

Association of Body Mass Index Variability With Risk of Dementia and Mild Cognitive Impairment in Older Adults

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Higher long-term BMI variability was associated with increased dementia risk, with the strongest association observed around the 12-year BMIV assessment window. Associations with MCI were directionally similar but smaller.

INTRODUCTION

DATA FLOWCHART

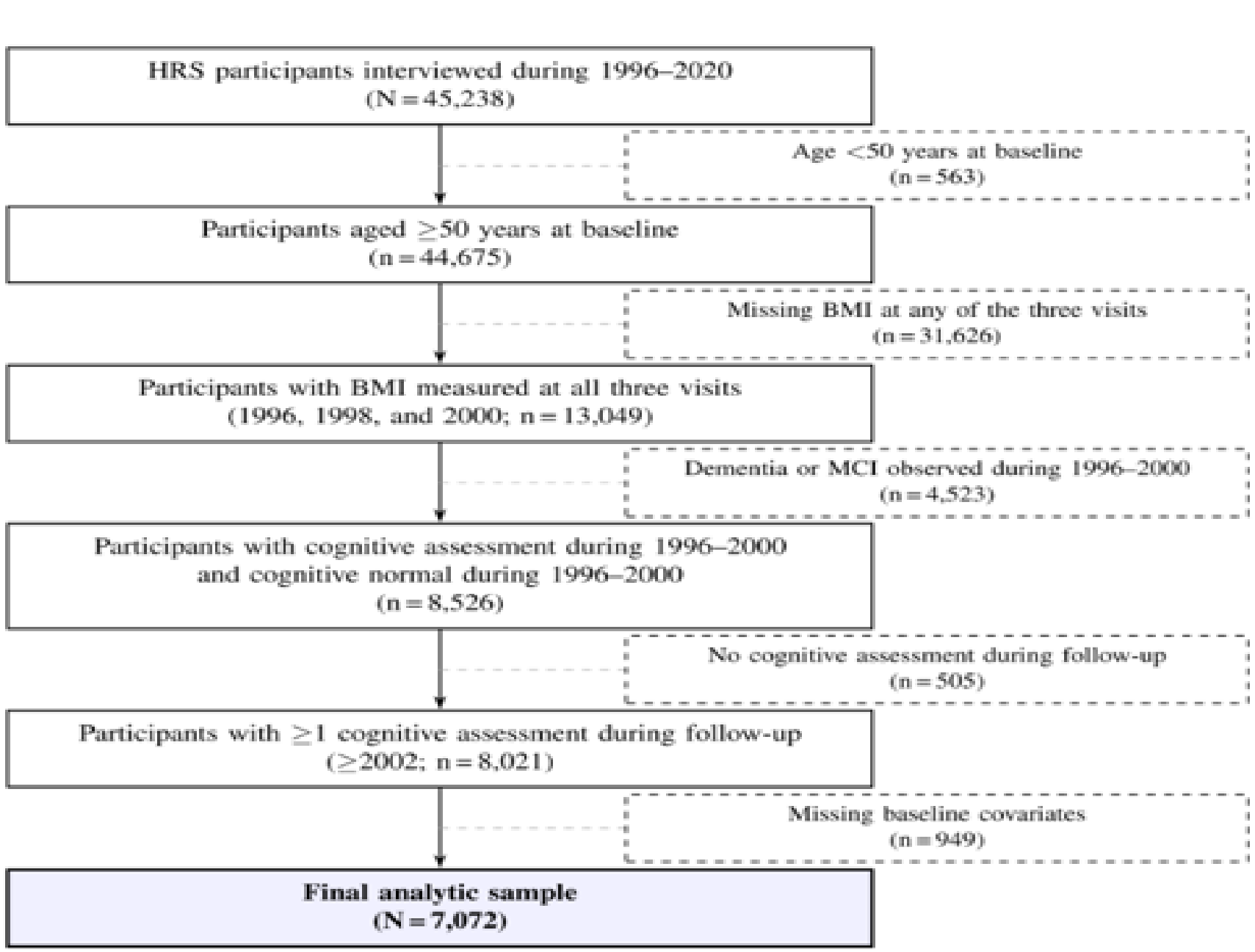
RESULTS

CONCLUSIONS

Background. BMI level has been linked to cognitive aging,¹ but single BMI measures may not capture long-term instability in body weight. BMI variability (BMIV) may reflect metabolic instability, frailty-related change, or underlying illness processes relevant to dementia risk.^{2,3}

Objective. To examine whether long-term BMIV is associated with subsequent incident dementia and MCI in the Health and Retirement Study (HRS), and whether associations vary by BMIV assessment window and baseline BMI category.

