

Does Oral Disease Contribute to Cognitive Impairment? Causal Insights from the Canadian Longitudinal Study on Aging (CLSA)

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Introduction

- Oral disease (Periodontal disease/Tooth loss/Masticatory dysfunction) could be hypothesized as a modifiable risk factor.
- Most evidence is observational and based on traditional regression methods.

Objectives

- To estimate the effects of **Self-Rated Oral Health (SROH)** and **Masticatory Ability (MA)** at baseline modelled independently, on incident cognitive impairment among middle aged and older adults enrolled in the Canadian Longitudinal Study on Aging (CLSA)

Why a Marginal Structural Model (MSM)?

- Prior oral health may influence subsequent confounders that also affect later exposure and cognitive outcomes.
- Conventional regression may therefore yield biased estimates in the presence of time-varying confounding affected by prior exposure.
- MSMs with inverse probability treatment weighting (IPTW) provide an appropriate analytic framework for this setting.

Study Cohort

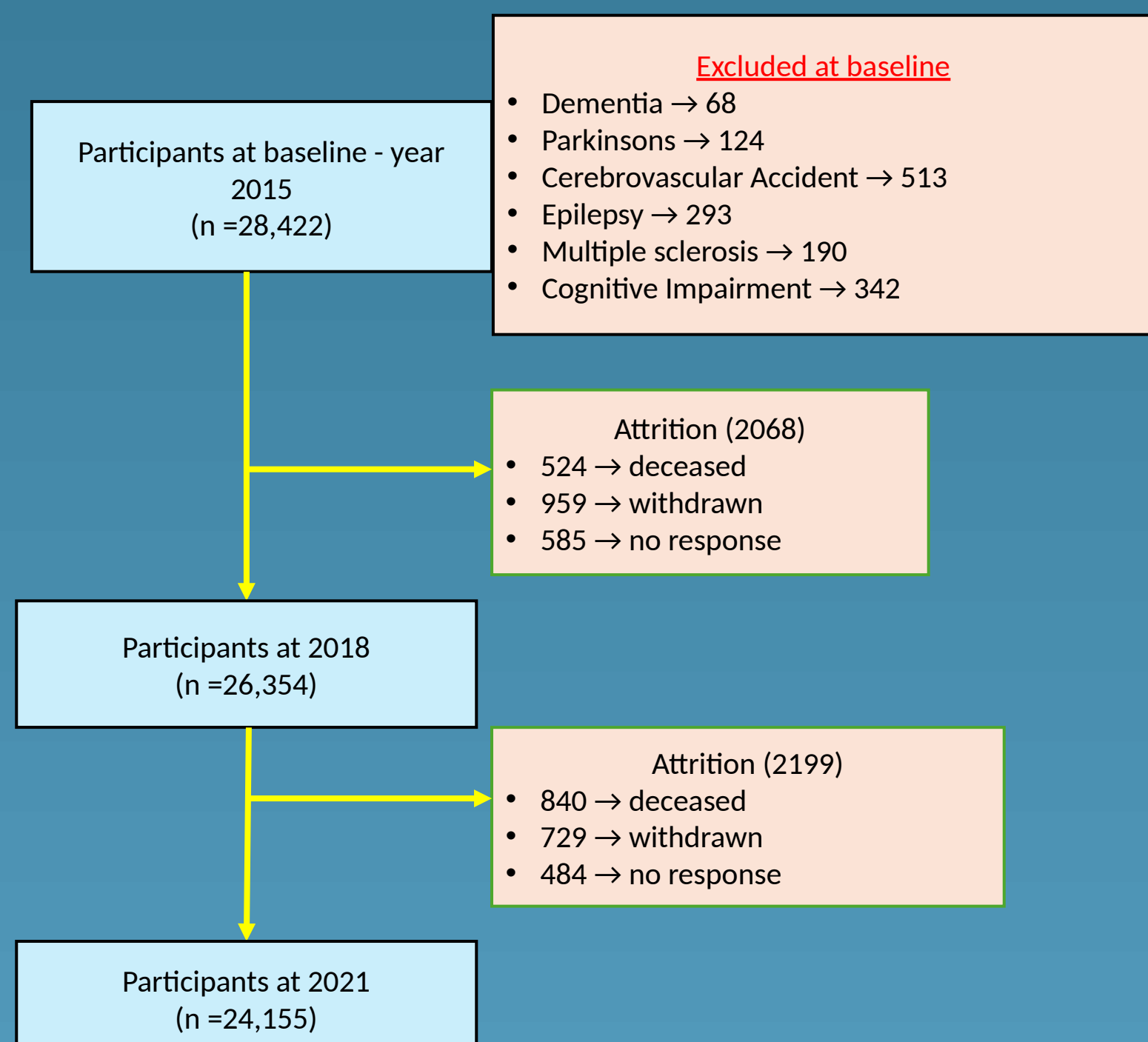
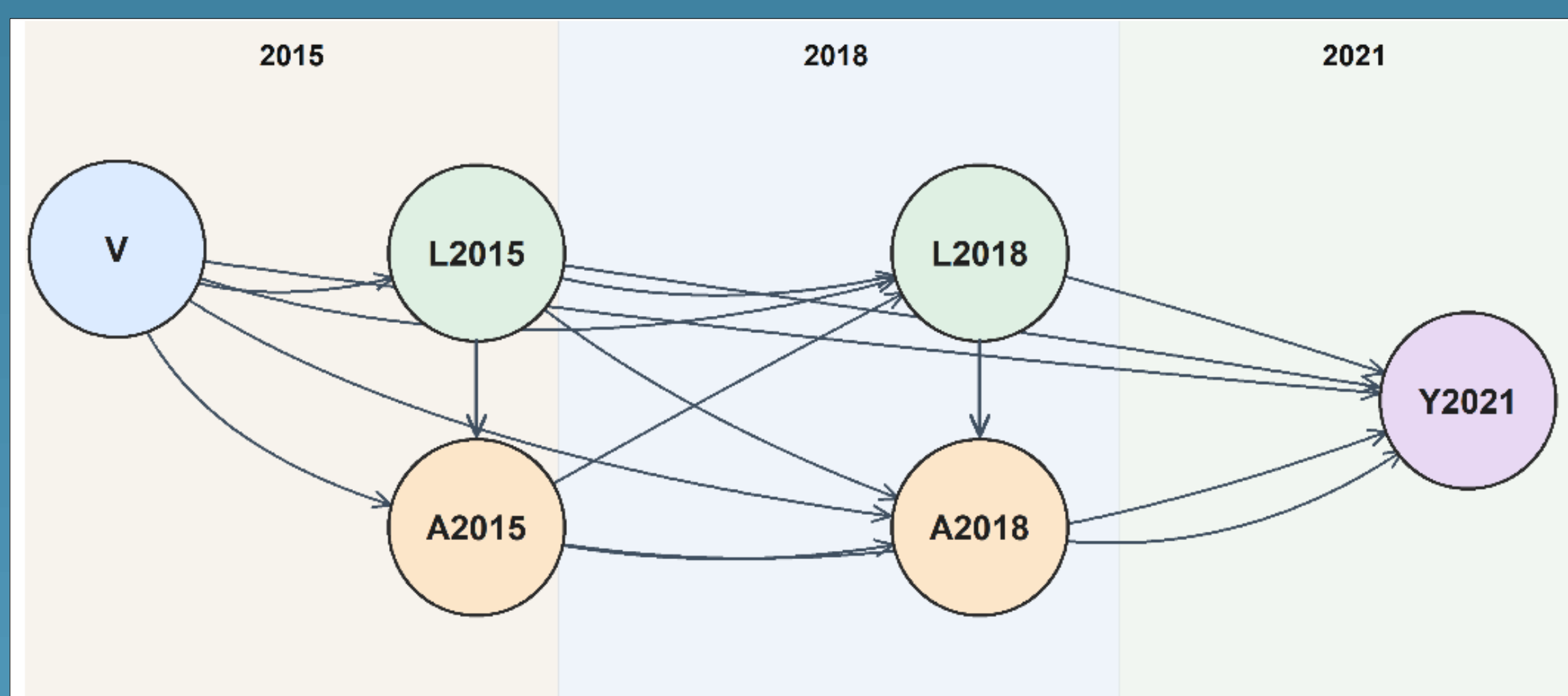


