Association Between Congenital or Acquired Physical Disability Conditions that Affect Central Nervous System and Risk of Alzheimer's Disease and Related Dementia

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Overview

- Background
- Study's Aims
- Data and Methods
- Results
- Policy Implications
- Limitations
- Future Work
- Questions/Answers

Background

Cerebral Palsy and Spina Bifida

- Cerebral palsy (CP) and spina bifida (SB) are congenital diseases known to cause an array of permanent movement disorders.

- Incidence rates: 2-2.5 per 1,000 births for CP and 1 in 3,000 births for SB.

- Life expectancy for adults with CP/SB has substantially increased over the last two decades.

Multiple Sclerosis (MS)

- Multiple Sclerosis (MS) is a chronic, inflammatory disease of the central nervous system, impacting the protective myelin sheath of nerve fibers in the brain and spinal cord.
- Typically diagnosed between the ages of 20 and 40.
- Neuroinflammation is a prominent feature of MS pathology

Traumatic Spinal Cord Injury (TSCI)

- TSCI is mostly caused by motor vehicle accidents, falls, or act of violence.

- Due to neuronal damage, TSCI may exacerbate certain biological mechanisms that elevate the risk for ADRD.
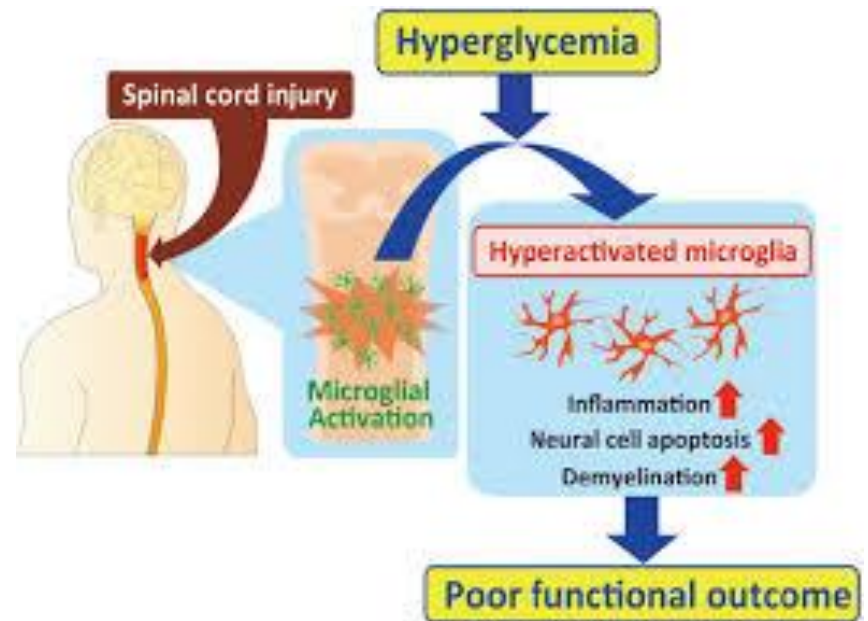
What do we know about the association between these conditions and ADRD?

- For CP/SB, research has been mainly focused on pediatric issues.

- Although there are a lot of similarities between MS and ADRD pathology, results from clinical trials were mixed and sample sizes were small.

- For TSCI, research has been mainly focused on physical rather than cognitive function.

What do we know about the association between these conditions and ADRD?

- Prevalence and incidence rate of cardiometabolic, psychological, and musculoskeletal conditions are substantially higher among adults with CP/SB, MS, and TSCI compared to their adult counterparts without disability.

- Higher prevalence of cardiometabolic, psychological, and musculoskeletal conditions have been linked with ADRD.

Aims

Objective

- To examine time to diagnosis of and adjusted hazard for ADRD, comparing adults with and without CP/SB, MS, and TSCI. comparing the risk with a matched-cohort of adults without any disability

Data & Methods

Dataset

- Commercial claims Data from OptumInsight

- Study period:2007-2016

- Patient population: Adults aged 45+ years at the time of insurance enrollment with diagnosis of CP/SB, MS, or TSCI at any point during the study period

Patient Population

Disability Condition	Unmatched		Matched	
	Case	Control	Case	Control
CP/SB	7,875	1,119,131	7,726	7,726
MS	6,151	916,143	6,025	6,025
TSCI	7,019	916,516	6,083	6,083

Study Design (1)

- Outcome of Interest:
  - Incident ADRD within a 4-year period
- Independent Variables:
  - Demographics: age, sex, race/ethnicity, U.S. Census Divisions
  - Health: diagnosis of cardiometabolic, psychologic, and musculoskeletal conditions during the 1-year look back period
  - Socioeconomic: Net worth and educational attainment

Study Design (2)

Survival models were used to quantify unadjusted, fully adjusted, and propensity-matched unadjusted and adjusted hazard ratios for incident ADRD.

