Does Income Inequality at the Community, State/Province and Country level Affect Overall Well-Being moving from Mid-Life to the Older Years?
A Longitudinal Canada/ U.S. Comparison

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Context

- Health inequalities increasingly linked to macro-level social, economic, and political contexts

- **Income inequality hypothesis** – Is level of income inequality within a geographic area associated with health outcomes in the older population?

- Focus has been on cross-sectional data/analyses; yet, *widespread acknowledgment* that socioeconomic conditions and health have a complex time-dependent relationship; and analysis requires longitudinal repeated-measures

In this paper

- Drawing on theory and research on the social determinants of health, the life course, and the welfare state, we examine relationships between income inequality and health longitudinally among Americans and Canadians in mid-life as they anticipate their later life

- We test whether income inequality at mulitiple levels of geographic specificity (community, state/province, country) is associated with individual well-being statuses (physical and mental health) in mid-life and the older years in Canada/U.S.

Research questions

- Do trajectories in overall well-being among adults in mid-life vary by levels of income inequality within a community, a state/province, a country?

- Does income in mid-life mediate this relationship?

Our research

- Mid- to Later Life (45+ Years)
- Nationally representative longitudinal samples
- Gini coefficient of income inequality: a comparative measure across countries and over time
- Considers range of scales – State, provinces, counties, Metropolitan Areas, and Census division
- Various health outcomes: Physical and Psychological well-being

Challenges in comparative-longitudinal research on inequality-health association

- Opportunities and challenges when making comparisons across groups within a society or across distinctive societies
- Comparable data often not available
- Changes in survey methodology and question consistency, differences in disease distributions across groups
- Variation in availability/quality of vital events or census data
- Problems with self-reports of health conditions
- Comparability of self-reported depression symptoms across countries (e.g. K6 distress scale vs. CES-D scale)
- Challenge related to Subjectivity of Analysis (e.g. cut-off point)

Data

- Canadian National Population Health Survey (NPHS) 9 cycles: 1994/95 - 2010/11
  - Sample: N = 6627 people aged 45+ years in cycle 1 (1994-95)
  - Individual characteristics and Geographical Unit identifier
- U.S. National Survey of Families and Households (NSFH): Wave 1 (1987-88) & Wave 2 (1992-94)
  - Sample: N=3479 people aged 45+ years old in wave 1 (1988-89)
  - Individual NSFH records are merged with contextual data from the 1980 & 1990 U.S. Census

Methods

- Multilevel Regression modeling: two-level logit model, with multiple observations nested within persons over time
- A series of random intercept logit models (RE) for the two dichotomous dependent variables
- RE models can estimate both within-individual and between-individual variance, and, thus account for the correlation of the repeated outcomes in the same subject (Snijders & Bosker, 2012)
- Data are not strictly hierarchical since individuals are not nested within the same neighbourhoods over time
- Neighbourhoods are time-varying (entering the model at person level) as respondents move in and out of neighbourhoods and also as neighbourhood characteristics change over time
- In addition, the Geographical Unit identifier is not available for U.S. NSFH respondents, for reasons of confidentiality

Measuring well-being statuses

- **Self-Reported Health (**NPHS & NSFH)

- Respondents' evaluations of their health as poor, fair, good, very good, or excellent (scored 1 through 5, respectively)

- Widely used in the research literature and found to be reliable

- In the analysis, the variable was dichotomised into 0 = good (combining good, very good and excellent) and 1= poor (combining fair and poor)

Measuring well-being statuses (continued…)

- **Self reported psychological distress**
- Canada's NPHS data: K6 distress scale for mental health (Kessler et al., 2002) - interval measure scaled 0 - 24 (higher scores indicate more distress)
  - A binary indicator was used for the present analysis. The cut-off for the binary outcome was a score of 4 or more, which is indicative of severe psychological distress (Nelson et al., 2001)
- U.S. NSFH data: A 12-item modified version of the Centre for Epidemiologic Studies-Depression Scale (CES-D) (Radloff , 1977). The range of the summed depression scale is 0–84 (high score equals more often feel depressed)
  - In the analysis, the CES-D scale was dichotomised into 0 – Low depressed (CES-D less than 20) and 1– High depressed (CES-D- 20 or more) (Ensel ,1986)

Income Inequality Measure

- Gini index (GI) of total annual household income adjusted for household size
- GI measures the degree of inequality in the distribution of household income in a Geographic Unit
- A low GI indicates a more equal distribution, with 0 corresponding to complete equality, while higher GIs indicate more unequal distribution, with 1 corresponding to complete inequality (Kennedy et al., 1996)
- Quartiles of area income inequality over time for: Province/State, County, Census Metropolitan Area, and Census Division

