



Neighborhood socioeconomic disadvantage, inequalities, and cognitive ageing

Prof. Dr. Anja Leist, 10 February 2022

w/Dr. Fabiana Ribeiro, Dr. Jason Settels, Matthias Klee, MSc, Dr. Ariane Bertogg, Jung Hyun Kim, MSc, and others

LISER-NUIG-IMA Microsimulation Inequality Global Webinar Series



Conflict of interest

Dr Leist received remuneration from Roche for advisory activities related to expanding health equity in AD.

CRISP Cognitive Aging: From Educational Opportunities to Individual Risk Profiles

- Investigate the social and behavioral determinants of cognitive ageing and dementia
- Test contextual-level inequalities related to education, sex/gender, and socioeconomic conditions
- Use new methods for risk prediction and causal inference in observational data

Why social and behavioral determinants of cognitive ageing and dementia?

Cognitive impairment and dementia are among the great societal challenges of ageing societies

No medical cure for dementia yet

Modifiable social and behavioral risk factors explain up to 40% of all dementia cases (Livingston et al., 2020)

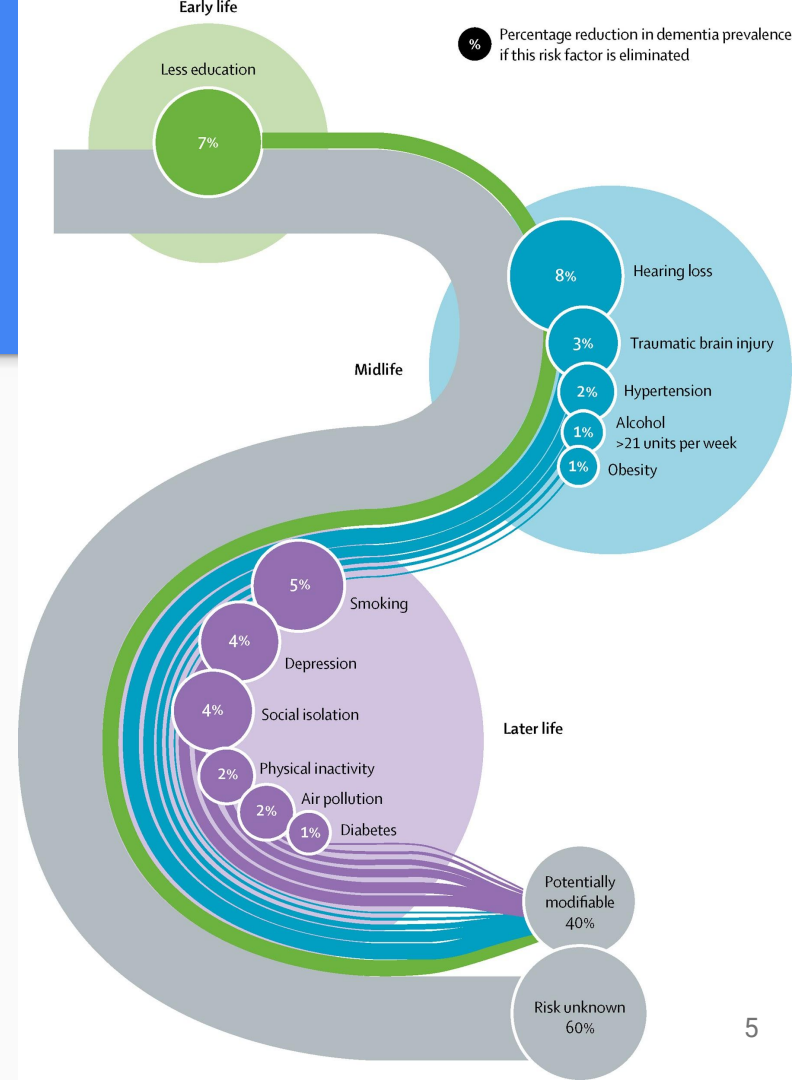
Important to understand (1) dementia risk of vulnerable individuals and (2) potential for dementia prevention

Modifiable dementia risk

Dementia: Range of conditions characterized by memory impairment. Irreversible, not possible to cure or delay decline.

Potentially modifiable risk factors account for up to 40% to all dementia diagnoses.

In comparison, genetic risk for dementia contributes to approximately 7% of all dementia diagnoses.



Why contextual-level inequalities in cognitive ageing and dementia?

Little focus on some particularities of cognitive ageing and dementia, e.g.

- Substantial **country-level variation** in population-based studies → impact of human development (education, health, socioeconomics)?
- **Sex/gender differences** in prevalence of dementia → impact of gender inequalities, e.g. gender-role attitudes?
- Cognitive development highly influenced by **schooling** → impact of schooling systems, educational opportunities?

CRISP output (selection)

Neighborhood socioeconomic disadvantage

Settels, J., & Leist, A. K. (2021). Changes in neighborhood-level socioeconomic disadvantage and older Americans' cognitive functioning. *Health & Place*, 68, 102510.