Figure 1: Selection of baseline and follow-up samples in the CLSA (2015 - 2021)

Hypothesized temporal associations between study variables in the CLSA



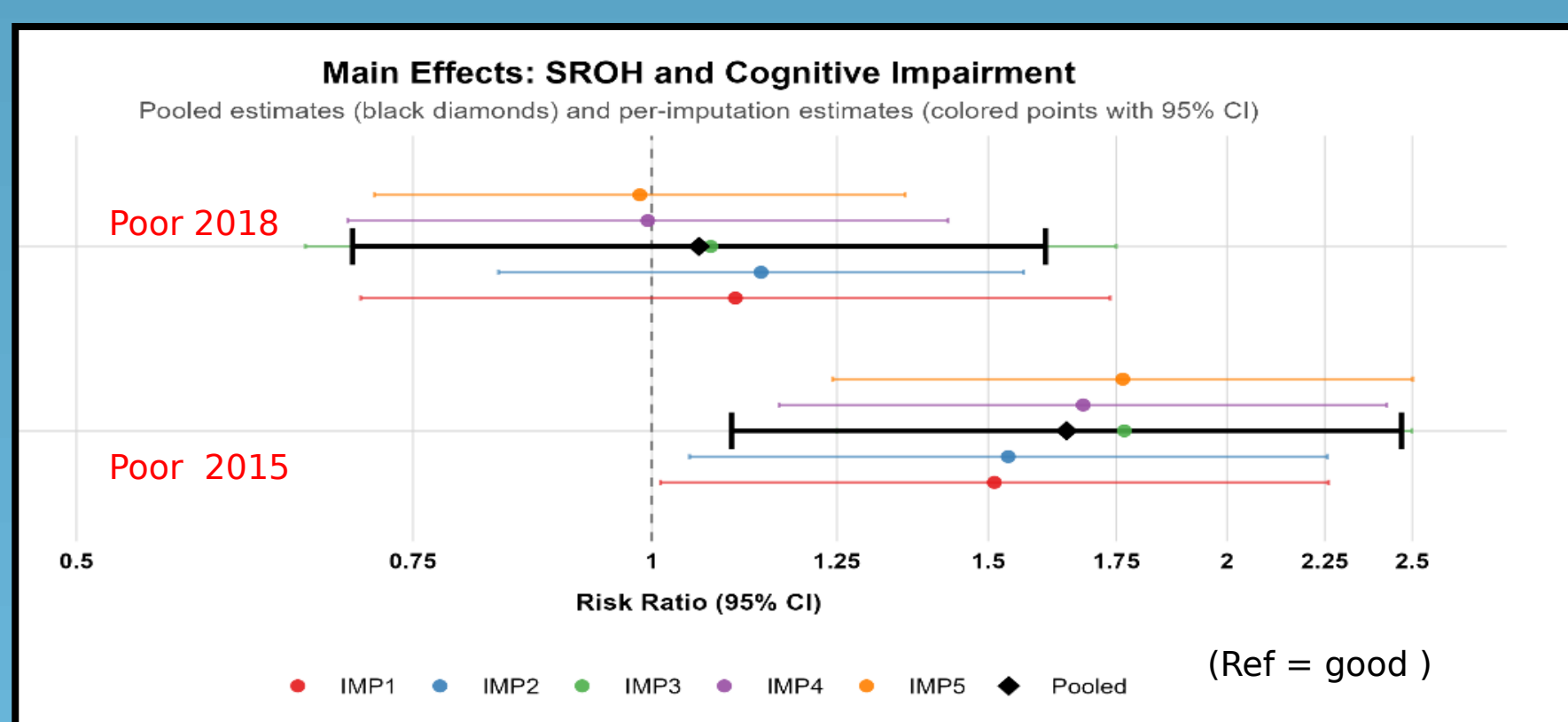
Abbreviations: baseline fixed covariates; L2015, time-varying confounders measured in 2015; A2015, oral health exposure measured in 2015; L2018, updated time-varying confounders measured in 2018; A2018, oral health exposure measured in 2018; Y2021, cognitive impairment measured in 2021.

