

The Salivary Microbiome and Cognitive Function

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Background

The oral microbiome is stratified by early life socioeconomic factors and is related via various mechanisms to cognitive functioning. However, there are few large, nationally representative, longitudinal data resources with microbiome data.

Research Question

- (1) Is it feasible to generate high quality oral microbiome assessments in a large national cohort study?
- (2) How is the composition of the oral microbiome associated with midlife cognitive test performance?

Data, Measures, & Methods

- High School & Beyond 1980 cohort; $n \approx 6,400$
- 2021 wave included cognitive assessments; surveys; and blood and saliva collection
- Outcome is global cognition at age ~58
- 16S rRNA Sequencing; composition expressed via alpha diversity (Shannon Index), beta diversity (Bray-Curtis Index), and Ratio of Treponema-to-Corynebacterium abundances
- Weights adjust for differential participation

Summary of Results

The composition of the oral microbiome – at least as characterized by alpha diversity – is associated with various ADRD markers of risk.

Results

Figure 1. Key species are more abundant among people without periodontal disease (e.g., *R. mucilaginosa*, *C. durum*) but others are more abundant among people who have ever had it (e.g., *P. gingivalis*, *F. nucleatum*)

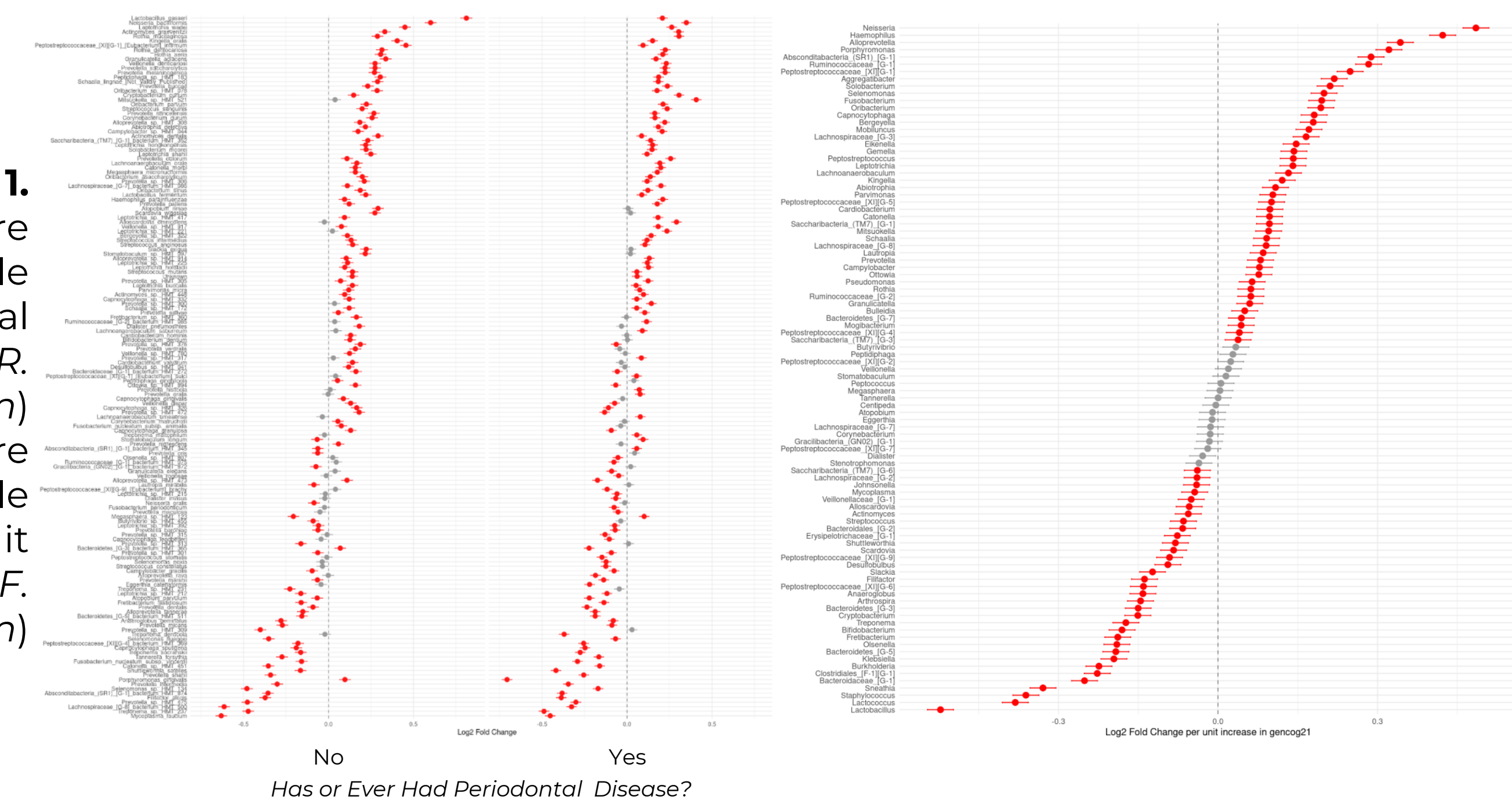
