified By Annual Family Income



RESULTS

MIND Diet Adherence

MIND diet scores averaged **7.2 (range 2.0-12.5)** in the Health ABC population. MIND scores decreased with olfactory status; individuals with anosmia showed a lower MIND score (Interquartile Range: 6.5, 5.5-8.0) compared to those without anosmia.

Olfaction and Cognition

Anosmia was strongly associated with lower 3-MS score ($\beta \pm SE$: -3.92 ± 0.43 , $P < 0.001$), and the association remained strong after accounting for SES ($\beta \pm SE$: -2.08 ± 0.38 , $P < 0.001$).

MIND Diet Adherence and Cognition

MIND score was positively associated with 3-MS score ($\beta \pm SE$: 0.50 ± 0.09 , $P < 0.001$). The association was attenuated after adjusting for SES ($\beta \pm SE$: 0.17 ± 0.08 , $P = 0.034$).

Olfaction and MIND Diet Adherence

Anosmia was associated with lower MIND diet score ($\beta \pm SE$: -0.24 ± 0.10 , $P = 0.023$). The association diminished after accounting for SES variables ($\beta \pm SE$: -0.16 ± 0.11 , $P = 0.145$).

Olfaction, MIND Diet Adherence, and Cognition

We observed a possible **synergistic effect between olfaction and MIND diet adherence** in relation to cognitive function in older adults. Specifically, compared to those with non-anosmia and good MIND diet adherence, those with anosmia alone, poor MIND diet adherence alone, or both had significantly lower 3-MS score after adjusting for SES indicators (poor MIND diet adherence alone, $\beta \pm SE$: -0.25 ± 0.28 , $P = 0.378$; anosmia and good diet adherence, $\beta \pm SE$: -1.89 ± 0.59 , $P = 0.001$; anosmia and poor diet adherence, $\beta \pm SE$: -2.39 ± 0.50 , $P < 0.001$). Diet adherence shown stronger effect among participants had anosmia.

Notably, **annual family income** appeared to be a consistent effect modifier across all the associations, with the strongest associations observed among participants with lower annual family income (**Figure 1**).

CONCLUSION

Poor olfaction and poor MIND diet adherence were associated with lower cognitive function among U.S. older adults and showed a potential joint association with cognitive impairment. Annual family income appeared to modify these associations, with the strongest associations observed among lower-income groups.

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Abbreviations: MIND, Mediterranean-DASH Intervention for Neurodegenerative Delay; 3MS, Modified Mini-Mental State Examination

Figure 1. Associations among olfaction, MIND diet, and cognition