

Chronic Back Pain and the 26-Year Risk of Alzheimer's Disease and Related Dementias



Santiago J. Manotas, MD, MPH¹, Tara Jenson, PhD¹, James Holsapple, MD², M. Maria Glymour, ScD¹, Marcia I. Pescador Jiménez, PhD, MSc, MA¹

¹ Boston University School of Public Health, Boston, MA ² Department of Neurosurgery, Boston Medical Center, Boston, MA

1 INTRODUCTION

Chronic pain is associated with increased risk of Alzheimer's disease and related dementias (ADRD) — risk rising as pain sites accumulate — and with higher mortality. Evidence specific to chronic back pain (CBP) is sparse and inconsistent. One study even reported paradoxical protection in adults ≥80, potentially reflecting survival bias. To our knowledge, no prior CBP–ADRD study has accounted for the competing risk of death. We evaluated this association in the Health and Retirement Study (HRS).

2 METHODS

Sample: 10,005 HRS adults free of ADRD at first cognitive assessment (Langa–Weir); median follow-up 18 years.

Exposure: self-reported back pain in two consecutive waves (1992, 1994). Outcome: incident ADRD (Langa–Weir).

Analysis: Cox cause-specific hazard models with sequential adjustment for demographic, behavioral, cardiometabolic, and socioeconomic (SES) factors; SES derived via latent class analysis.

Competing risk: Fine–Gray models and inverse probability of censoring weighting (IPCW); cumulative incidence via Aalen–Johansen. Arthritis–ADRD pre-specified as a positive control. PAF via Miettinen's formula.

CONTACT

Santiago J. Manotas, MD, MPH
Boston University School of Public Health
Email: santiman@bu.edu

3 RESULTS

At baseline, 22% (N=2,179) reported CBP. Over follow-up, 2,124 (21%) developed ADRD, including 512 (24%) with baseline CBP. CBP was associated with **increased ADRD hazard** in the unadjusted model (HR 1.20, 95% CI 1.09-1.33) after full adjustment (HR 1.13, 95% CI 1.02-1.25; **Figure 1**), with **consistent** Fine-Gray and IPCW estimates (HR 1.13, 95% CI 1.02-1.25). Cumulative incidence was higher in the CBP group throughout follow-up (**Figure 2**). As expected, the arthritis positive control showed a **stronger association** (HR 1.22, 95% CI 1.12-1.33). The PAF was 2.77% (95% CI 0.47%-4.82%), suggesting ~1 in 36 ADRD cases might be **prevented** if individuals with CBP experienced the same ADRD incidence as those without CBP.

HR 1.13

Fully adjusted hazard ratio for ADRD
(95% CI 1.02–1.25)

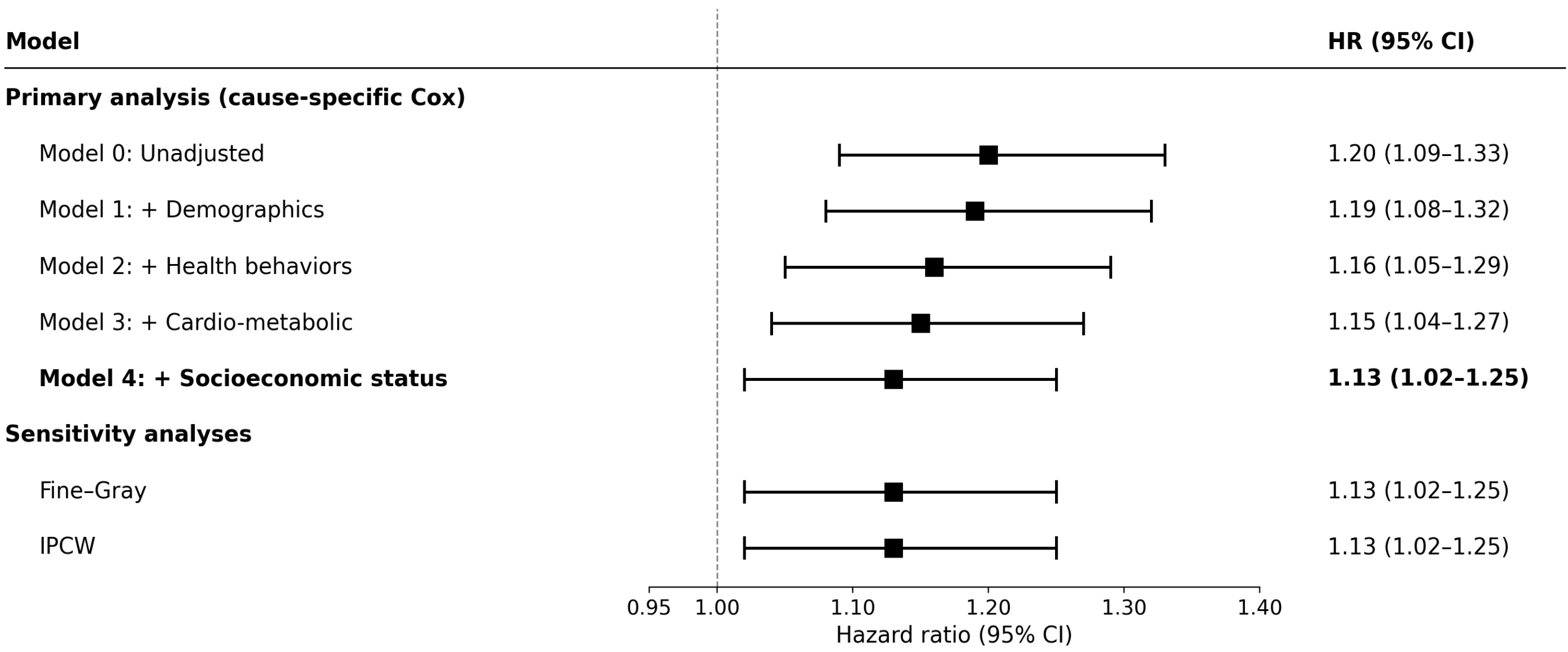
2.77%

Population attributable fraction
(95% CI 0.47%–4.82%)

