

Exploring the Relationship between Social Isolation and Cognitive Change in the CLSA

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Acknowledgements

Project authors

- Hopper, S., Wister, A.V., Cosco, T.D., & Best, J.R. (2023). Social isolation, physical activity, and subsequent changes in cognition among middle- and older-aged adults: Results from the Canadian Longitudinal Study on Aging. Psychosomatic Medicine. <https://doi.org/10.1097/PSY.0000000000001271>

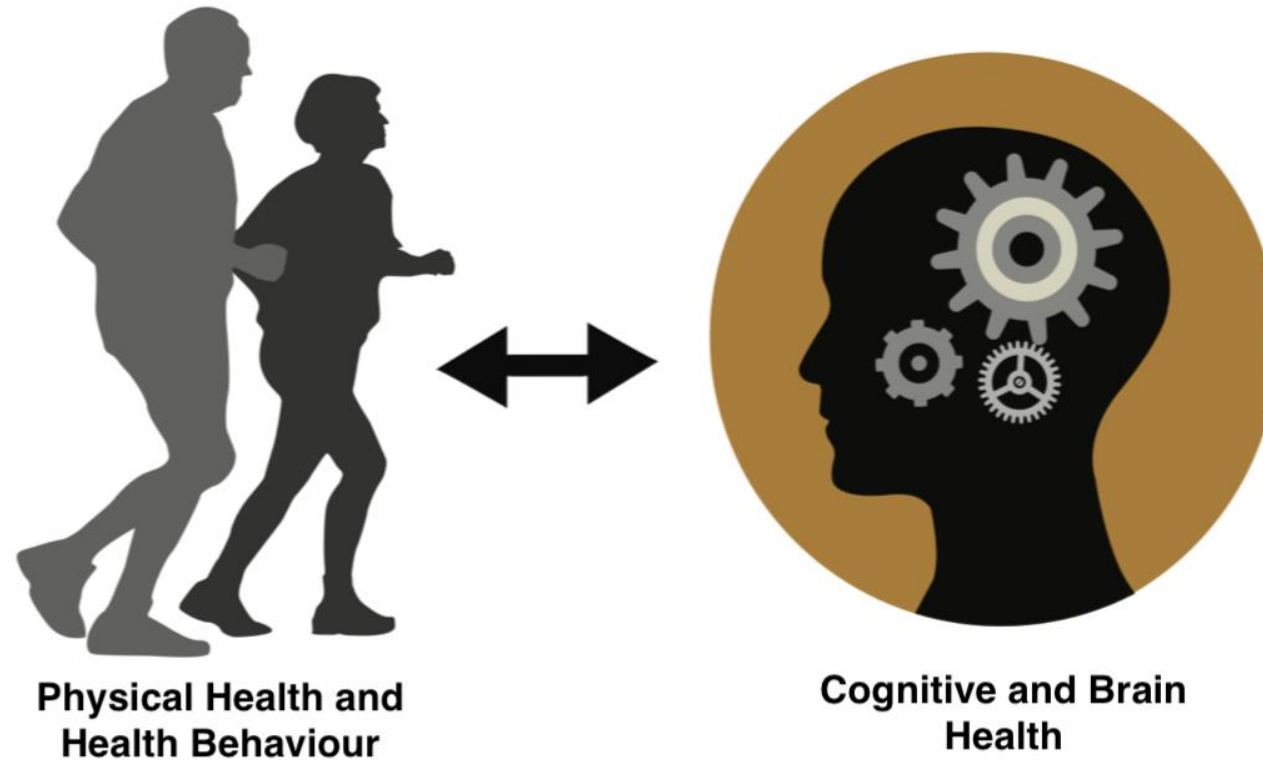
Project funding

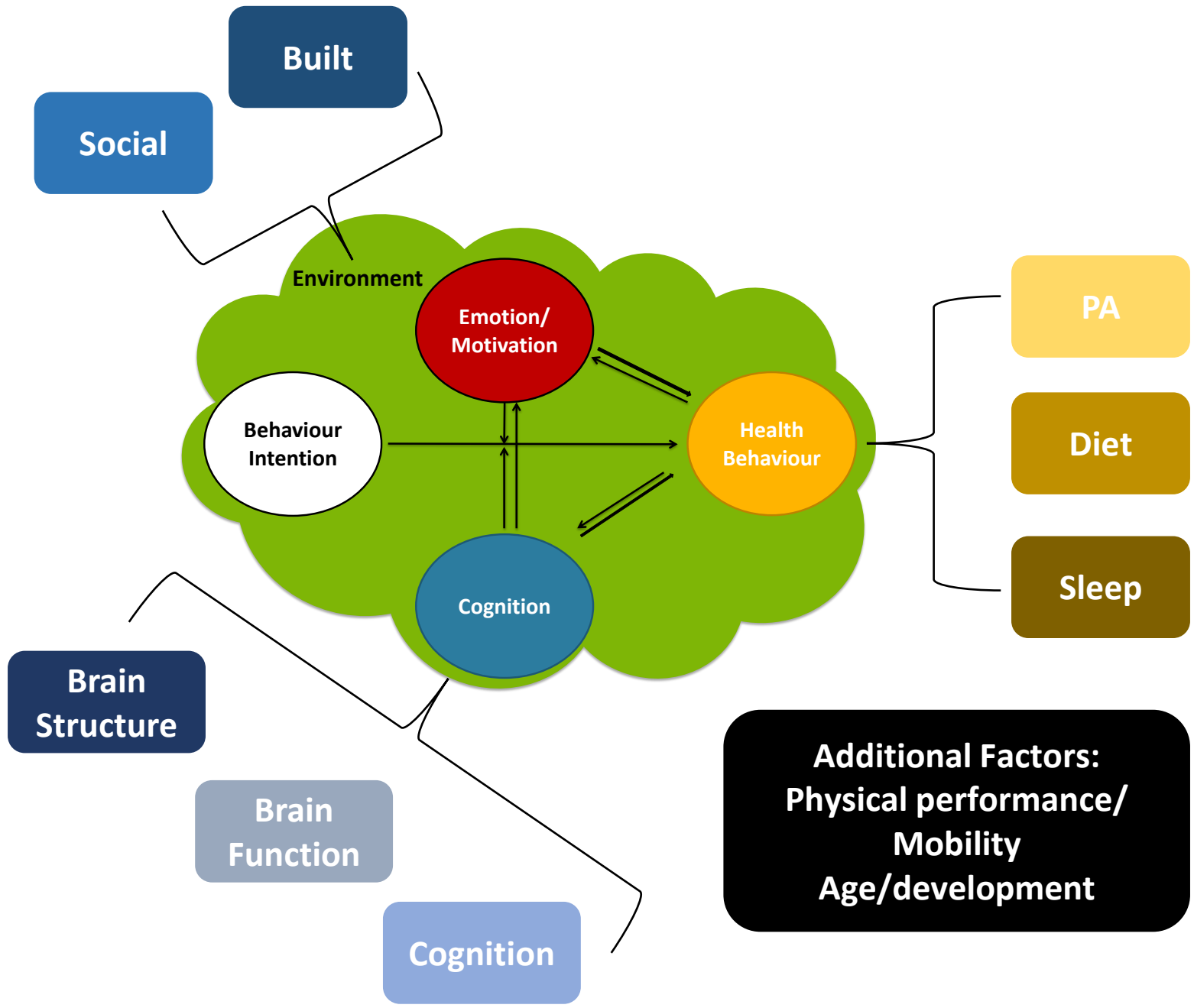
- Canadian Institutes of Health Research Healthy Cities Research Initiative: Analysis of Existing Datasets