Klee, M., Leist, A.K., Veldsman, M., Ranson, J.M., Llewellyn, D.J. (under review). Socioeconomic deprivation, genetics and risk of dementia.

Schooling and childhood socioeconomic conditions

Leist, A. K., Bar-Haim, E., & Chauvel, L. (2021). Inequality of educational opportunity at time of schooling predicts cognitive functioning in later adulthood. *SSM - Population Health*, doi: 10.1016/j.ssmph.2021.100837.

Ford, K.J., Kobayashi, L., & Leist, A.K. Childhood socioeconomic disadvantage and pathways to memory performance in mid to late Adulthood: What matters most? *Revise, Journals of Gerontology: Social Sciences*.

Psychosocial work characteristics

Ford, K., Batty, G. D., & Leist, A. K. (2021). Examining gender differentials in the association of low control work with cognitive performance in older workers. *European Journal of Public Health*, 31(1), 174–180, doi: 10.1093/eurpub/ckaa173

Employment transitions

Kim, J.H., Muniz-Terrera, G., & Leist, A. K. Does (re-)entering the labor market at advanced ages protect against cognitive decline? In preparation

Partnership

Bertogg, A., & Leist, A. K. (2021). Partnership and cognitive aging in Europe: Mediating factors and social stratification. *Journals of Gerontology: Social Sciences*, <https://doi.org/10.1093/geronb/gbab020>.

Contextual
inequalities

Methods

Life course

Sex/gender

Klee, M., Langa, K.M., Leist, A.K. Algorithms for probable dementia classification in the Survey of Health, Ageing and Retirement in Europe. In preparation.

Leist, A. K., Klee, M., Kim, J. H., Rehkopf, D. H., Bordas, S. P. A., Muniz-Terrera, G., & Wade, S. (2021, June). Machine learning in the social and health sciences. arXiv. <https://arxiv.org/abs/2106.10716> *Revise, Science Advances*

... Cognitive trajectories with unsupervised ML (lead: M. Klee), causal inference in observational data (lead: Zhalama)

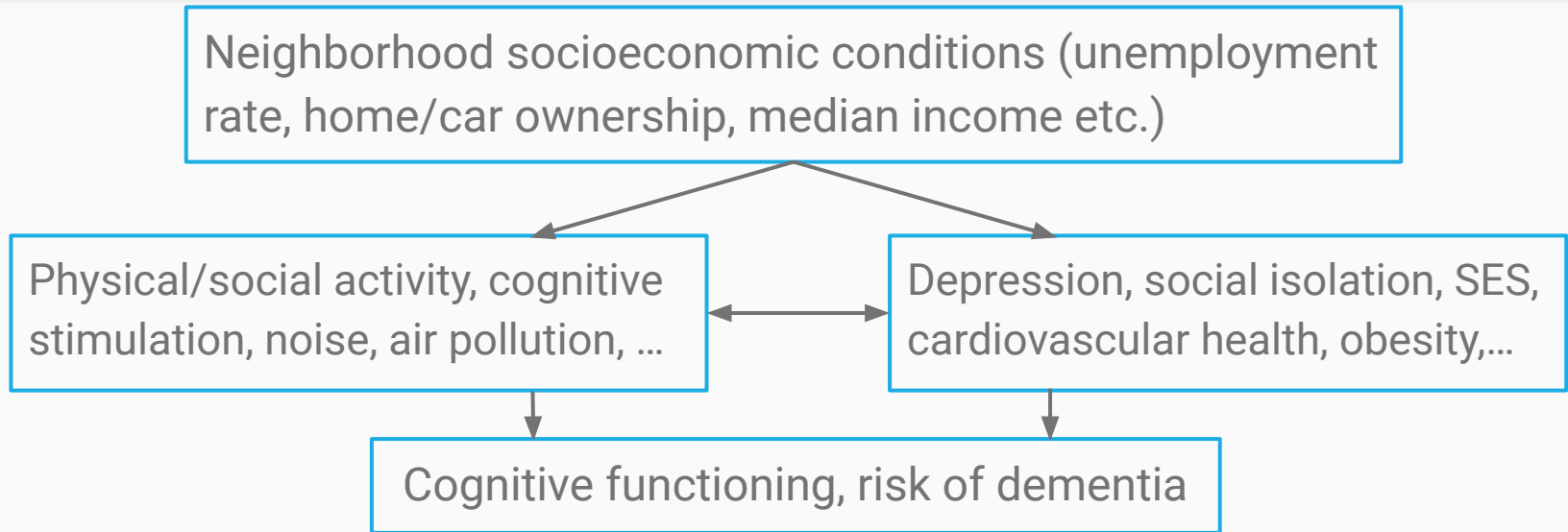
Ribeiro, F., Teixeira-Santos, A. C., & Leist, A. K. (2021). The prevalence of mild cognitive impairment in Latin America and the Caribbean: a systematic review and meta-analysis. *Aging & Mental Health*, <https://doi.org/10.1080/13607863.2021.2003297>

Ford, K. J., & Leist, A. K. (2021). Returns to educational and occupational attainment in cognitive performance for middle-aged South Korean men and women. *Gerontology and Geriatric Medicine (SAGE)*, 7, <https://doi.org/10.1177/23337214211004366>.