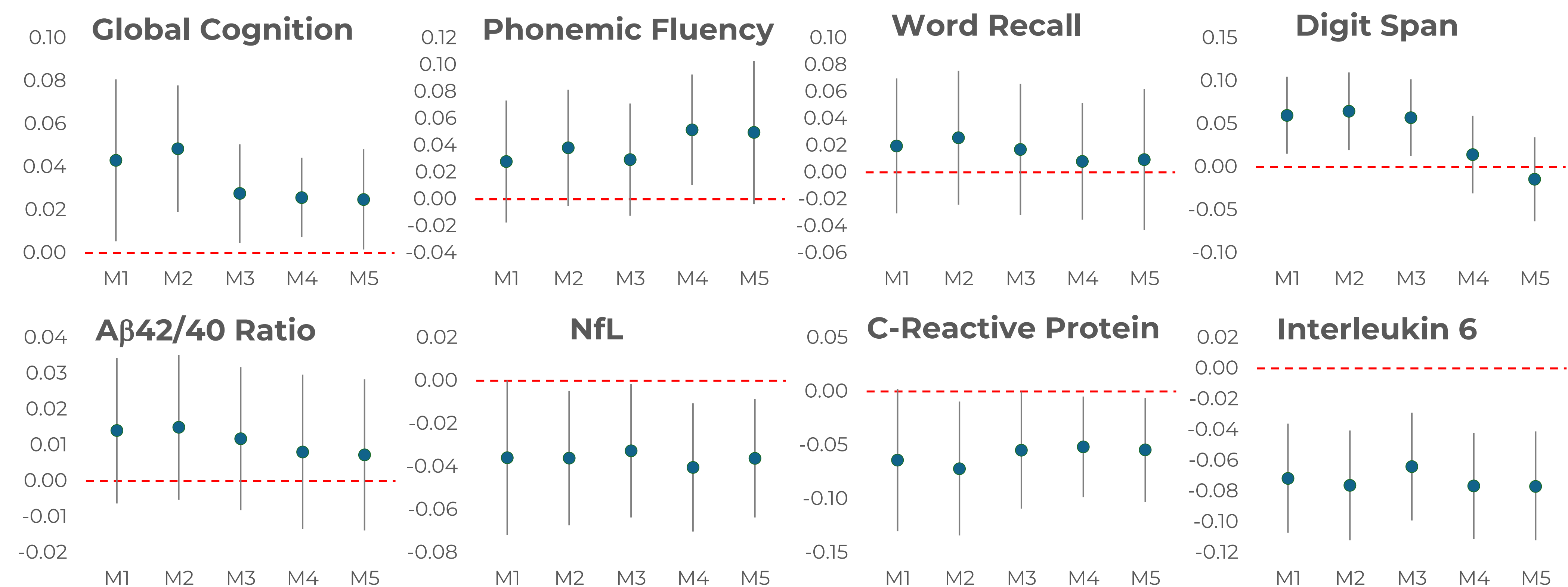


Figure 2. Key taxa are associated with better cognitive functioning (e.g., *R. mucilaginosa*, *V. parvula*) but others are associated with worse cognitive functioning (e.g., *T. Forsythia*, *T. denticola*, *F. alocis*, *P. gingivalis*)

Figure 3.

Alpha diversity is associated with various cognitive outcomes and biomarkers of ADRD risk, even net of confounders. Each figure shows models that regress an outcome measure on measures of Alpha Diversity (using Shannon Index). Models differ with respect to their covariates; see key below the figures.



M1 = No covariates **M2** = Age, gender, race/ethnicity **M3** = M2 + Highest degree, region, smoking history, BMI
M4 = M3 + Family socioeconomic background, high school achievement test scores **M5** = M4 + Diabetes, A1C, hypertension, income

Conclusion

- (1) It is possible to generate high quality oral microbiome measures in a large national cohort.
- (2) The composition of the oral microbiome is associated with ADRD risk markers even net of a rich set of confounders.



Project Website
www.edshareproject.org



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THANKS!

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HS&B Cohort Profile in the
International Journal of Epidemiology

- History (1980-2021)
- Study Design
- Survey Contents
- Sample Sizes
- List of Biomarkers
- Data Access Info