Territorial acknowledgement

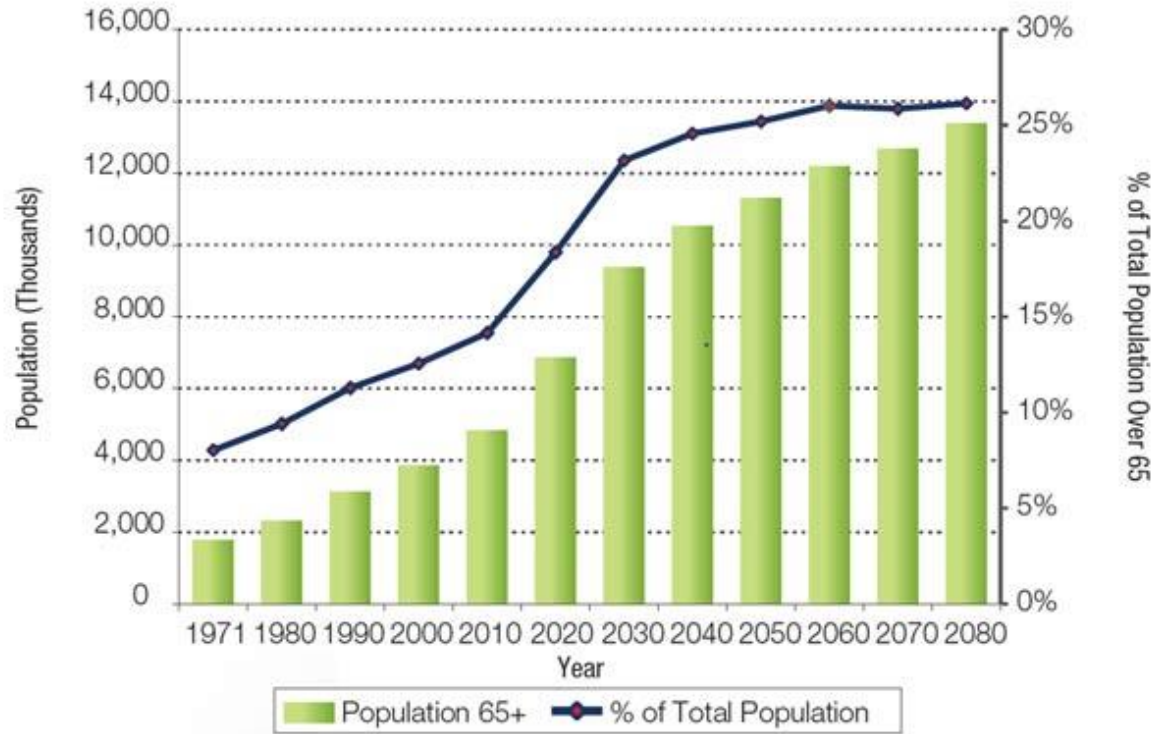
- We respectfully acknowledge the unceded traditional territories including, the Sk̓wx̓wú7mesh Úxwumixw (Squamish), səlilwətał (Tsleil-Waututh) and xʷməθkʷəy̓əm (Musqueam) Nations, on which SFU Vancouver is located.
- Additionally, we acknowledge and honor the diverse Indigenous peoples across Canada, whose territories stretch from coast to coast to coast. Whether we gather in person or virtually, it's crucial to recognize the history, culture, and ongoing struggles of Indigenous peoples across this vast land.

Health Neuroscience





A Trend



Source: Statistics Canada (1971-2010) and Office of the Superintendent of Financial Institutions (2020-2080)

An Issue



Source: National Seniors Council, *Who's at risk and what can be done about it? A review of the literature on the social isolation of different groups of seniors*, February 2017.

The loneliness epidemic: How social isolation can damage our minds and bodies



By **Katie Dangerfield** • Global News

Posted May 14, 2023 6:00 am · Updated May 12, 2023 3:35 pm

Understanding the Effects of Social Isolation on Mental Health

‘The epidemic of loneliness.’ We’re learning just how dangerous social isolation is, especially for older

Social Isolation Can Cause men Depression for Middle-Aged and Older Adults

Social isolation is getting worse among Canada’s elderly. Here’s why

HEALTH NEWS APRIL 12, 2024 / 1:45 PM

Older Americans are still feeling the effects of pandemic isolation

New Surgeon General Advisory Raises Alarm about the Devastating Impact of the Epidemic of Loneliness and Isolation in the United States

Surgeon General Dr. Vivek Murthy Calls for Action to Address Public Health Crisis, Lays Out Framework for a National Strategy to Advance Social Connection

Elderly People Who Live Alone at Increased Risk of Cognitive Decline

Opinion: When senior centres close on weekends, many older adults are left isolated

Defining Social Isolation

“A lack in **quantity** and quality of social contacts” and “involves few social contacts and few social roles, as well as the absence of mutually rewarding relationships” (Keefe et al., 2006)