Control Variables

- Household income quartiles, adjusted for household size (<u>Lowest fourth</u>(Ref.), 2nd fourth, 3rd fourth, Highest fourth)
- Education (<u>Less than secondary graduation</u>(Ref.), Secondary graduation Some postsecondary, Postsecondary graduation)
- Employment Status (<u>Unemployed</u>(Ref.), Employed)
- Sex (<u>Female</u>(Ref.), Male)
- Marital status [<u>Not married</u> (widowed, divorced, separated or never married) (Ref.); Married or living common-law]
- Visible minority status/(Race/Ethnicity in U.S.) (Non-whites(Ref.); Whites)
- Immigration status (<u>Non-immigrants</u>(Ref.); Immigrants)
- Age
- Time (centered at the first Cycle/Wave of data collection)

Household Income- key predictor of individual overall health*
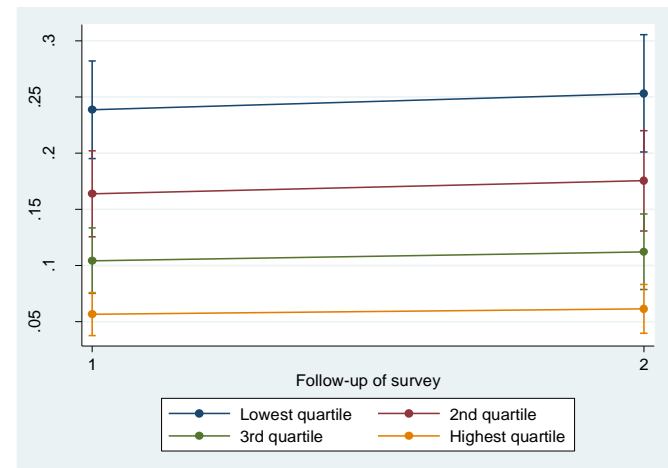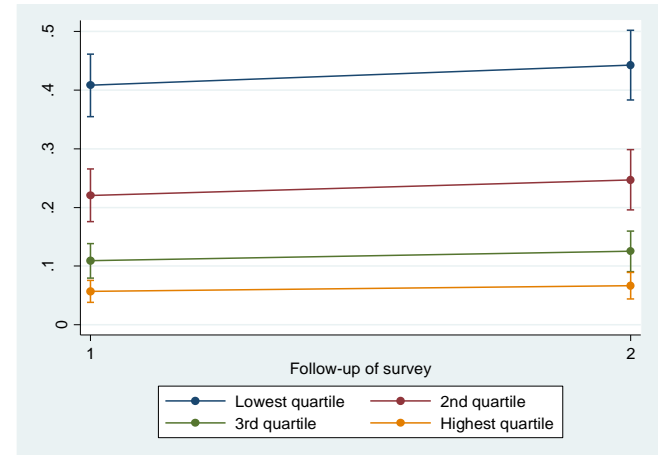
Self-rated poor health

Legend:
- Canada, NPHS 1994/95-2010/11
- U.S. NSFH 1988-89 & 1992-94
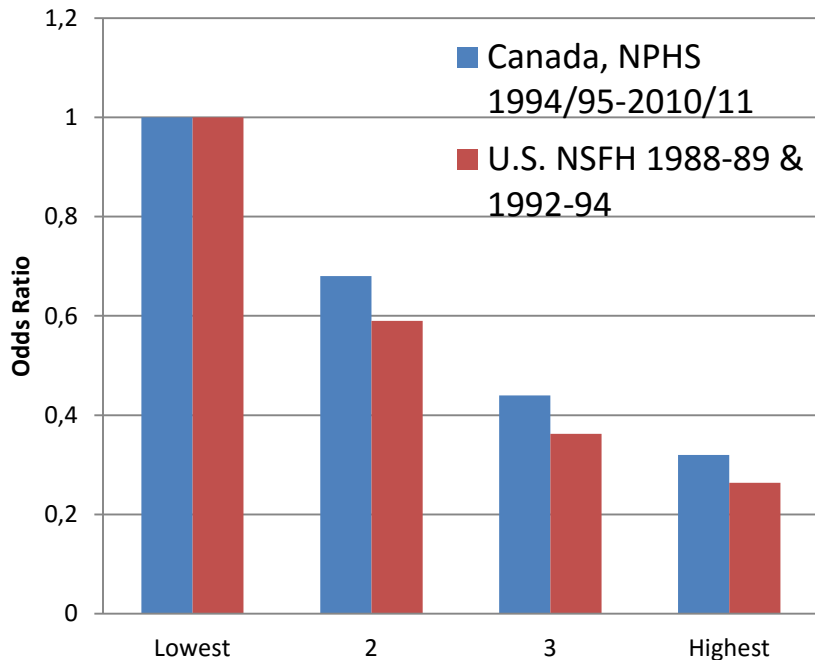
Equalized Household income quartiles