Results

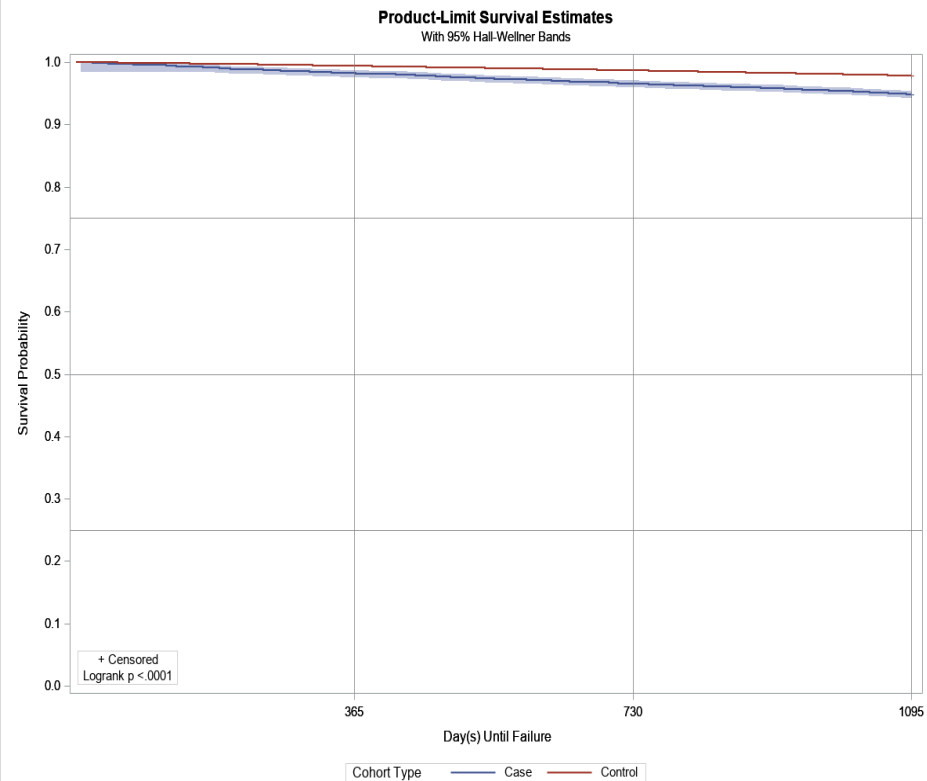# Incident ADRD among Adults with CP/SB