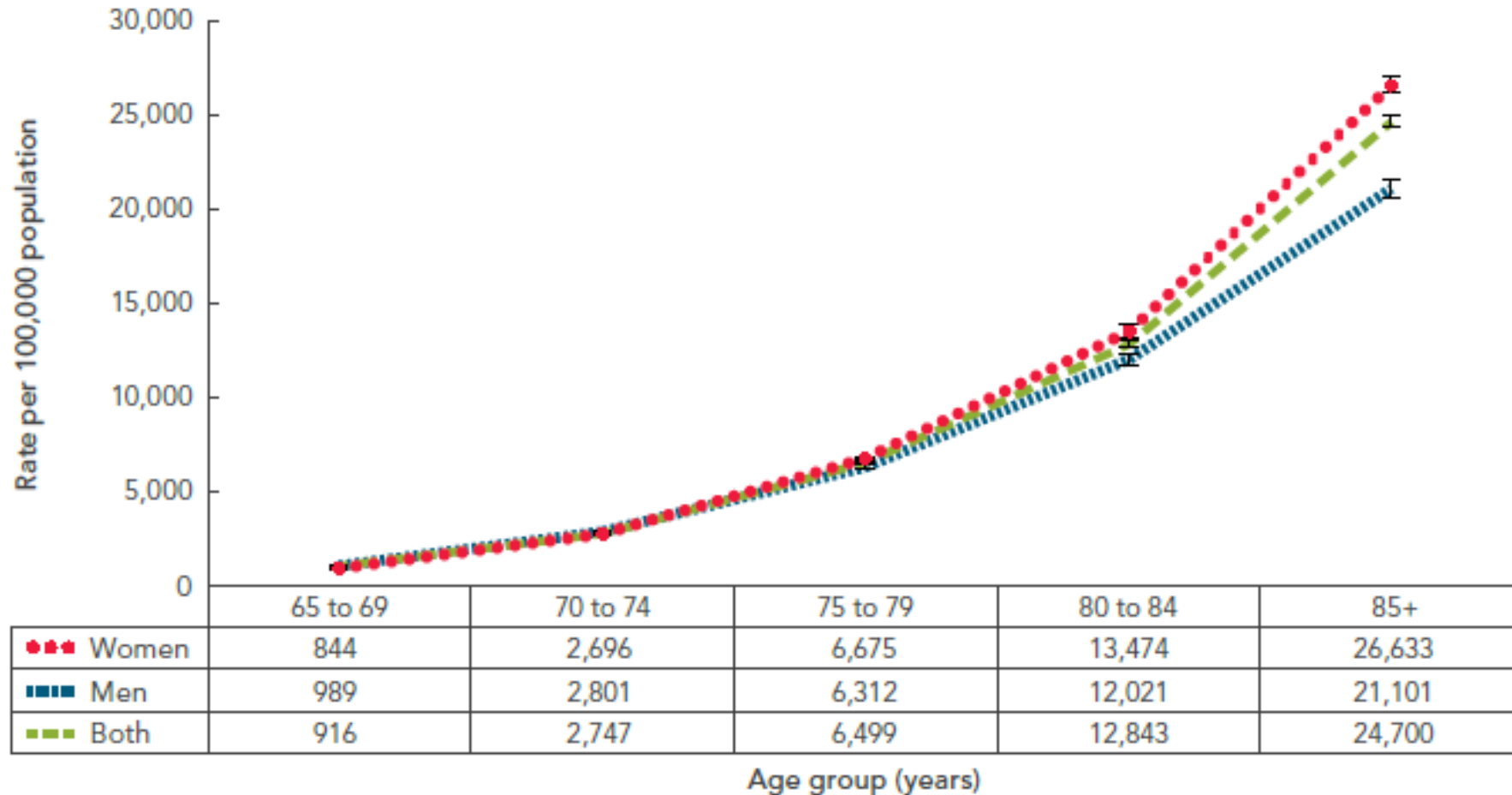
Broader impacts of social isolation

- Diminished cognition and increased risk of dementia (Evans et al., 2019; Lara et al., 2019; Yang et al., 2020)
- Reduced physical activity and greater sedentary time (Kobayashi & Steptoe, 2018; Shankar et al., 2011)
- Increased hypertension (Holt-Lunstad et al., 2015)
- Increased risk of mortality (Holt-Lunstad et al., 2015)

Another Issue

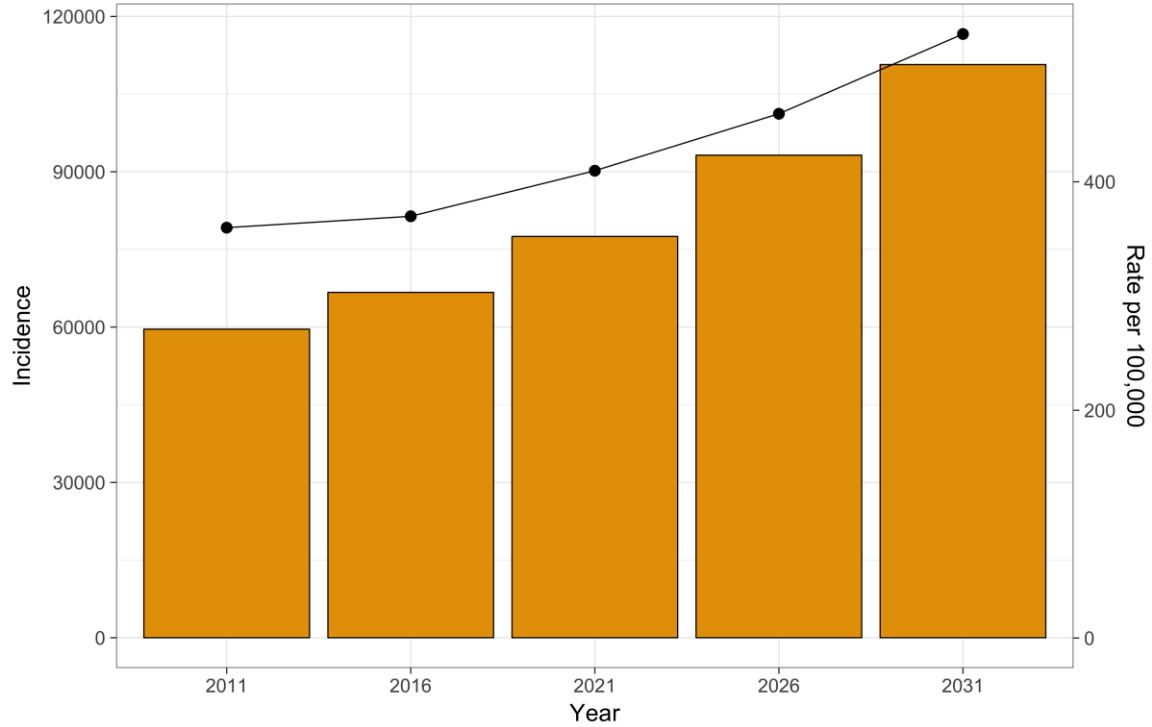
Prevalence of Alzheimer's disease and other dementias

by sex and age group, British Columbia, 2009/2010, BC Administrative Data Project

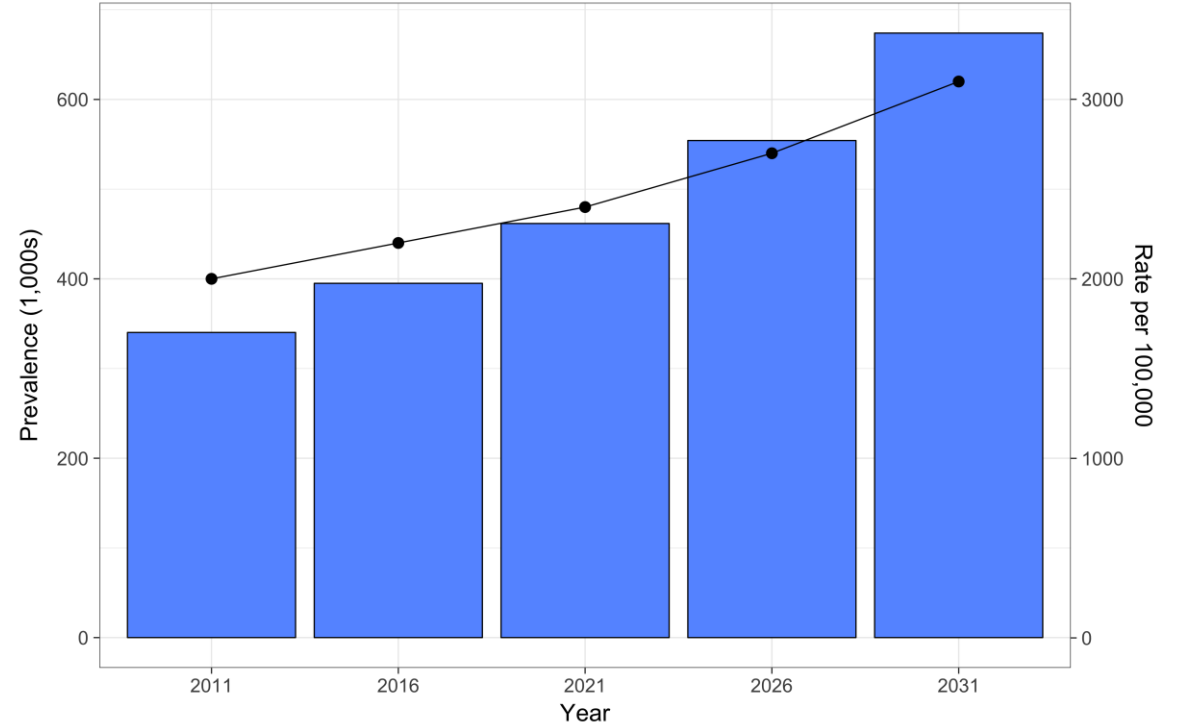


Dementia x The Aging Population

Dementia incidence



Dementia prevalence



Source: Statistics Canada and Public Health Agency of Canada
Manuel et al. 2016 *Population Health Metrics*