Methods. 1996–2020 HRS, biennial assessments. **Exposure.** BMIV measured as the coefficient of variation of BMI across repeated BMI measures. BMIV was evaluated across landmark windows of increasing length, from 6 to 18 years. Tertiles were Low ≤3.9%, Mid 3.9–6.2%, and High >6.2%. **Outcome.** Incident dementia was the primary outcome; incident MCI was a secondary outcome, based on Langa-Weir cognitive classification. **Analysis.** Cox proportional hazards models. Sensitivity analyses used ARV, no-chronic-condition restriction, underweight exclusion, and IPW for attrition.



Landmark Analysis: Representative Follow-up Windows		
Landmark Year	Follow-up Window	Sample / Events
2000 BMIV from 3 BMI measures 1996, 1998, 2000	6-year follow-up Outcome: 2002–2020 Dementia-free at 2000	N = 7,072 Dementia events: 672 9.5%
↓ Attrition: death, dropout		
2004 BMIV from 5 BMI measures 1996–2004	10-year follow-up Outcome: 2006–2020 Dementia-free at 2004	N = 5,082 Dementia events: 378 7.4%
↓ Attrition: death, dropout		
2006 BMIV from 6 BMI measures 1996–2006	12-year follow-up Outcome: 2008–2020 Dementia-free at 2006	N = 4,306 Dementia events: 264 6.1%
↓ Attrition: death, dropout		
2012 BMIV from 9 BMI measures 1996–2012	18-year follow-up Outcome: 2014–2020 Dementia-free at 2012	N = 2,519 Dementia events: 67 2.7%