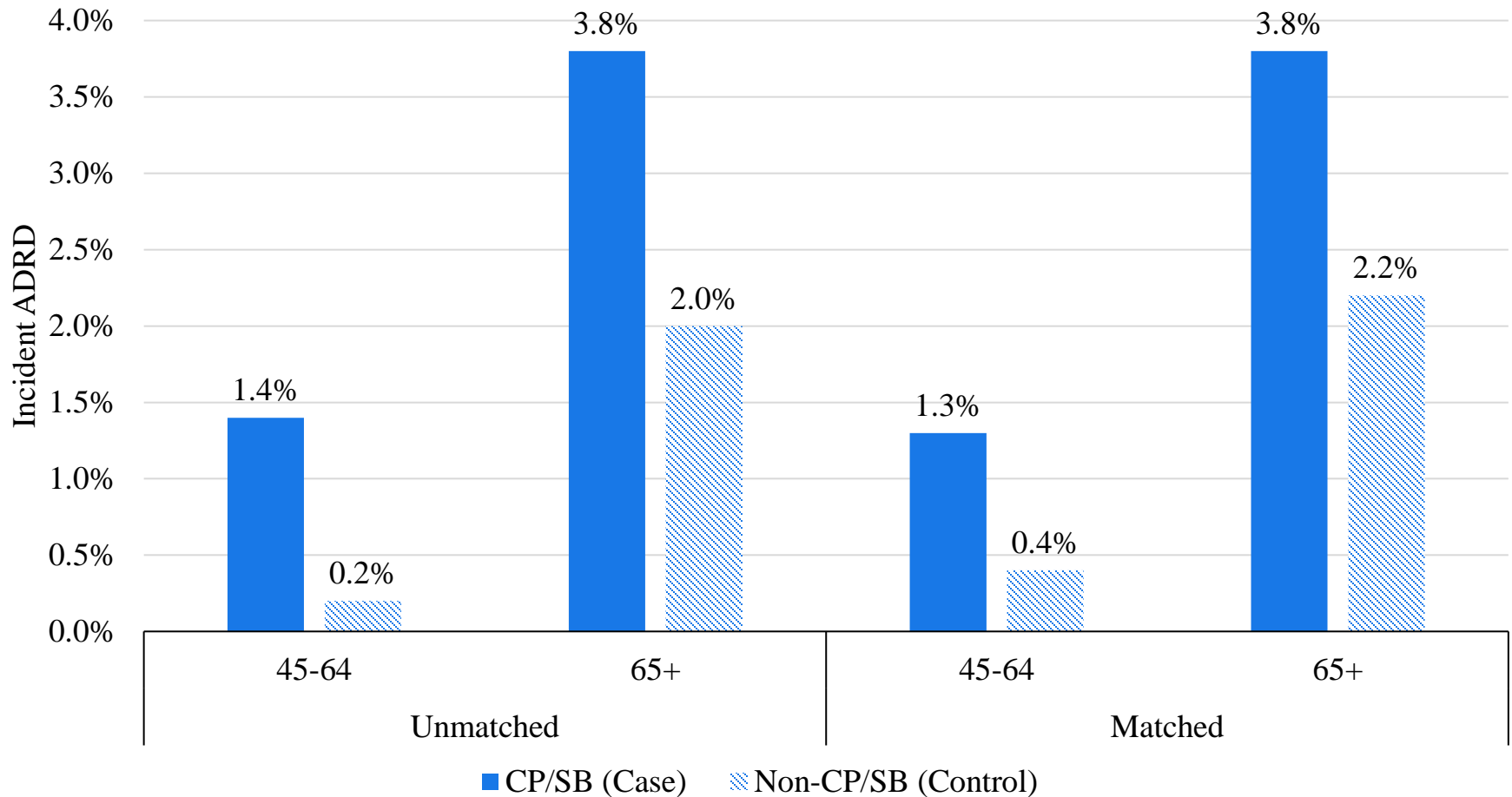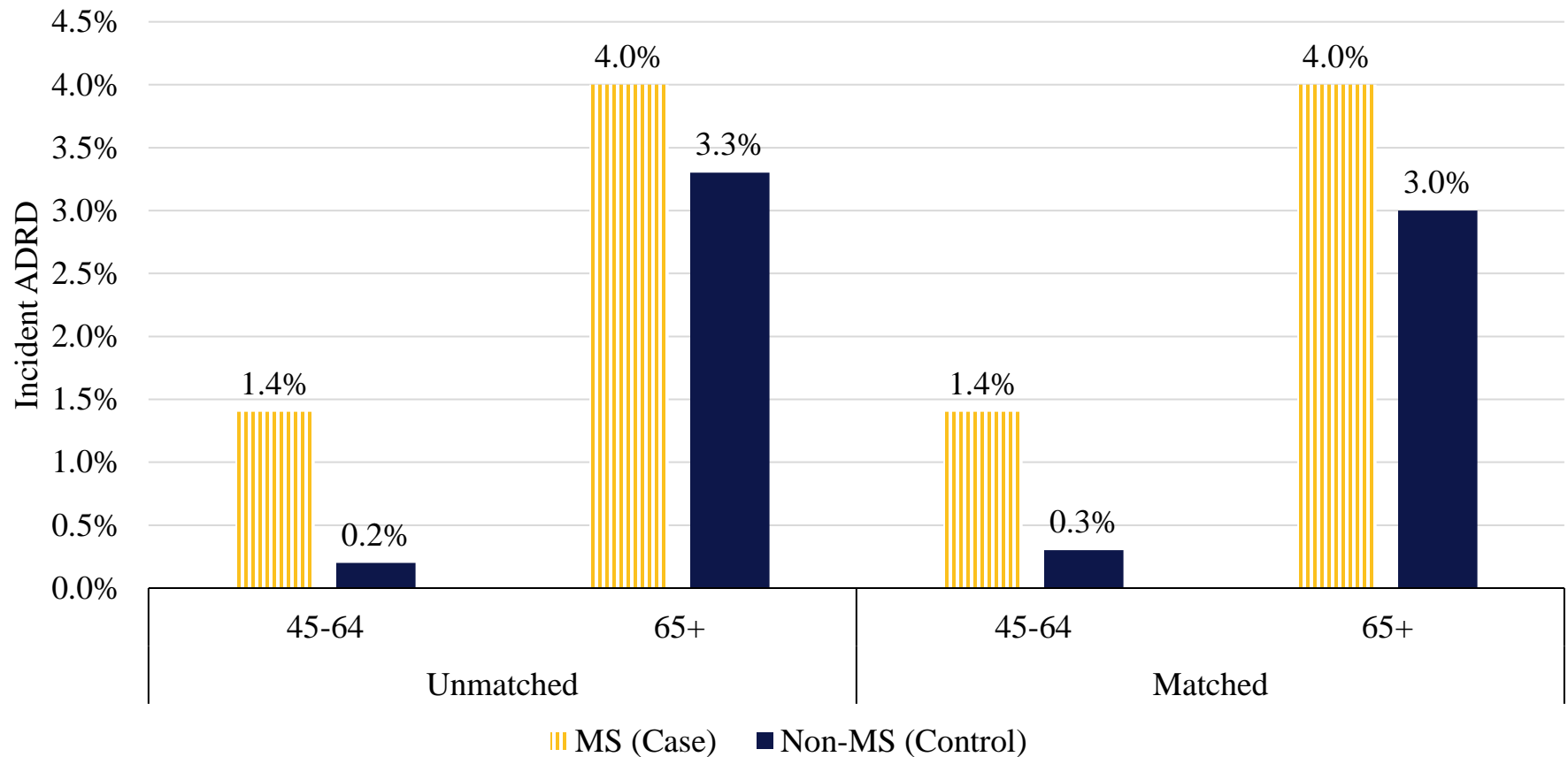
Kaplan-Meier Curves for Adults with CP/SB