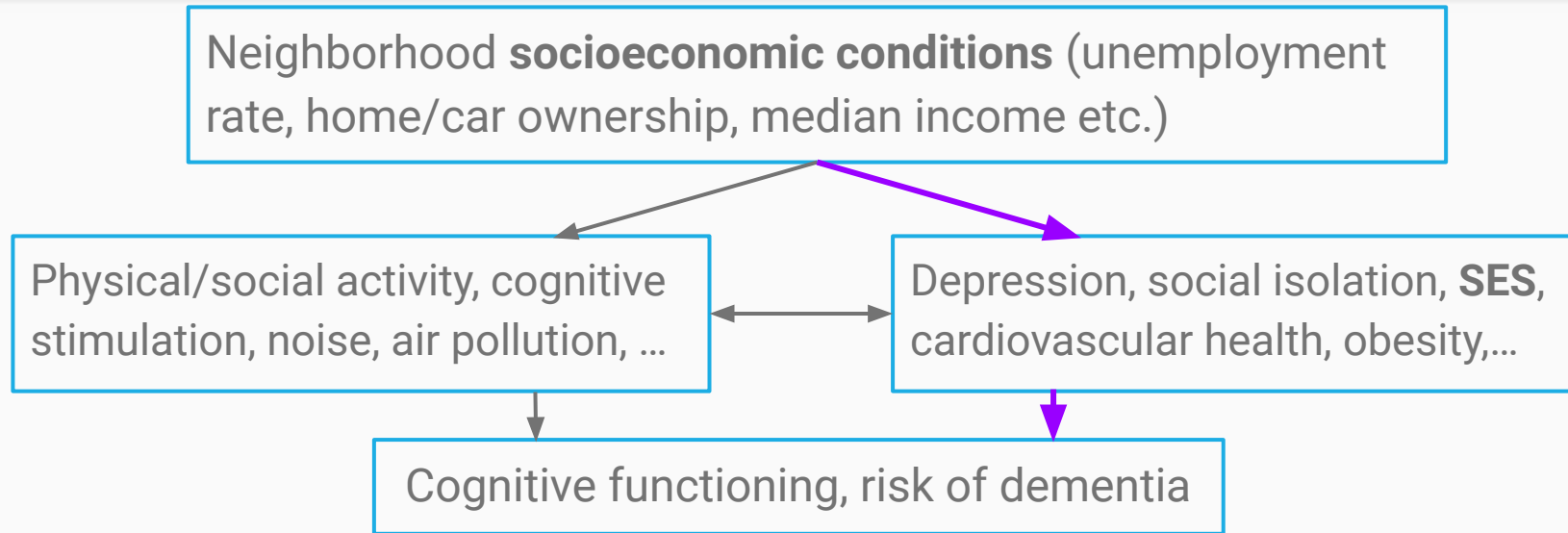
Bertogg, A., & Leist, A.K. (under review). Gendered life courses and cognitive functioning in later life: The role of gender norms and employment biographies.

... Gender inequalities in Latin American countries (lead: F. Ribeiro)

Why neighborhood socioeconomic disadvantage?