MSM Methodology

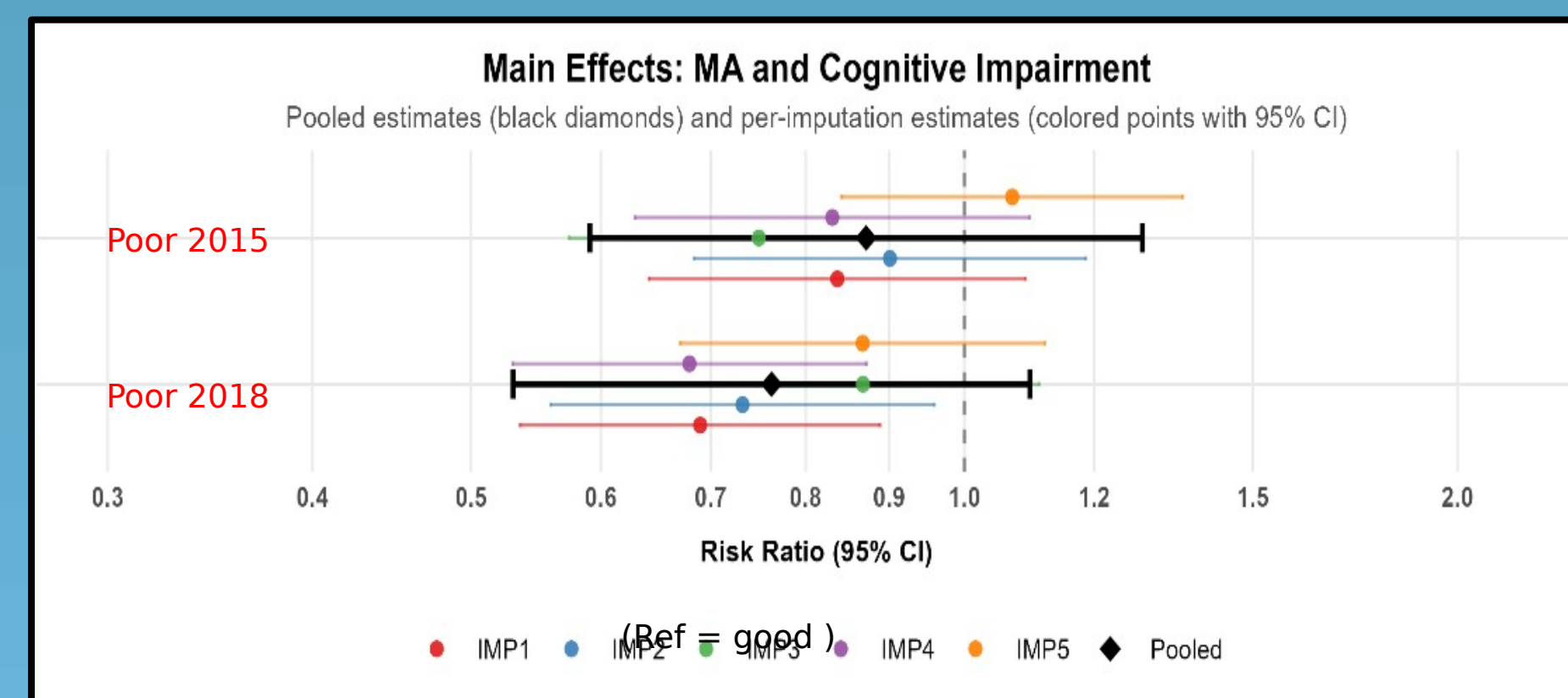
- Step 1- Multiple imputation- 5 imputed datasets
- Step 2- Propensity score model for 2015 & 2018
- Step 3- Inverse Probability Treatment Weighting (IPTW)
- Step 4 - Weighted Generalized Linear model with robust sandwich errors.