Cognition in a Time of Social Isolation & Rapid Population Aging



(Evans et al., 2019; Lara et al., 2019)



(Mandolesi et al., 2018; Tan et al., 2017)



(Schrempft et al., 2019)



The Gap

- Intervention studies show small effect sizes, therefore interventions targeting physical activity may be more beneficial (Evans et al., 2019)
- No studies have looked at these three variables together
- Small sample sizes and/or non-Canadian samples
- Age and sex considerations





Social
isolation



Physical
activity levels



Cognitive
decline

Objectives

- 1) Evaluate associations between social isolation and change in cognition over a three-year period
- 2) Evaluate whether physical activity mediates the association between social isolation and cognition change.

The Canadian Longitudinal Study on Aging

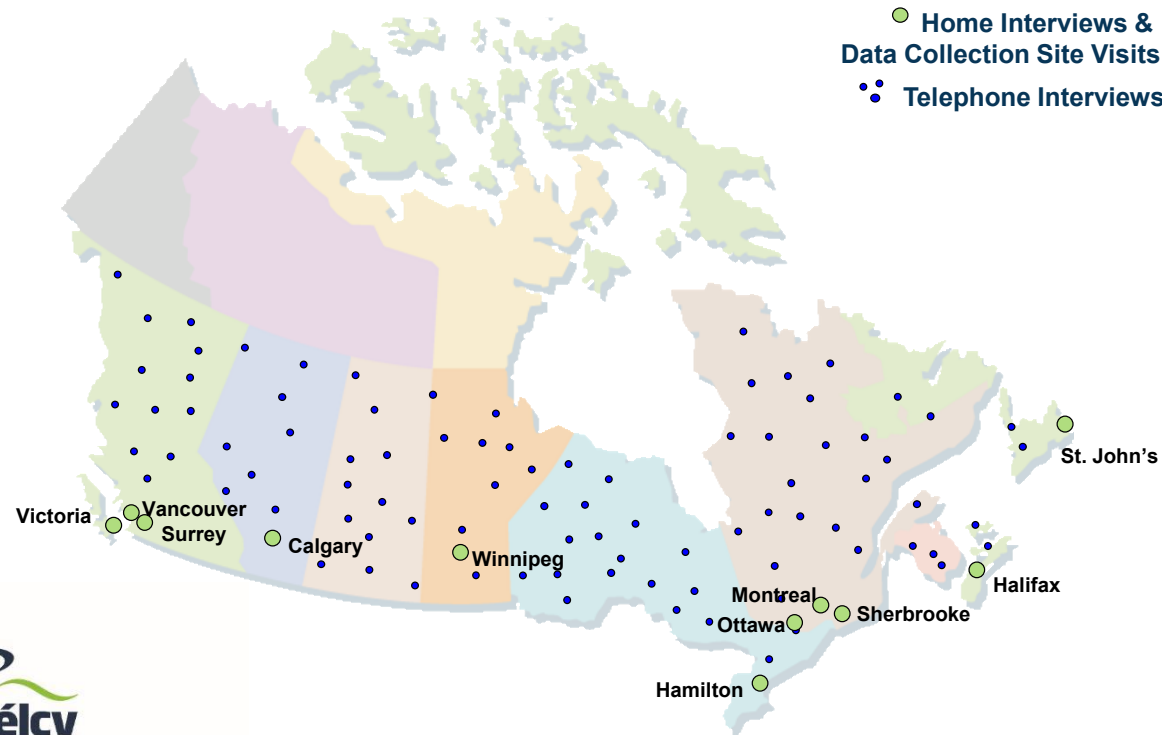
51,338 participants at baseline

Data Collection:
20 years or until death

2011:
Baseline data collection

Follow up 1:
Three years later

Tracking and
Comprehensive
Cohorts

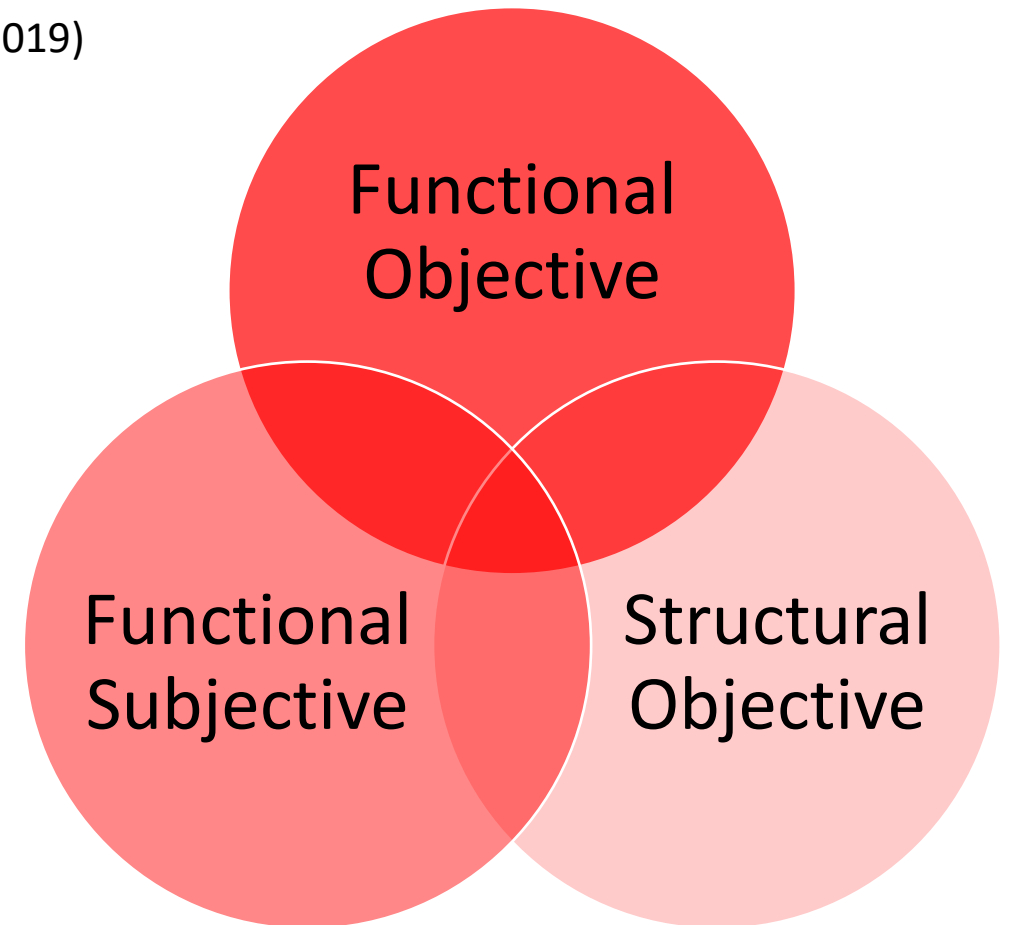


Measures

Exposure - Social Isolation Index (Wister et al., 2019)

- Structural Objective
 - Community participation items
 - Social network items
 - Last time visited items
 - Living alone
 - Marital Status
- Functional Objective
 - Social Support
- Functional Subjective
 - Loneliness
 - Desire to participate in more activities

$$(SO + FO + FS) / 3$$



Measures

Mediator

- Physical Activity (PASE)

Outcomes

Executive Function

- Animal fluency – number of distinct animals produced in 60 seconds
- Mental alterations test – alternate stating numbers and letters in ascending order (“1-A-2-B...”)