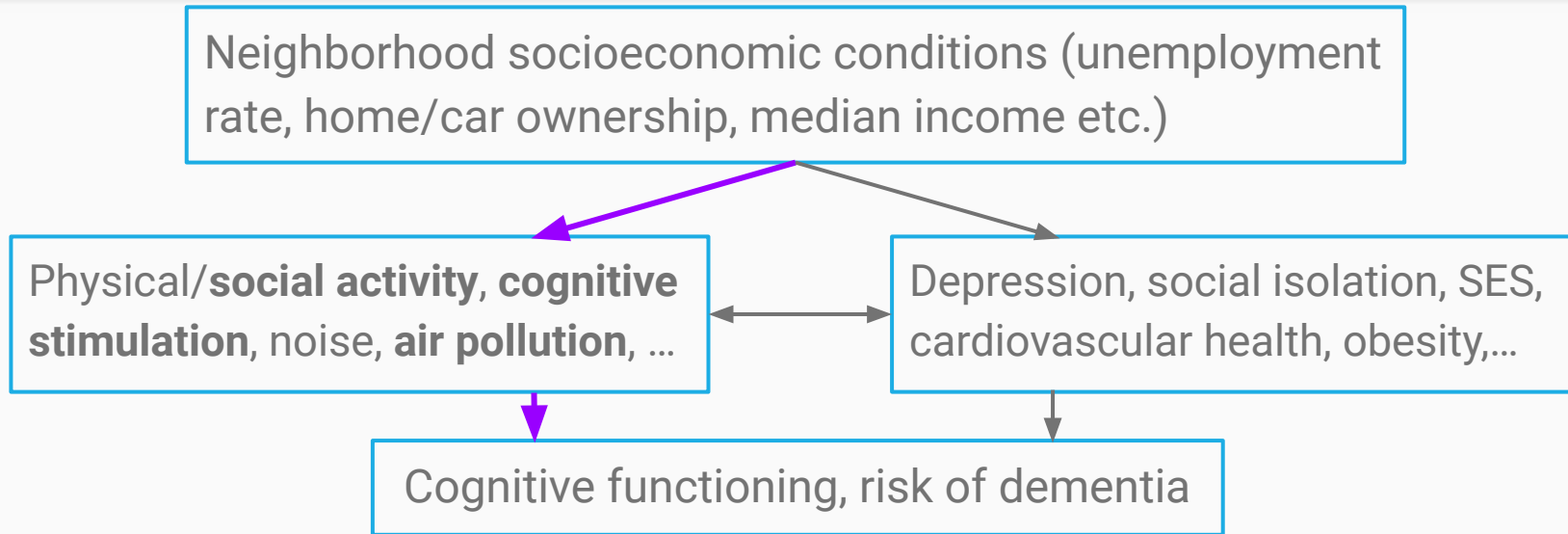
Why neighborhood socioeconomic disadvantage?



Clarke, P. J., Ailshire, J. A., House, J. S., Morenoff, J. D., King, K., Melendez, R., & Langa, K. M. (2012). Cognitive function in the community setting: the neighbourhood as a source of 'cognitive reserve'?. *J Epidemiol Community Health*, 66(8), 730-736.

Cadar, D., Lassale, C., Davies, H., Llewellyn, D. J., Batty, G. D., & Steptoe, A. (2018). Individual and area-based socioeconomic factors associated with dementia incidence in England: evidence from a 12-year follow-up in the English longitudinal study of ageing. *JAMA psychiatry*, 75(7), 723-732.

Why neighborhood socioeconomic disadvantage?



Ailshire, J. A., & Clarke, P. (2015). Fine particulate matter air pollution and cognitive function among US older adults. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 70(2), 322-328.

Ailshire, J., Karraker, A., & Clarke, P. (2017). Neighborhood social stressors, fine particulate matter air pollution, and cognitive function among older US adults. *Social Science & Medicine*, 172, 56-63.

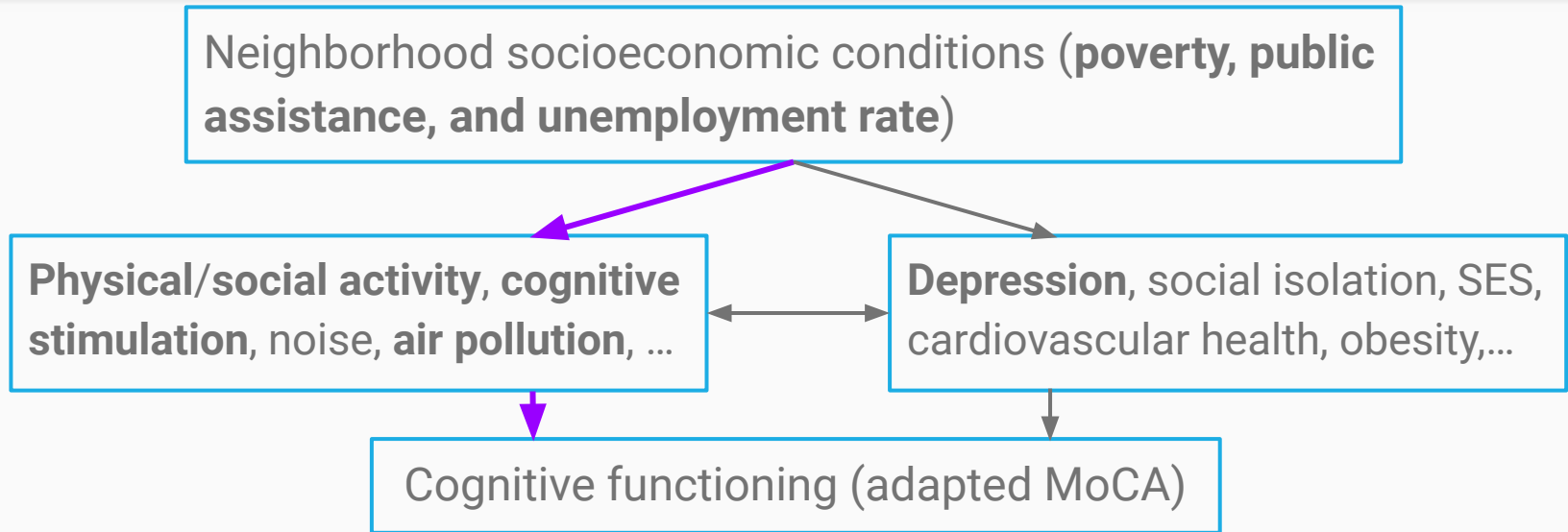
Clarke, P. J., Weuve, J., Barnes, L., Evans, D. A., & de Leon, C. F. M. (2015). Cognitive decline and the neighborhood environment. *Annals of Epidemiology*, 25(11), 849-854.