~1 in 36

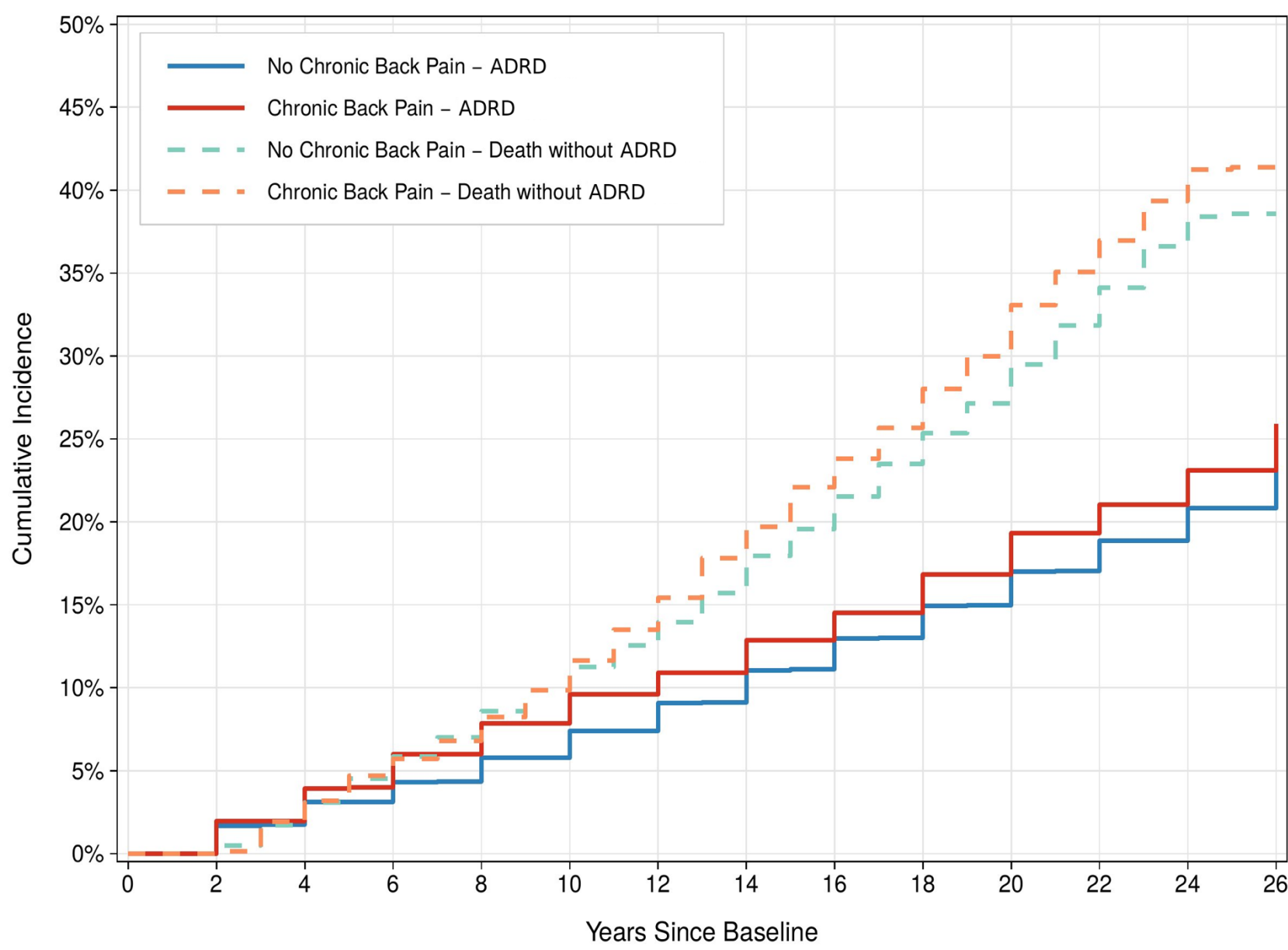
ADRD cases potentially preventable
at the population level

Figure 1. Association of Baseline Chronic Back Pain With Incident ADRD in the Health and Retirement Study (1994-2020)



Abbreviations: ADRD, Alzheimer's disease and related dementias; CI, confidence interval; HR, hazard ratio. Model 0: unadjusted. Model 1: adjusted for age, sex, race/ethnicity, and baseline cognition. Model 2: Model 1 + smoking status, alcohol use, and physical activity. Model 3: Model 2 + BMI, stroke, and diabetes. Model 4: Model 3 + socioeconomic status (income, wealth, education).

Figure 2. Cumulative Incidence of ADRD and Death without ADRD by Chronic Back Pain Status, HRS (1994-2020)



Abbreviations: ADRD, Alzheimer's disease and related dementias; HRS, Health and Retirement Study.

4 CONCLUSIONS

CBP was associated with increased ADRD risk, robust across models and to the competing risk of death. Given CBP's high prevalence, even a modest population-level reduction in risk could meaningfully lower dementia burden — CBP may represent an underrecognized, modifiable entry point for dementia prevention.