Hazard Ratios of CP/SB for ADRD

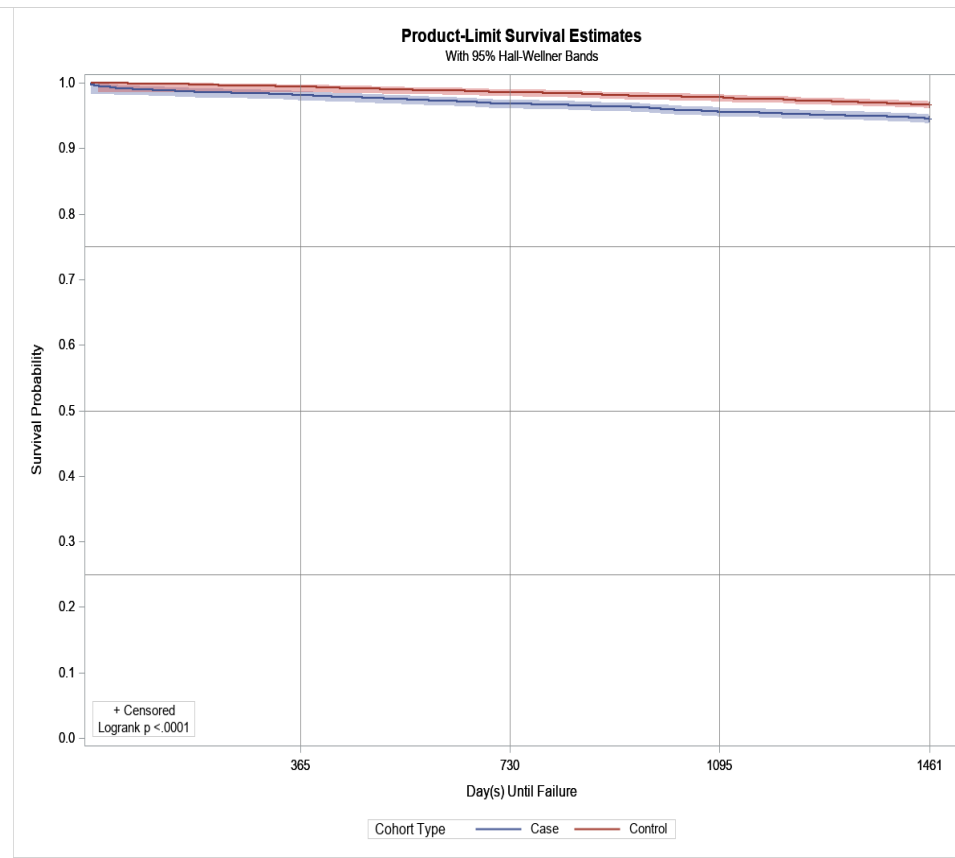|	Unmatched Cohort		Matched Cohort	
Age	Unadjusted	Adjusted	Unadjusted	Adjusted
45-64 years of age	7.84 (6.45, 9.52) ***	5.91 (4.87, 7.18) ***	3.63 (2.36, 5.58) ***	3.35 (2.18, 5.14) ***
65+ years of age	2.49 (2.22, 2.79) ***	1.88 (1.68, 2.11) ***	1.79 (1.47, 2.17) ***	1.68 (1.38, 2.03) ***