Results

SROH

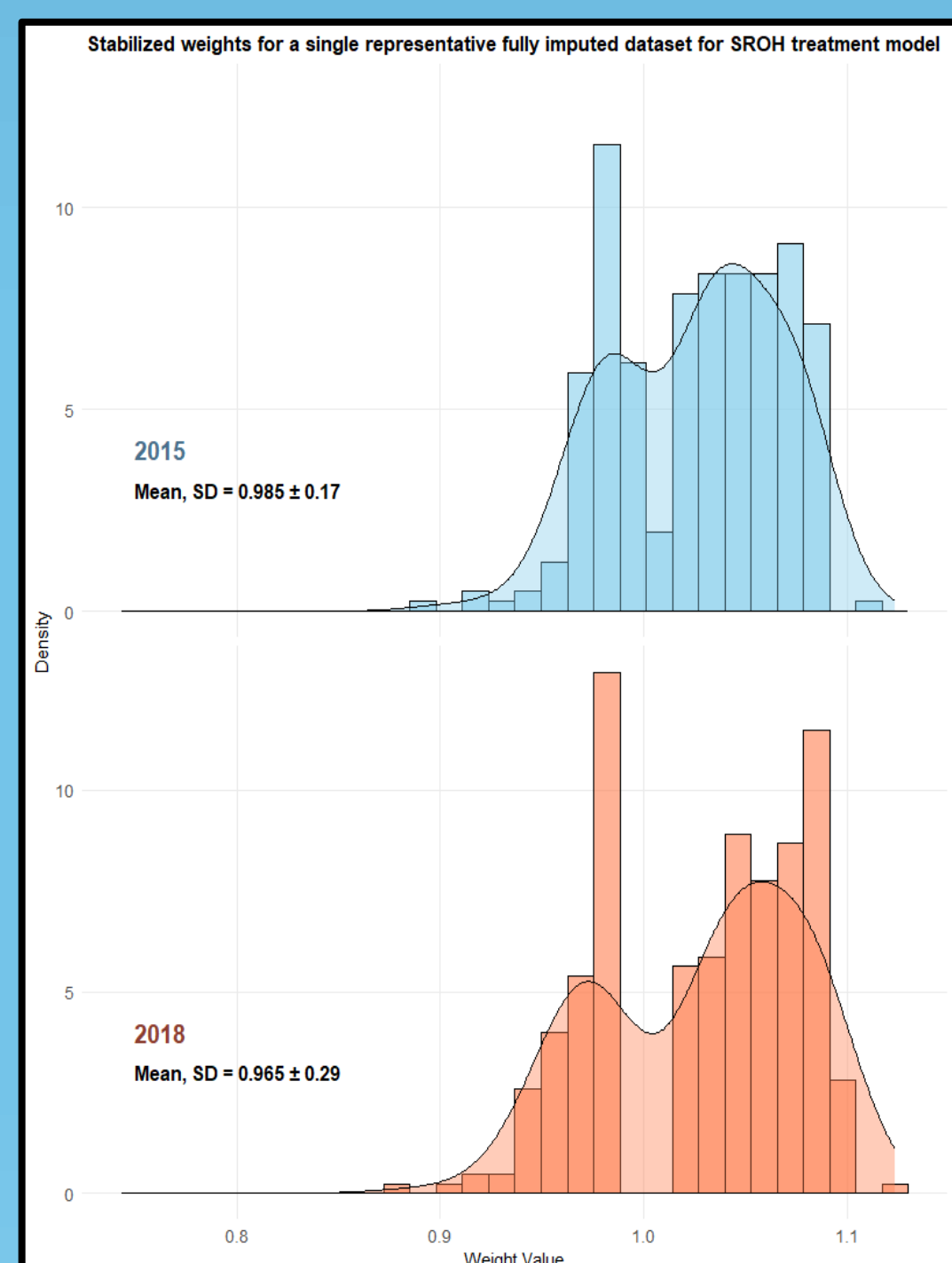


MA

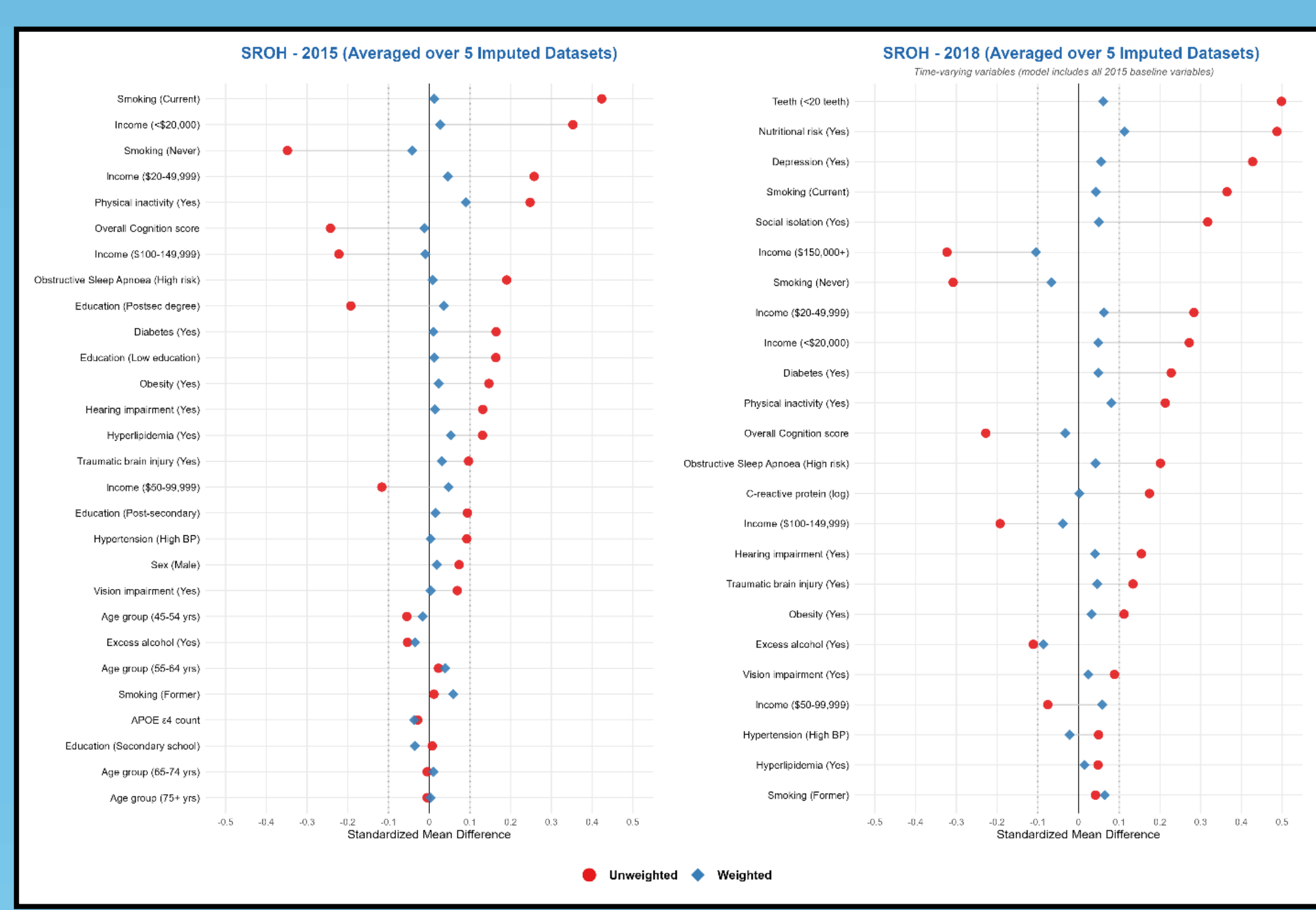


Model diagnostics

Stabilized Weight diagnostics

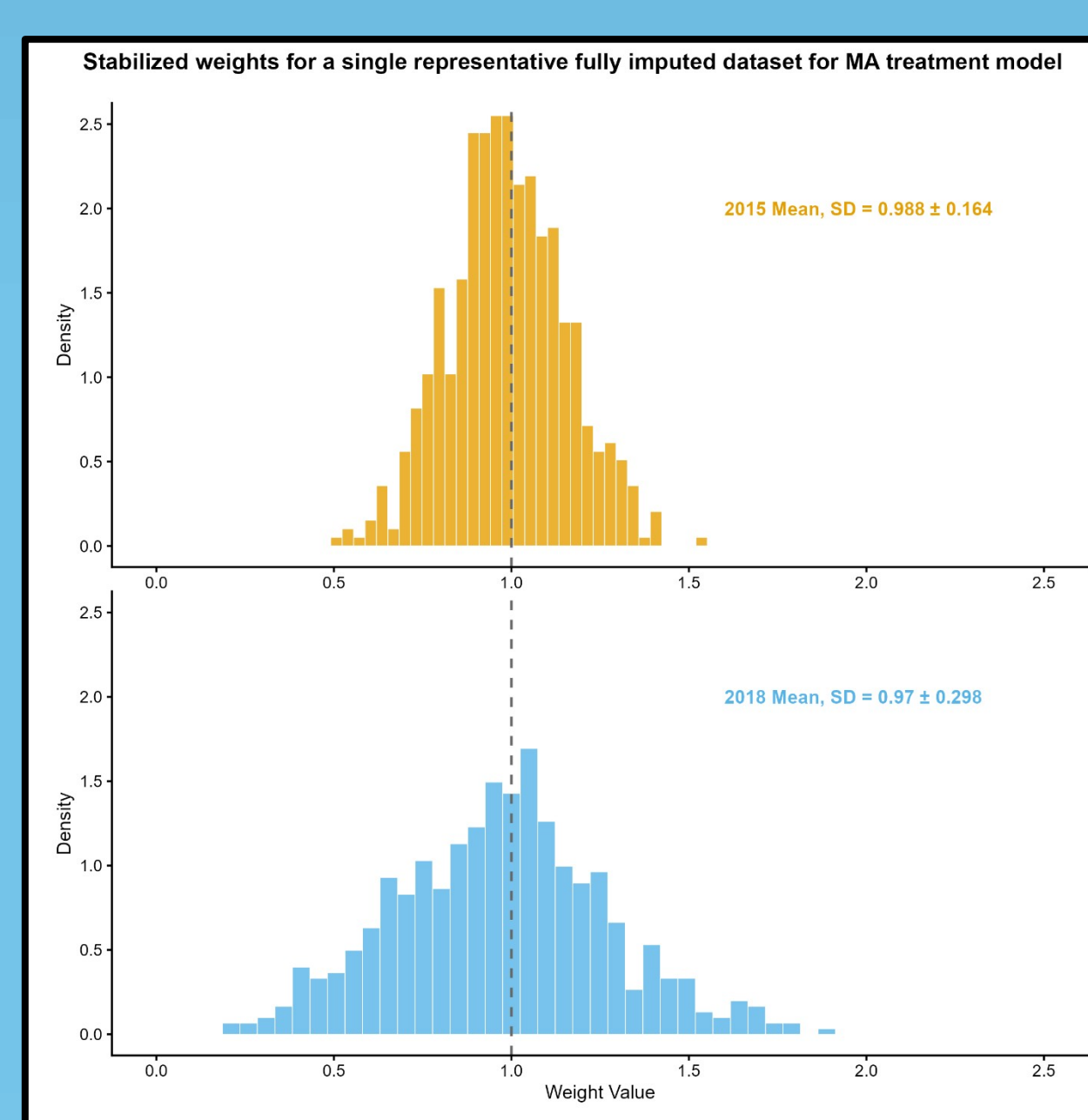


Covariate balance