Do changes in neighborhood conditions go along with changes in cognitive functioning?



Jason Settels, PhD, IRSEI, UL

Changes in neighborhood SES associated with changes in cognitive functioning?



Changes in neighborhood socioeconomic disadvantage?

- National Social Life, Health and Aging Project (NSAP) ($n = 1837$)
- Longitudinal design: wave 2 (2010-11), wave 3 (2015-16)

- Outcome: Montreal Cognitive Assessment adaptation (CCFM), executive function, visuo-construction skills, naming, memory, attention, language, abstract thinking, and orientation

Changes in neighborhood socioeconomic disadvantage?

Neighborhood socioeconomic disadvantage:

- Poverty, public assistance, and unemployment rate
- Rates standardized and averaged; scores at wave 2 subtracted from scores at wave 3
- Census-tract level: 1,200-8,000 individuals, optimum size 4,000 individuals
- 598 census tracts, with 1 to 25 respondents per census tract

→ OLS regressions and mediation analyses

Table 1. Mediating pathways.

Larger Variable	Component Variables
Community involvement	Volunteer work in the past year Attendance at meetings of organized groups in the past year Attendance at religious services
Size of close social network	–
Social support	Social support from family Social support from friends
Community social capital	–
Total household assets	–
Physical activity	–
Substance consumption	Alcoholic drinks per week Cigarettes per day
Depressive symptoms	–

Mediators between changes in neighborhood socioeconomic disadvantage and changes in cognitive functioning

Table 2
Descriptive statistics for time-changing variables (N = 1837).

Variables	Wave 2		Wave 3		Change over Waves 2 and 3	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean/ %	Standard Deviation
Dependent Variable						
Cognitive Functioning (0–20)	15.26	3.15	14.58	3.54	–0.68	2.67
Independent Variable						
Neighborhood-Level Socioeconomic Disadvantage	–0.07	0.78	–0.09	0.77	–0.01	0.55
Mediating Variables						
Depressive Symptoms (1–4)	1.40	0.42	1.47	0.44	0.07	0.43
Close Social Ties (0–7)	4.60	1.50	4.19	1.31	–0.42	1.66
Physical Activity (0–5)	2.90	1.78	2.66	1.86	–0.24	1.94
Number of Alcoholic Drinks per Week	2.78	5.98	2.33	5.09	–0.45	4.23
Number of Cigarettes per Day	1.39	4.84	0.97	4.04	–0.41	3.02
Social Support from Family (0–3)	2.42	0.68	2.40	0.68	–0.01	0.76
Social Support from Friends (0–3)	2.03	0.83	1.98	0.78	–0.07	0.80
Logged Total Household Assets ¹	12.02	3.03	11.85	3.22	–0.13	2.81
Neighborhood Social Capital	0.04	0.56	0.05	0.56	0.01	0.51
Frequency of Volunteer Work in Past Year (0–6)	2.36	2.12	2.25	2.17	–0.12	1.78
Frequency of Attendance at Meetings of Organized Groups in Past Year (0–6)	2.89	2.12	2.77	2.20	–0.16	2.01
Frequency of Attendance at Religious Services (0–5)	2.67	1.77	2.57	1.77	–0.09	1.16
Control Variable						
Change in Census Tract						
Did not Change Census Tracts between Waves 2 and 3	–	–	–	–	82.47%	–
Changed Census Tracts between Waves 2 and 3	–	–	–	–	17.53%	–

¹ To adjust for inflation, amounts from wave 2 were multiplied by 1.086449 before being log transformed.

Table 4
OLS regressions of change in cognitive functioning.