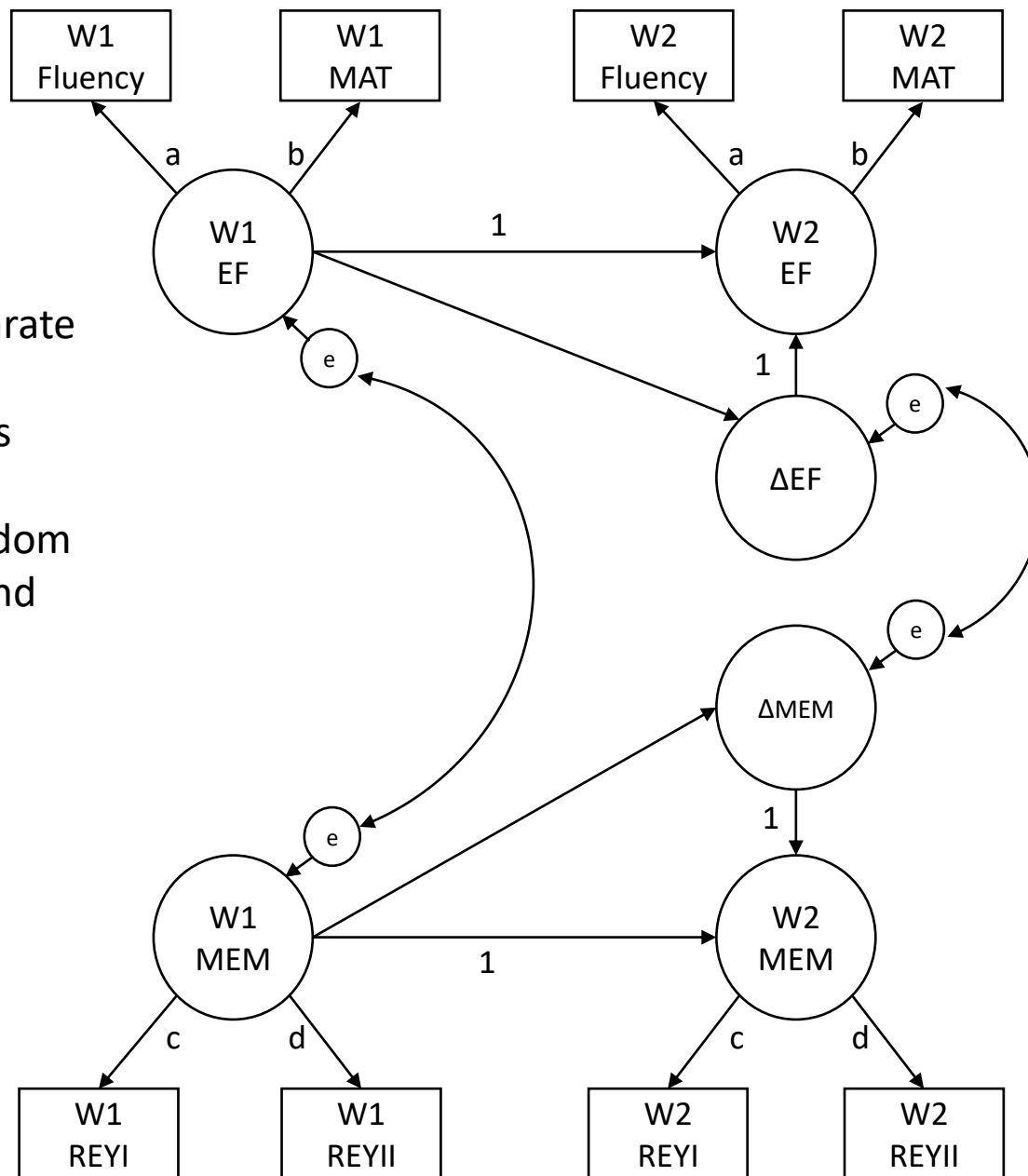
Memory

- RAVLT I – Immediate word recall
- RAVLT II – Delayed (5 minutes) word recall

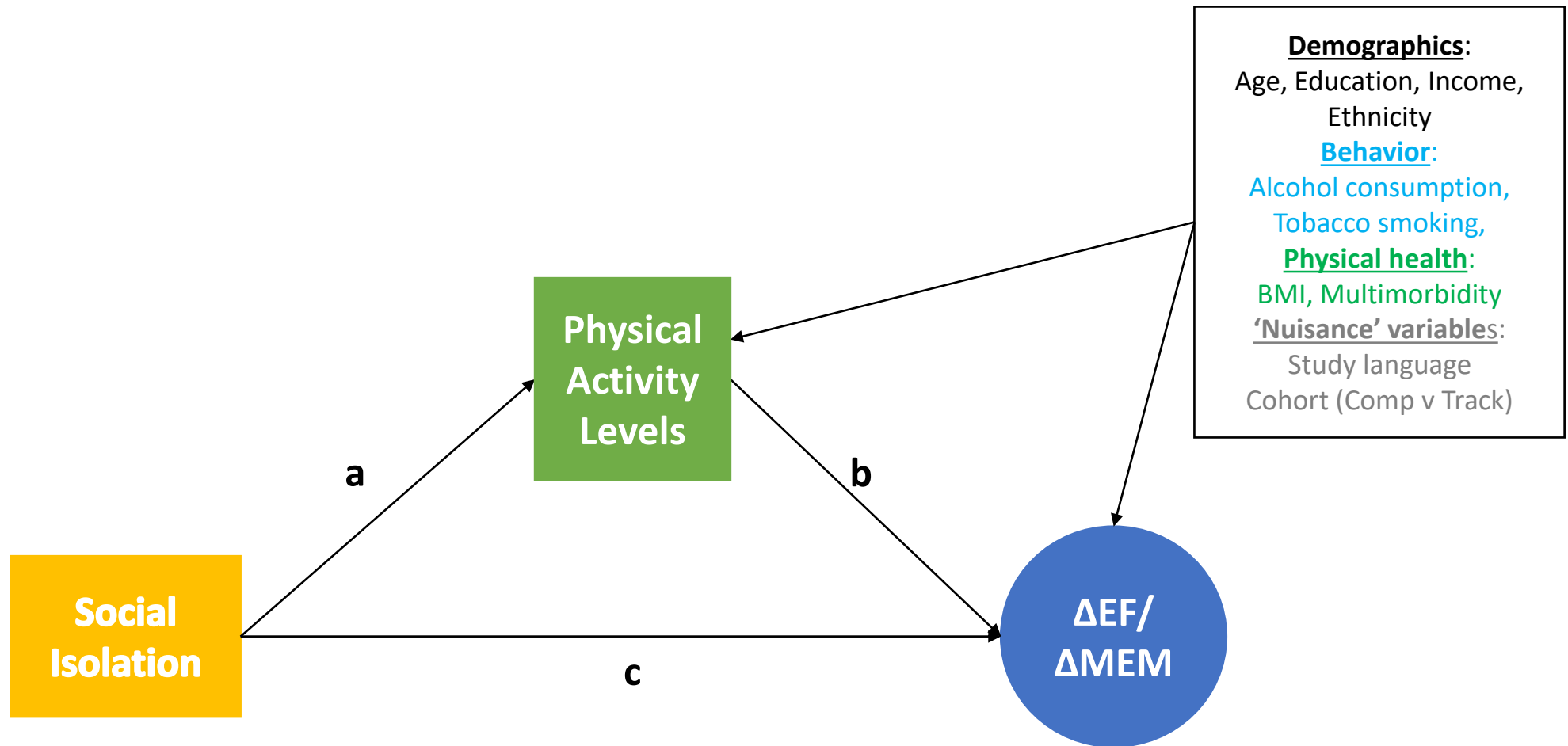
(Washburn et al., 1993; Rey, 1964; Teng, 1995; Tuokko et al., 2017)

