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LIFETIME DETERMINANTS OF THE COGNITIVE STATUS IN THE OLDER AGE

NEAR WORKSHOP

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Background

- Aging as life-long multidimensional process
 - ✓ Progressive biological, psychological, and social changes (Kachele, 1999)
- Long-term effects of early exposures on aging and cognition, e.g.:
 - ✓ Early exposure to poor childhood conditions and financial adversity may increase the risk of health problems in the older age (Brand et al., 2012)
 - ✓ Risk factors that accumulate from midlife to the older age (e.g., long-term smoking and scarce social engagement) are associated with late-life health problems (Agahi et al., 2013)

General aim

- We take a life-course perspective on aging and functioning and, in this general framework, we aim to study the dynamic relation between vulnerability to disease or pain in the adult life, and cognitive performance in the older age

Phase 1: LNU and SWEOLD

LNU

- Survey conducted on a nationally representative random sample (1:1,000) of the Swedish population aged 15/18 – 78 yrs
- We considered information from 5 waves (1968, 1974, 1981, 1991, 2000)

SWEOLD

- Assessment of LNU participants at age > 75 yrs
- We considered the panel waves 2002, 2011

Phase 2: LNU and SWEOLD + NORTH KARELIA, FINMONICA and CAIDE

NORTH KARELIA, FINMONICA

- Large sample of Finnish participants examined for cardiovascular risk factors (WHO international project) in the midlife (1 assessment in 1972, or 1977, or 1982, or 1987)

CAIDE

- A random sample of 2,000 NK-FINMONICA survivors were invited for re-examination (including cognitive assessment) at age 65-79 (1998) and re-examined in 2005-08 (follow-up)

Phase 3: SNAC-K

- Random sample of participants living in the Kungsholmen area (Stockholm) from 11 age cohorts (60+)

Approach, phase 1

Two main steps (Brown et al., 1995)

1. We model the independent variables, i.e. number of clinical conditions (diseases) or pain in the adult life (younger age, midlife, transition phase, older age <75 yrs) identifying potential predictive factors of disease (or pain) in terms of the level of living conditions
 - This part of the program has been conducted with the LNU database adopting a risk scoring approach (e.g. Kivipelto et al., 2006) to disease or pain in the adult life (< 75 yrs) providing a measure of “cumulative exposure”
2. We study if vulnerability to disease (or pain) in the adult life (< 75 yrs) at different time points is associated with cognitive performance (MMSE, primary outcome) or disability (ADL/iADL, secondary outcome) in the older age (> 75 yrs)
 - This part of the program has been conducted with the SWEOLD database, which collects information on a sample of LNU participants interviewed in the older age (>75 yrs)

Approach, phase 2

- Information from LNU, SWEOLD, and from FINMONICA, CAIDE has been taken into consideration
- To control for cohort effects, the same birth cohort of participants (1916-28) has been selected from the databases
- A delimited subset of LNU/FINMONICA variables (presenting an intermediate to high harmonization potential) has been taken into consideration for the creation of the vulnerability scores in the midlife
 - ✓ This mainly included information on life-style related variables, available in both LNU and FINMONICA
- Retrospective harmonization has been performed to create a pooled database from the 4 original databases
 - ✓ The harmonization procedure followed the Maelstrom Research Guidelines (Fortier et al., 2017)
 - ✓ A specific course has been followed by the NEAR team under the guidance of the Maelstrom specialists (Montreal, May 4-7, 2020)

Retrospective harmonization

6 steps (Fortier et al., 2017)

1. Assemble pre-existing knowledge from the original databases
2. Define the target variables to be harmonized and create a data schema
3. Assess the harmonization potential for each variable
4. For each variable, create a harmonization rule, i.e., a suitable transformation allowing to create the new variables
5. Process data
6. Conduct quality checks in the harmonized dataset (e.g., evaluate the distribution of the transformed variables)

Ongoing developments

- Preliminary results from phase 1 (involving the LNU and SWEOLD databases) are available
 - ✓ Vulnerability scores for pain in the adult life are associated with MMSE performance in the older age (see Erdal et al., 2017)
 - ✓ Vulnerability scores for disease in the adult life are associated with ADL performance in the older age (see Stineman et al., 2011)
- In phase 2 (harmonized database: LNU, SWEOLD + North Karelia, Finmonica, CAIDE) a larger number of diseases will be taken into account to create the vulnerability scores in the adult life
- Calculate vulnerability scores related to other conditions, e.g., alcohol consumption (Brown et al. 1995) and evaluate their association with cognitive performance in the older age
- Joint models will be used as a supplement of mixed random effects models to keep into account the competing risk of death

Research team

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Thank you for your attention

- Agahi N. et al. Smoking trajectories from midlife to old age and the development of non-life-threatening health problems. *Prev Med* 2013;57:107.
- Brandt M. et al. Tracing the origins of successful aging. *Soc Sci Med* 2012;74:1418.
- Brown SA et al. Stress, vulnerability and adult alcohol relapse. *J Studies Alcohol*. 1995;56:538-45.
- Erdal An et al. Associations between pain and depression in nursing home patients at different stages of dementia. *J Aff Dis* 2017,218:8-14.
- Fang et al. Ideal cardiovascular health metrics and risk of cardiovascular disease or mortality. *Int J Cardiology* 2016;214:279.
- Fortier I, et al. Maelstrom Research guidelines for rigorous retrospective data harmonization. *Int J Epidem*. 2017;46:103-5.
- Kalache A. Ageing: A global perspective. *Comm Eye Health* 1999;12:1.
- Kivipelto M. et al. Risk score for the prediction of dementia risk. *Lancet Neurol* 2006;5:735.
- Stineman MG et al. Activity of daily living staging, chronic health conditions, and perceived lack of home accessibility features for elderly people living in the community *J Am Ger Soc* 2011, 59: 454-462.