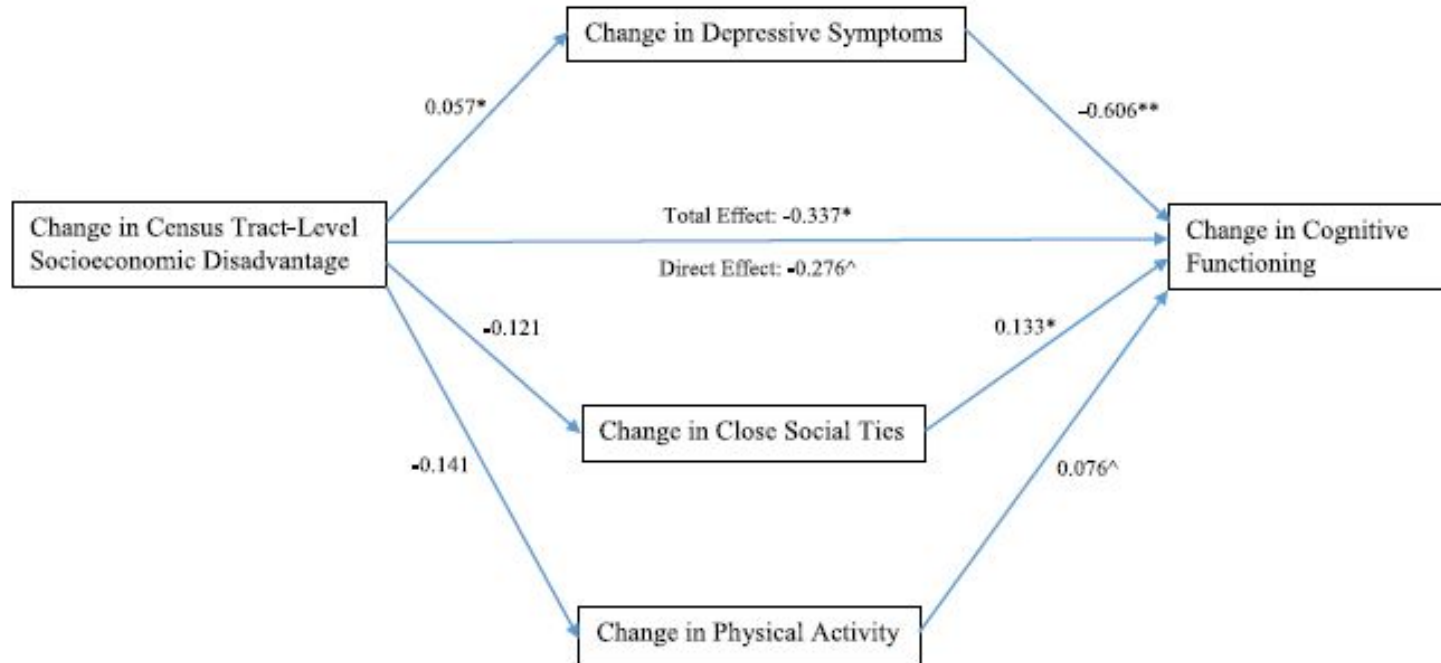
VARIABLES	Wave(s) of Assessment	Model 1	Model 2
Change in Census Tract-Level Socioeconomic Disadvantage	Change W2 to W3	-0.414* (0.172)	-0.337* (0.159)
Female (ref. male)	W2	-0.283 (0.150)	-0.191 (0.149)
Black (ref. White)	W2	0.236 (0.270)	0.336 (0.274)
Hispanic, Non-Black		0.953* (0.407)	0.812* (0.395)
Other		0.387 (0.341)	0.397 (0.336)
Census Tract Logged Population Density (Persons per Square Mile)	W2		-0.031 (0.050)
Census Tract Located in MSA (ref. Not Located in MSA)	W2		-0.021 (0.229)
Age	W2		-0.065*** (0.013)
Separated or Divorced (ref. Married or Living with a Partner)	W2		-0.329 (0.299)
Widowed			-0.123 (0.237)
Never Married			0.011 (0.476)
No Children (ref. Three or More Children)	W2		0.168 (0.297)
One or Two Children			-0.137 (0.166)
High School Diploma (ref. University Degree)	W2		-0.343* (0.172)
Less than High School Diploma			-0.120 (0.267)

Main analyses

Increase in neighborhood socioeconomic disadvantage was associated with stronger declines in cognitive functioning

+ controlling for self-rated physical health, health problems, working for pay, length of residence in local area, changed census tract, participation in wave 1, census-tract level population density.