Latent change score model¹

- Start with 2-factor solution reflecting separate memory and executive function factors²
- Maximum likelihood estimation (addresses missingness in outcome)
- Exogenous variables considered to be random (addresses missingness in covariates, SII, and PASE)

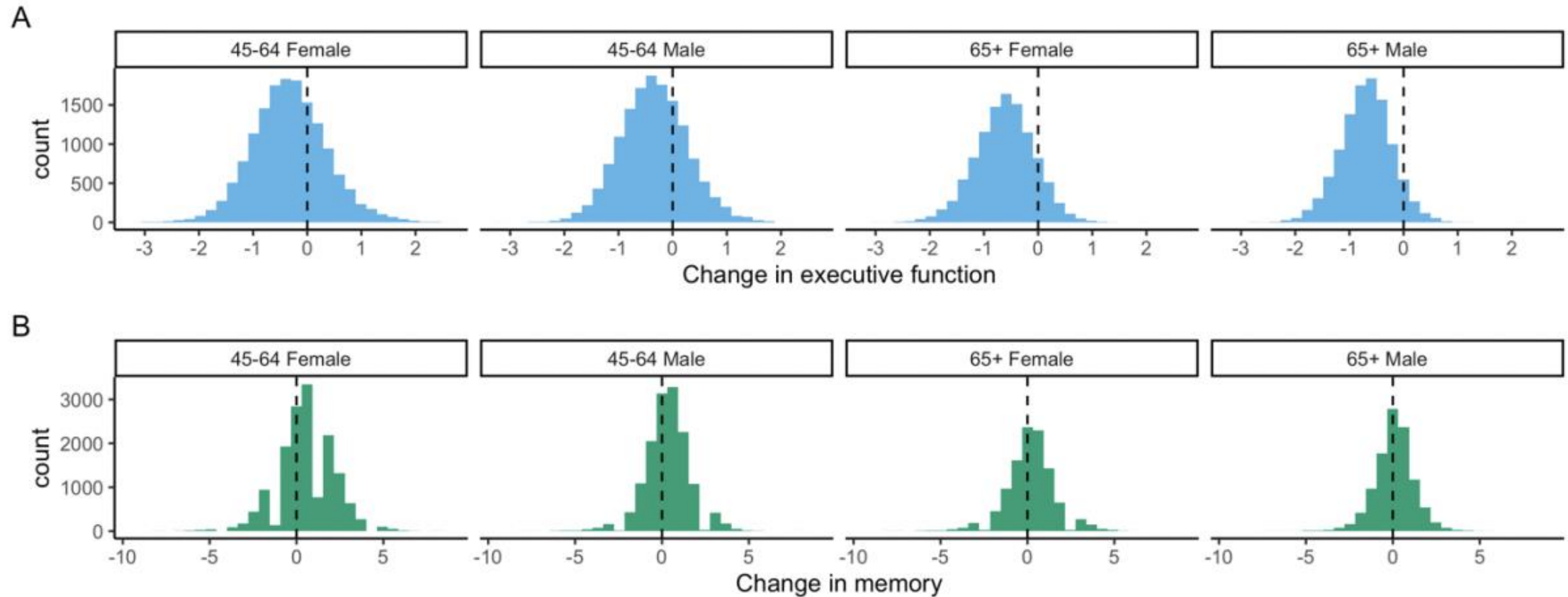


Simplified diagram of multigroup* mediation model



*Stratified by age (45-64 vs 65+) and biological sex (male vs female)