Incident ADRD among Adults with MS
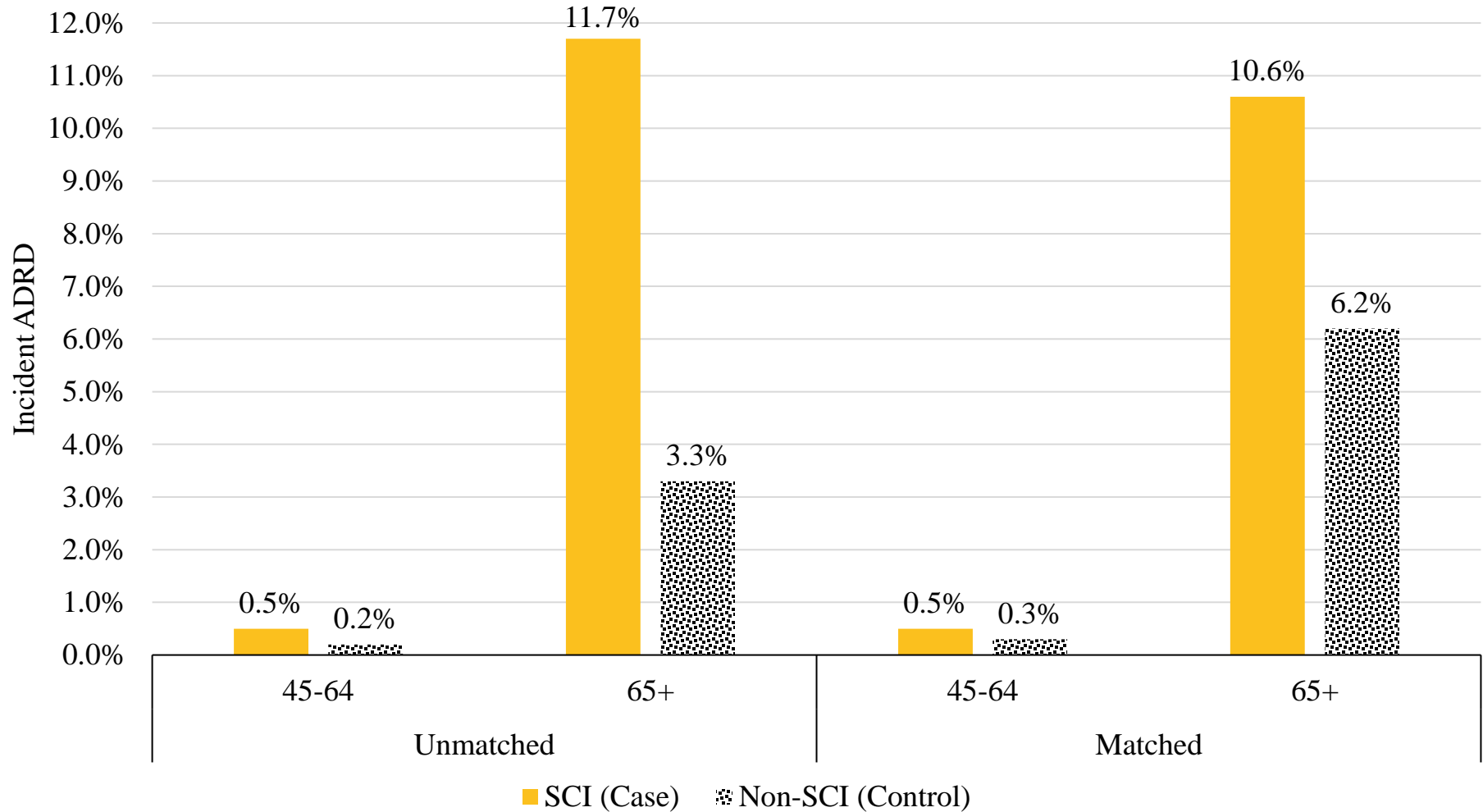
Kaplan-Meier Curves for Adults with MS