Mediation analyses

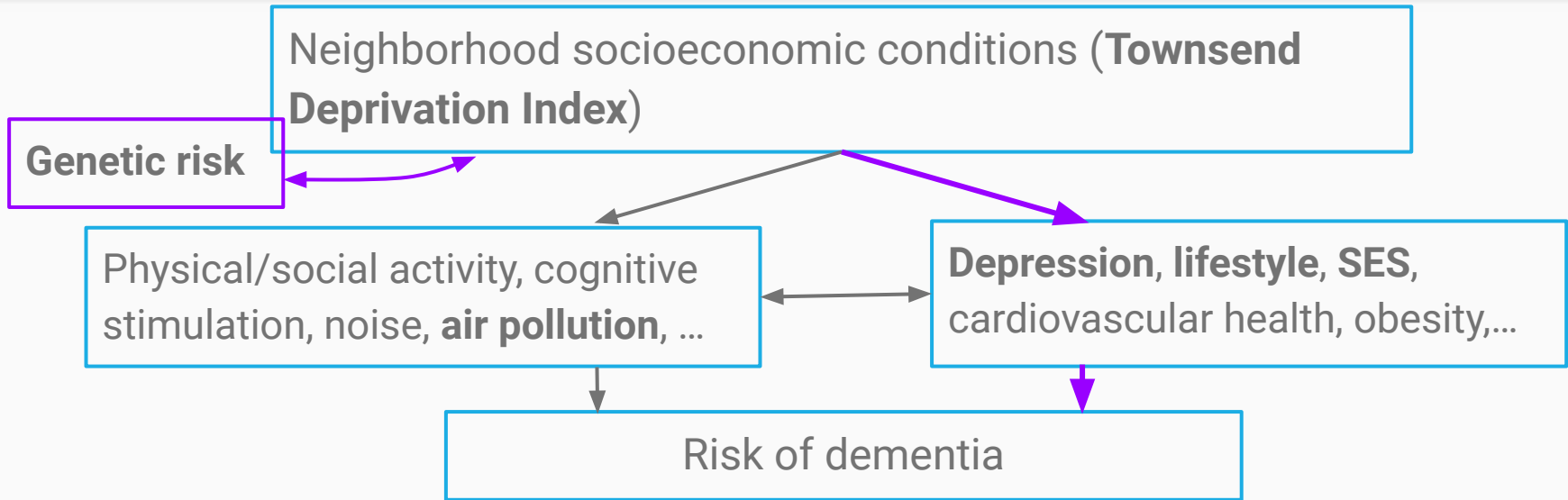


Do neighborhood socioeconomic conditions interact with genetic risk of dementia?



Matthias Klee, PhD candidate,
IRSEI, UL

Neighborhood deprivation x genetic dementia risk?



Dementia prevalence and prevention potential in different parts of the world

Background

- Compare dementia prevalence in lower-resource settings against prevalence in higher-resource settings
- Compare secular trends in dementia incidence/prevalence in lower-resource settings against declining incidence of dementia in many high-income countries over the last two decades
- Investigate interplay between rising life expectancy, rising educational attainment, increases in cardiovascular risk and dementia prevalence in lower-resource settings

What is the dementia prevalence in Latin America and the Caribbean, and what are the secular trends?



Fabiana Ribeiro, PhD, IRSEI, UL

Prevalence of mild cognitive impairment and dementia in LAC

Lead: Dr Fabiana Ribeiro

- Prevalence of mild cognitive impairment in Latin America and the Caribbean, published in *Aging & Mental Health* 2021, DOI: 10.1080/13607863.2021.2003297
- Prevalence of dementia and mild cognitive impairment in Latin America and the Caribbean, *under review*

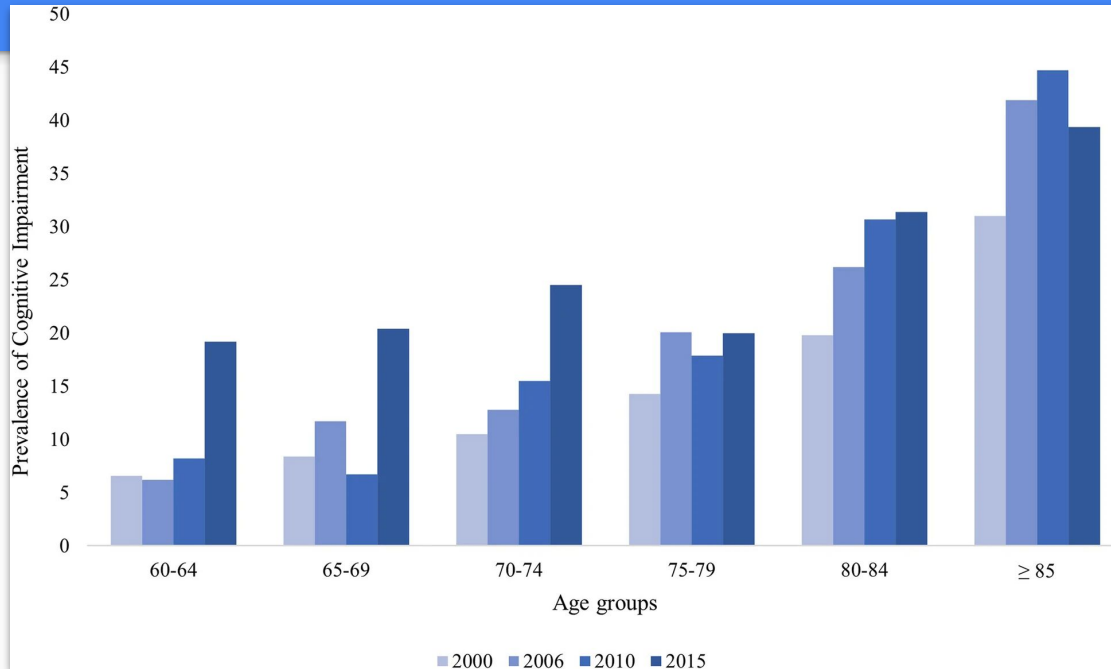
Cognitive impairment in Sao Paulo, Brazil, 2000-2015