How scores changed from baseline to follow-up



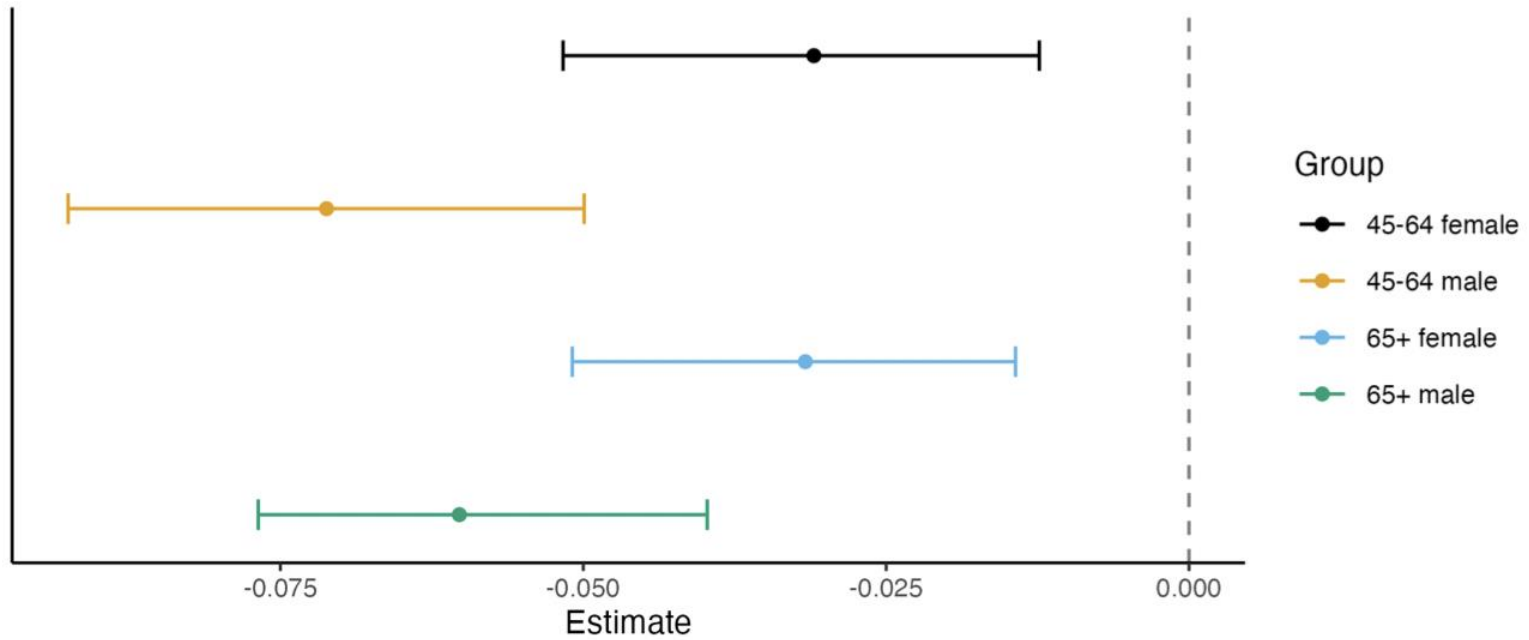


Social isolation



Physical activity levels

A Association between social isolation and physical activity





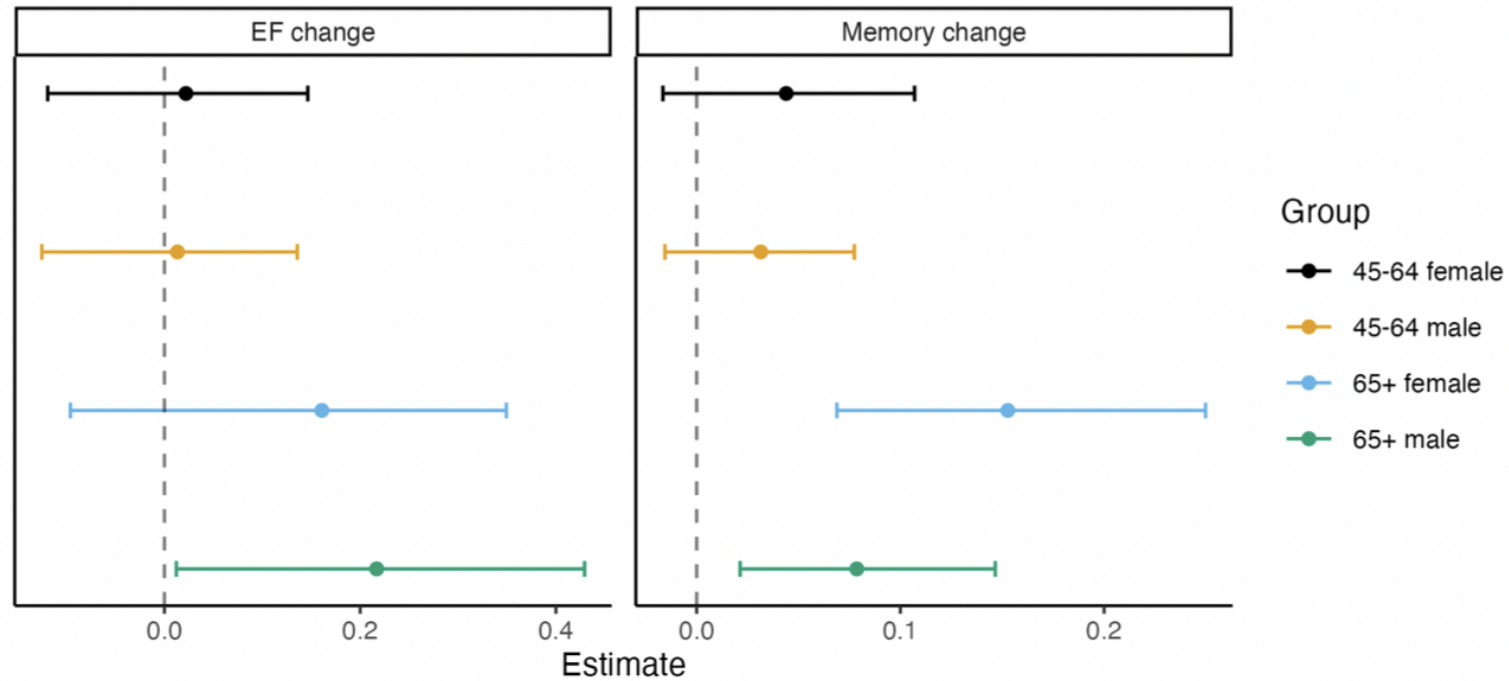
Physical activity levels



Cognitive decline

B

Association between physical activity and cognition





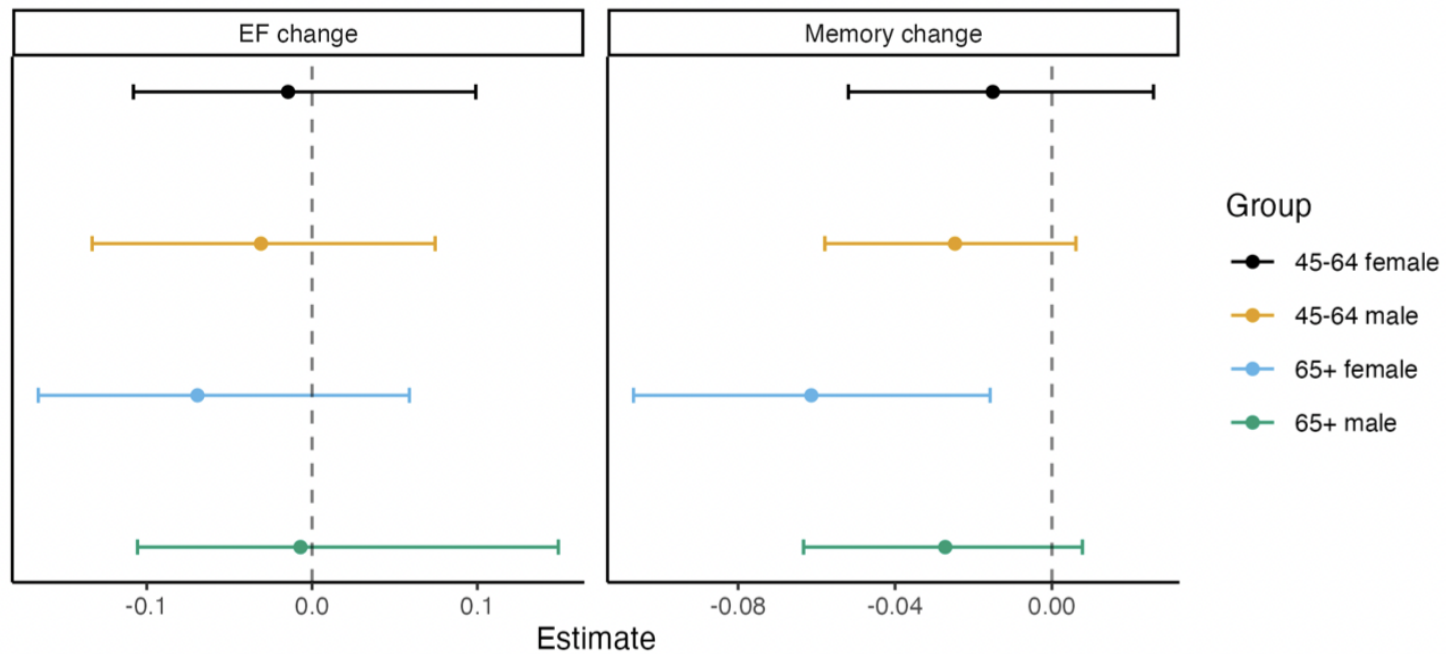
Social isolation

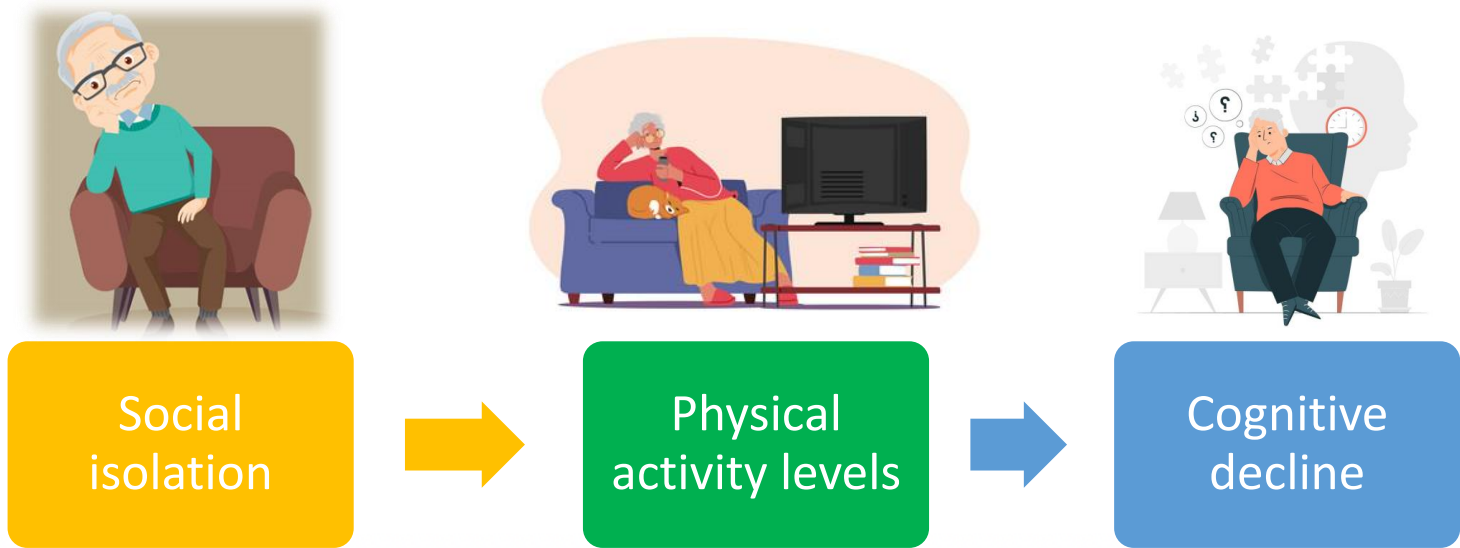


Cognitive decline

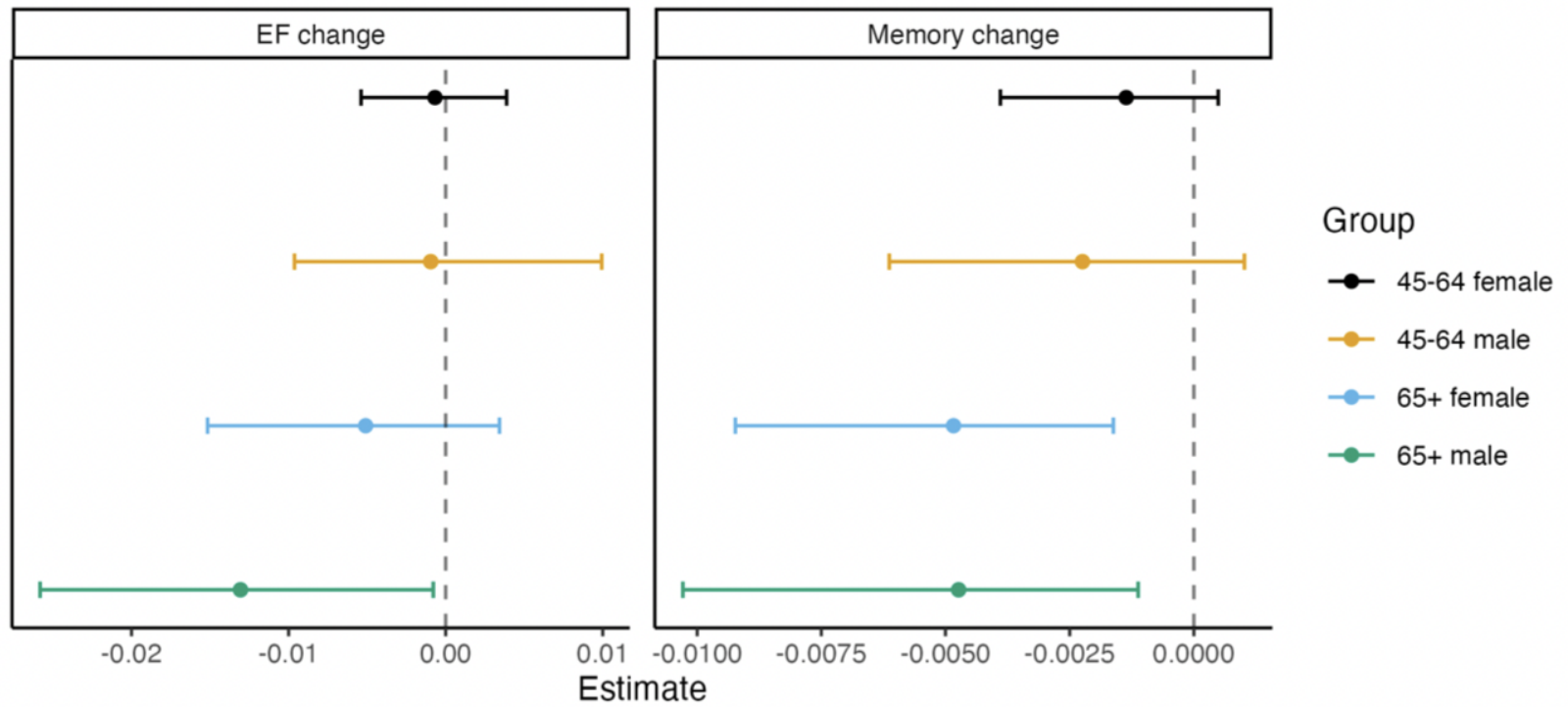
C

Total effect of social isolation on cognition





D Indirect effect of social isolation on cognition



Limitations

- Self-report measure of physical activity
- Dynamic and reciprocal relationship – bidirectionality?
- Causal interpretation of effects relies on the assumption of ‘sequential ignorability’
 - This is a strong assumption that is not directly verifiable (Forastiere & Mattei, 2018)
 - Longitudinal data helps, but is not a panacea (Rohrer et al. 2022)

Conclusions

Evidence is clearest for an association between **social isolation and short-term memory decline** in older males and females, and further, this effect is **mediated by physical activity**

Association between **social isolation and physical activity** is stronger in **males** compared to females

Combined physical activity and social interaction may be a promising intervention

(Quialheiro et al., 2022)

Future Research

- Test bidirectionality
- Include more waves of data
- Replication in a different dataset



Social
isolation



Cognitive
decline

Thank you!



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