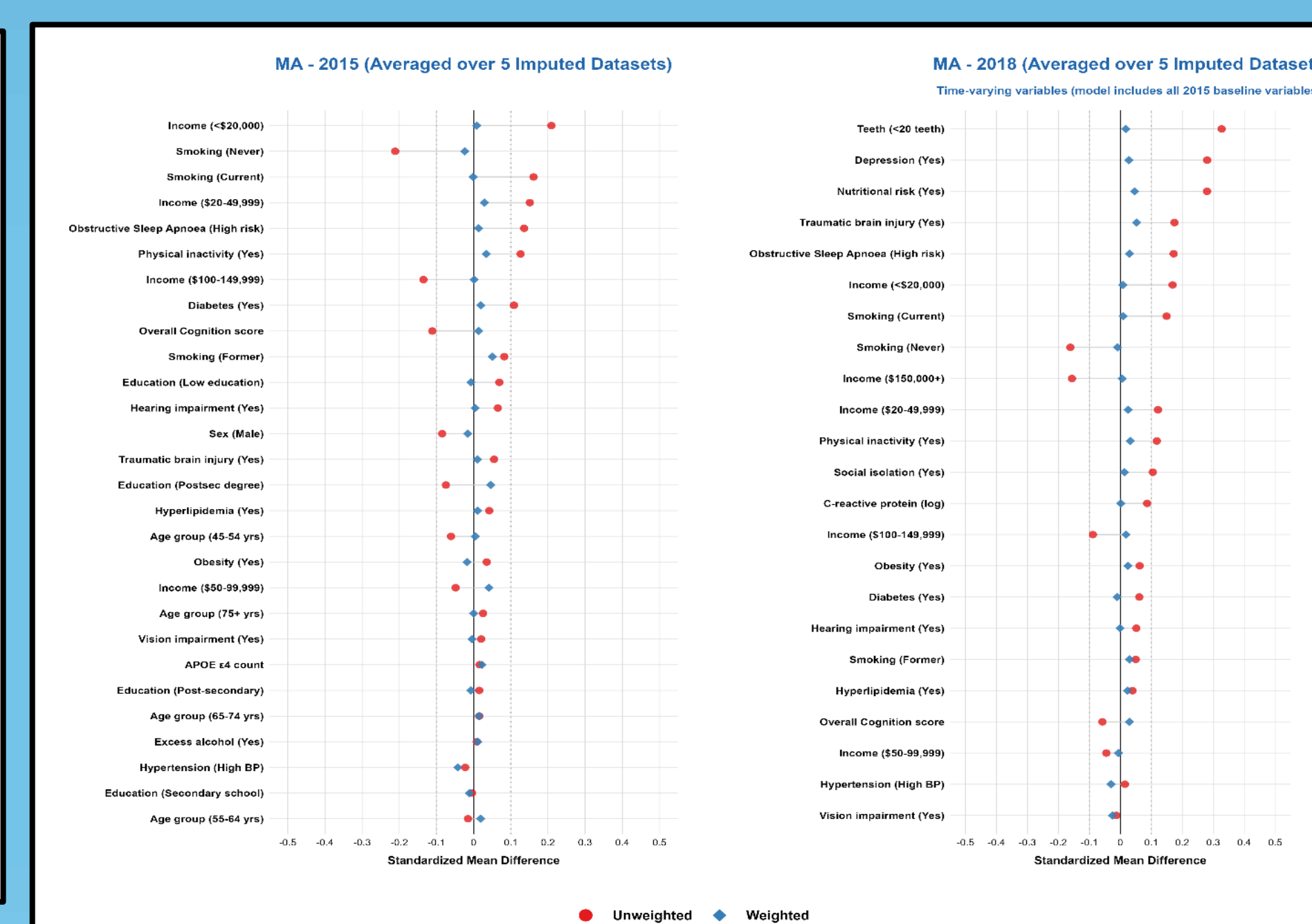


Model diagnostics

Stabilized Weight diagnostics



Covariate balance



Key findings - SROH

- Poor SROH in 2015 was associated with an 64% increase in marginal risk of cognitive impairment.

Key findings - MA

- Poor MA in 2015 showed no association with cognitive impairment.

Conclusion

- Preliminary results showed significant association with SROH. However, no association was observed with MA. Further analysis is warranted

Sensitivity Analysis (to be done)

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Québec

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