Figure 1. Data Flowchart

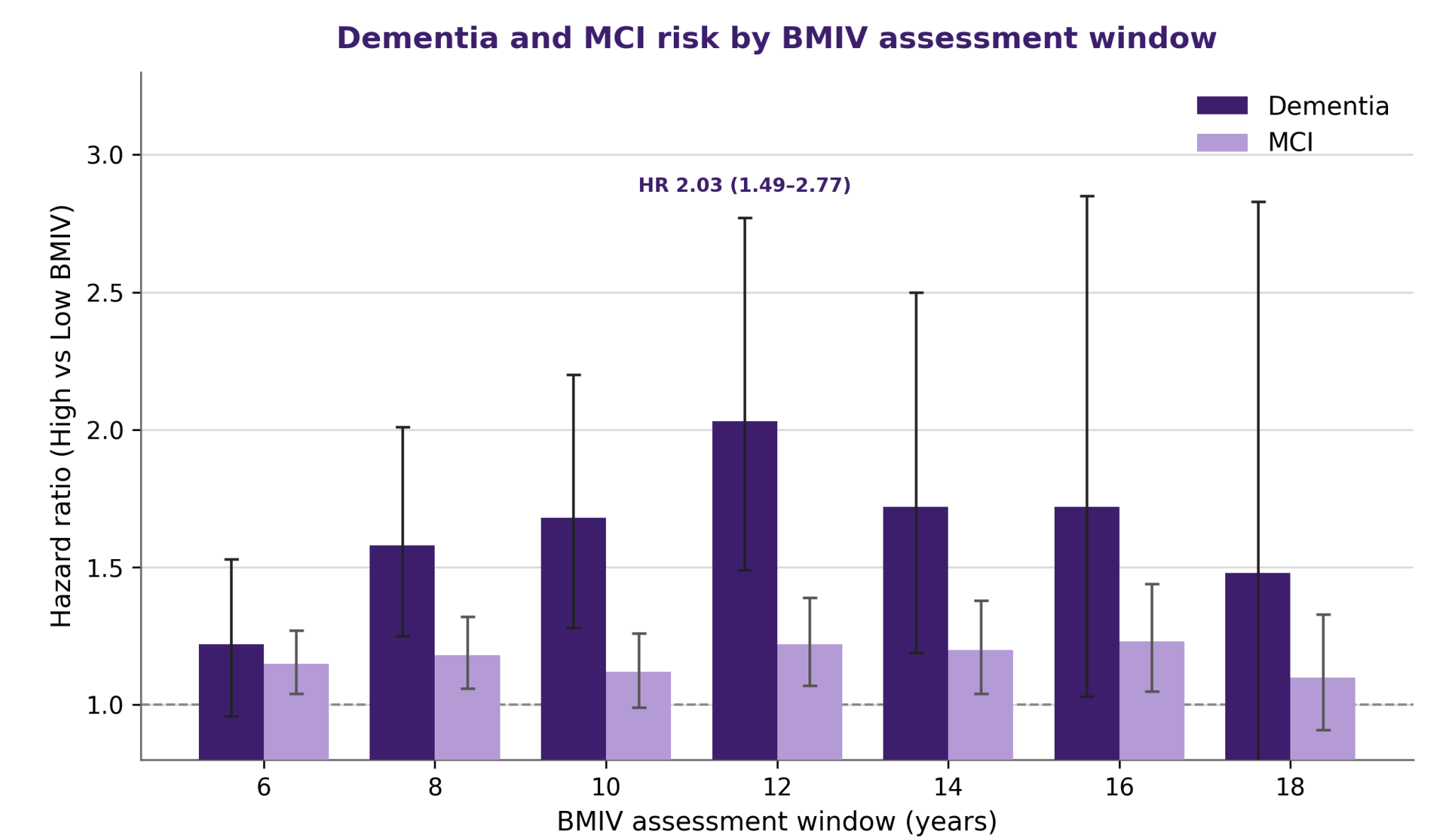


Figure 2. Dementia and MCI Risk by BMIV assessment window. Higher BMI variability was associated with increased dementia risk, most pronounced over the 10–12 year windows, where the highest tertile carried roughly twice the hazard (HR 2.03). Associations with MCI were weaker and relatively flat across windows.

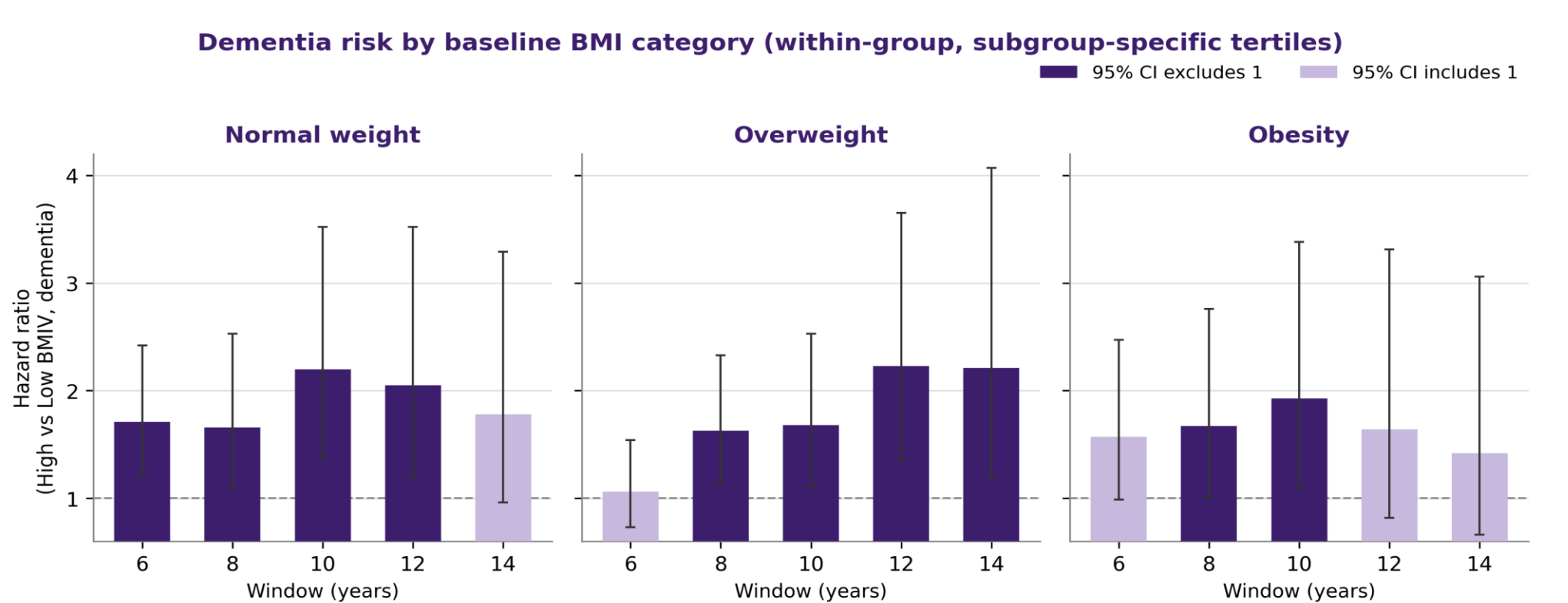


Figure 3. Dementia risk by BMI categories. Within each baseline BMI category, higher BMI variability was associated with dementia risk, but the pattern differed: associations appeared earlier in normal-weight participants, later in those with overweight, and were less stable in obesity. Because tertile cutoffs were defined within each category, estimates are interpreted within groups rather than compared across them.

BMI variability carries dementia risk information beyond BMI level, and the timing of its assessment matters: the association was most evident over 10–12 year windows and was not limited to any single BMI category. MCI showed a weaker pattern, supporting examination of MCI and dementia separately.

Limitation. BMI was self-reported, and longer windows may be affected by attrition and selective survival.

REFERENCES

- Livingston et al., Lancet, 2024.
- Beeri et al., Alzheimer’s & Dementia, 2022.
- Guo et al., JAMA Psychiatry, 2022.

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