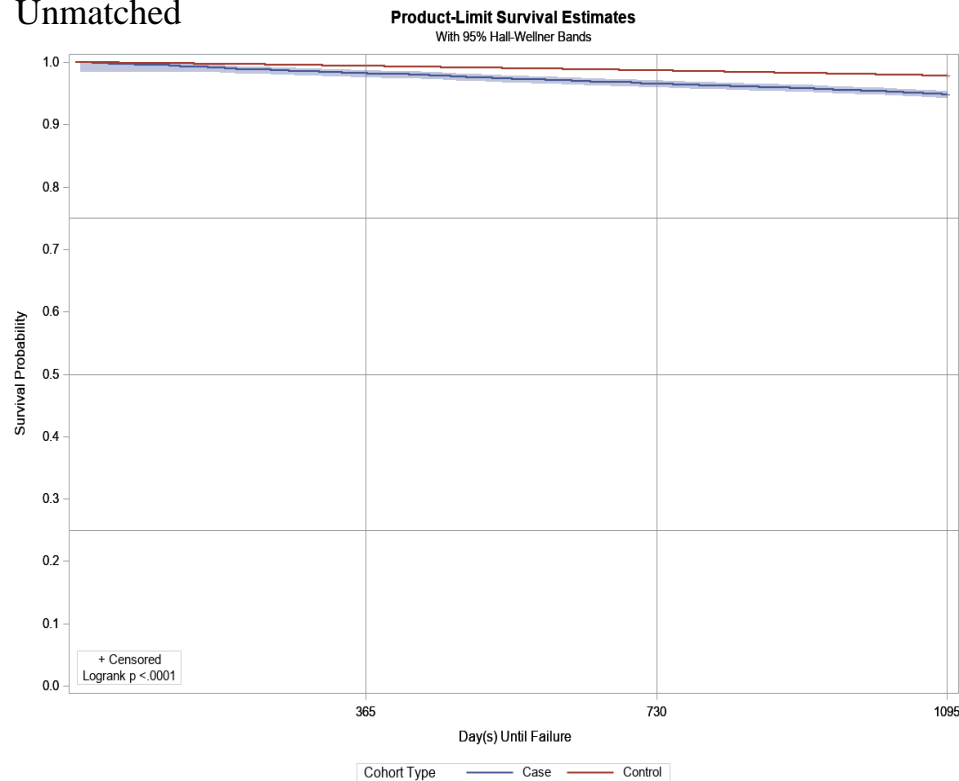
A. Unmatched
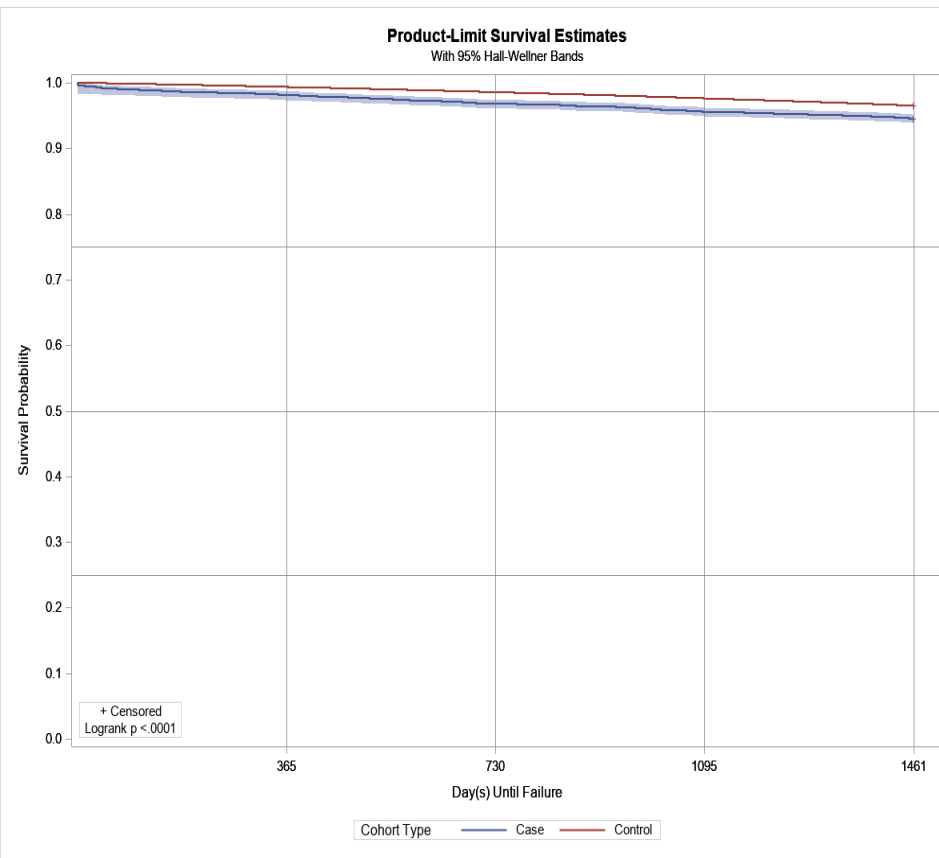
B. Matched