Health, Welfare and Aging survey, repeated cross-section with panel respondents, 2000, 2006, 2010, 2015

Outcome: abbreviated Mini-Mental State Exam, education-adjusted

Associated protective and risk factors: education, cardiovascular risk factors

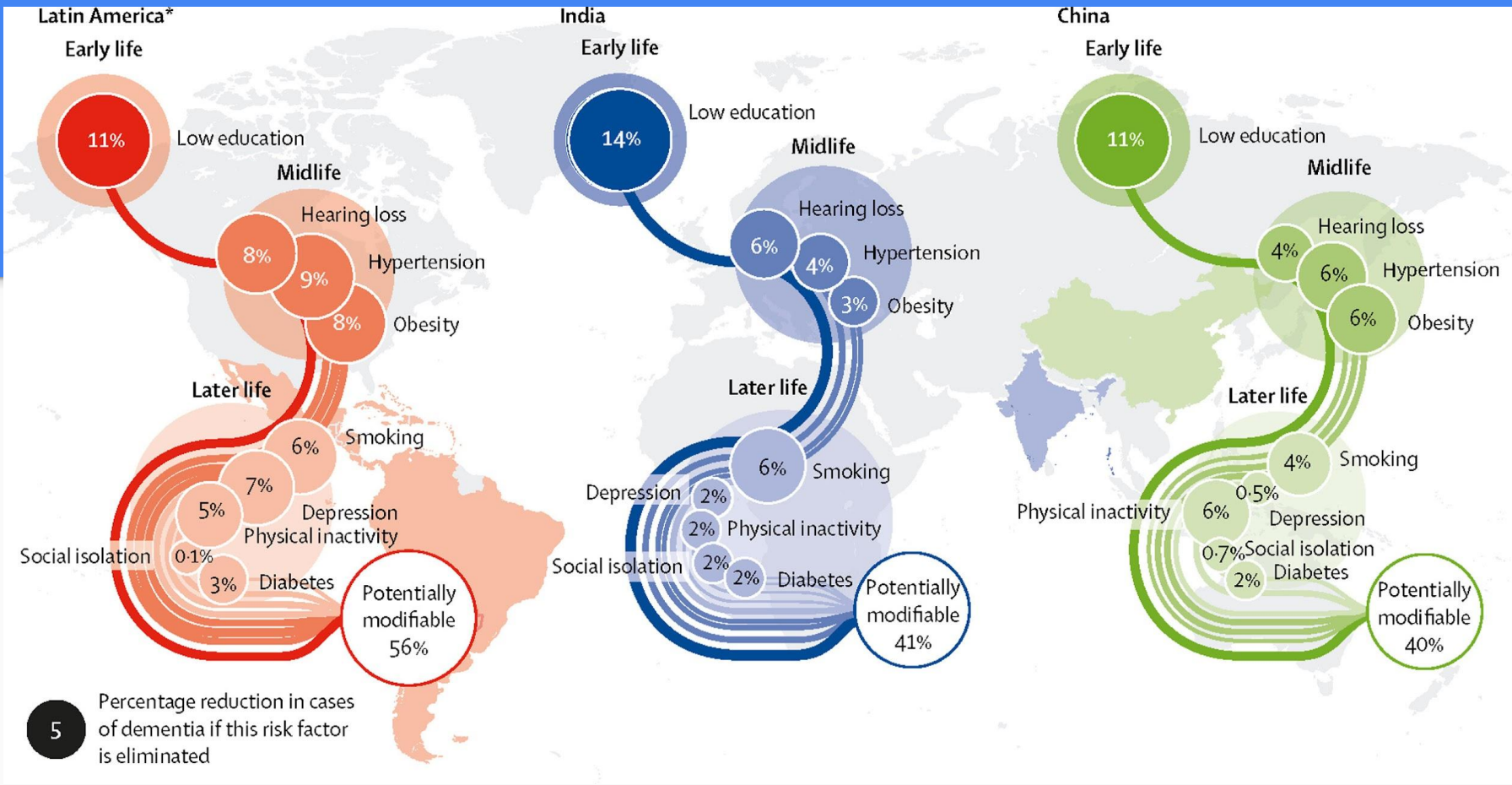
Prevalence of cognitive impairment by age group 2000-2015



Increases in prevalence of cognitive impairment, specifically 60-79 years, 2000-2015

Increases in formal education and income, 2000-2015

Increases in prevalence of diabetes, hypertension, overweight/obesity, 2000-2015



Ongoing research on dementia in LAC

Lead: Dr Fabiana Ribeiro

- Understand better dementia prevention potential in Latin America and the Caribbean through identifying hidden modifiable risk factors:
 - Gender-role norms around care responsibilities, education and careers
 - Undernutrition, food insecurity
 - ...

Thank you!



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<https://cognitiveageing.uni.lu>



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