Hazard Ratios of MS for ADRD

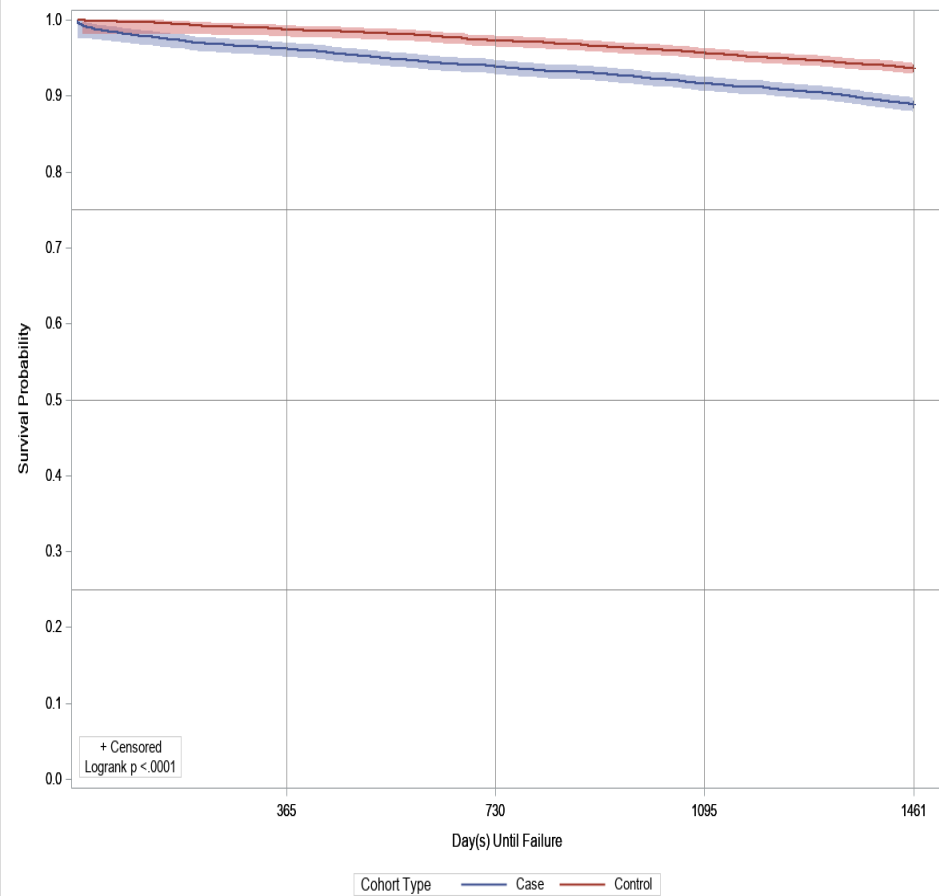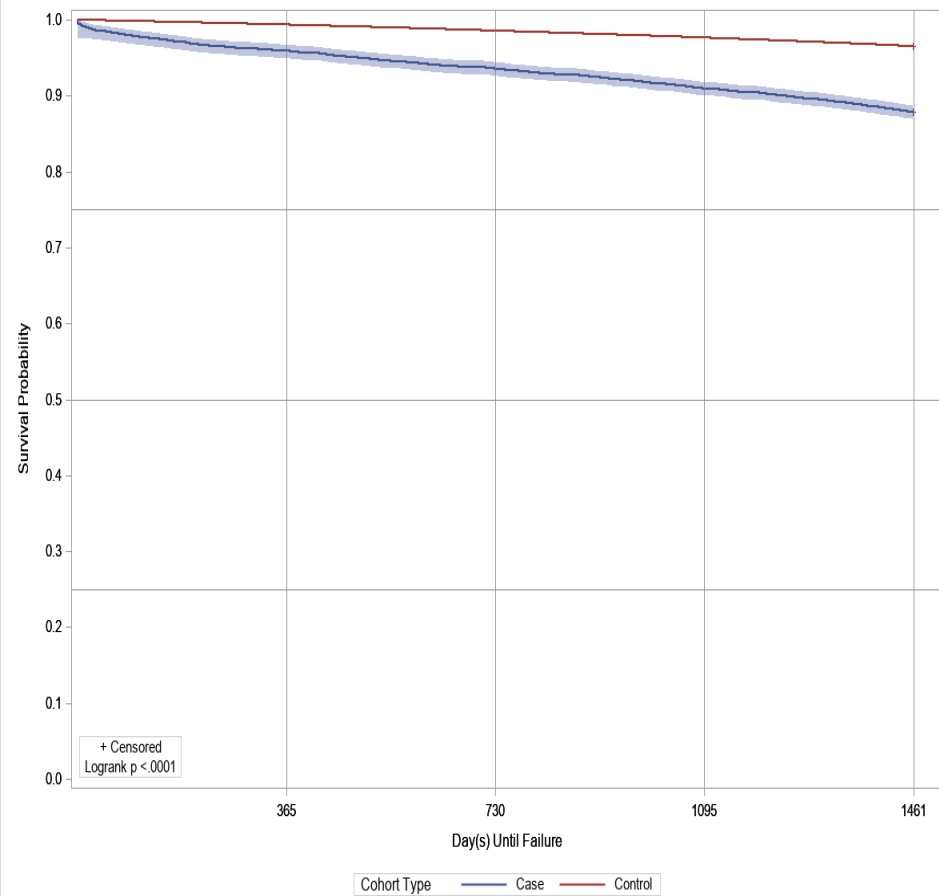| Age	Unmatched Cohort		Matched Cohort	
	Unadjusted	Adjusted	Unadjusted	Adjusted
45-64 years of age	5.20 (4.16, 6.50) ***	4.25 (3.40, 5.32) ***	4.71 (2.74, 8.08) ***	4.49 (2.62, 7.69) ***
65+ years of age	1.68 (1.47, 1.91) ***	1.39 (1.22, 1.58) ***	1.33 (1.09, 1.62) ***	1.26 (1.04, 1.54) ***

Incident ADRD among Adults with TSCI

Kaplan-Meier Curves for Adults with TSCI

A. Unmatched

B. Matched

Hazard Ratios of CP/SB for ADRD

	Unmatched Cohort		Matched Cohort	
	Unadjusted	Adjusted	Unadjusted	Adjusted
45-64 years of age	4.08 (2.93, 5.67) ***	3.19 (2.30, 4.44) ***	1.99 (1.09, 3.62) ***	1.93 (1.06, 3.51) ***
65+ years of age	2.51 (2.34, 2.70) ***	1.90 (1.77, 2.04) ***	1.79 (1.56, 2.04) ***	1.77 (1.55, 2.02) ***

Conclusions

- Both middle-aged and older adults with CP/SB, MS, and TSCI had higher incident ADRD compared to those without disabilities.

- Fully adjusted survival models indicated that adults with aforementioned disabilities had a greater hazard for ADRD.

Limitations

- Lack of more granular socioeconomic data
- Lack of any measure for cognitive function
- Underdiagnosis of ADRD
- Hard to define index diagnosis of comorbid conditions
- Results are not representative of the U.S. population
- Potential selection bias – inclusion of privately insured with higher income and education

Policy Implications

- Although there is no cure for ADRD, research shows that diet, lifestyle, routine exercise, and some therapeutic may slow down the onset of ADRD and/or help preserve level of cognitive function.

- Improved clinical screening and early interventions aiming to preserve cognitive function are of paramount importance for this patient cohort.

Questions and Answers

Thank you!

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