Self-reported high depression symptoms

Legend:
- Canada, NPHS 1994/95-2010/11
- U.S. NSFH 1988-89 & 1992-94
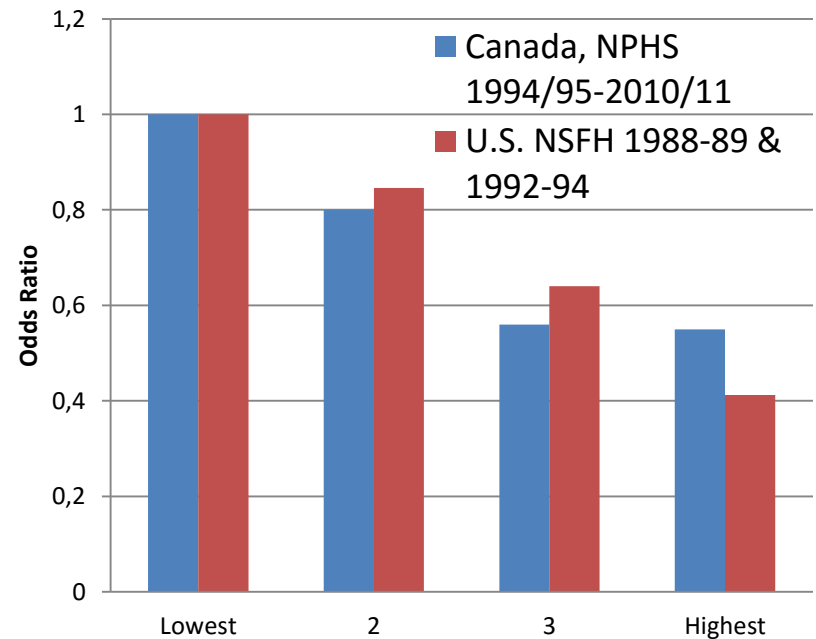
Equalized Household income quartiles

*Two-level logit model adjusted for individual characteristics

Trajectories of self-rated poor health and self reported high depression symptoms by household income, two-level logit model adjusted for individual characteristics
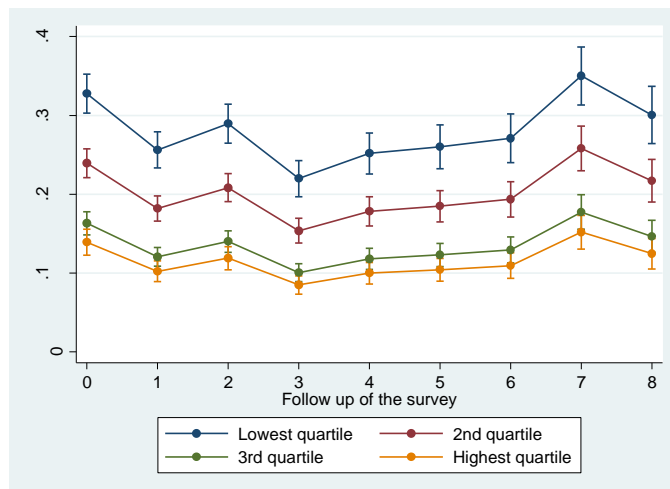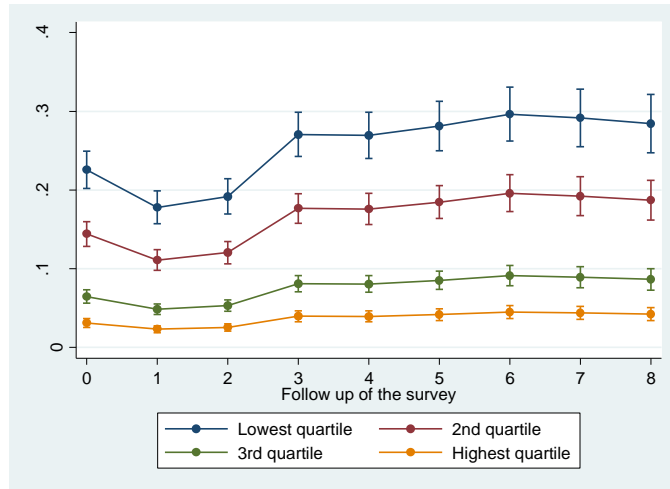
Canadian National Population Health Survey (NPHS) 9 cycles (1994/95 -2010/11) (N=6627 , aged 45+)

National Survey of Families and Households (NSFH) Wave 1 (1987-88) & Wave 2(1992-94)(N=3479 , aged 45+)

Multilevel odds ratios of self-rated fair/poor health by Area level income inequality quartiles (age 45+ years)

|	Canada			U.S.	
	Province-level Gini Coefficient Quartiles	CMA-level Gini Coefficient Quartiles	CD-level Gini Coefficient Quartiles	State-level Gini Coefficient Quartiles	County-level Gini Coefficient Quartiles
1st (Lowest) Quartile	1.00	1.00	1.00	1.00	1.00
2nd Quartile	1.00	0.95	1.05	1.11	1.08
3rd Quartile	0.95	0.98	1.07	1.38*	1.06
4th (Highest) Quartile	1.05	0.94	0.98	1.32	1.03

 + p<.10 * p<0.05, ** p<0.01, *** p<0.001

Notes. Random intercept logit models, controlling for for individual socio-demographic characteristics (not show)

Canadian National Population Health Survey (NPHS) 9 cycles (1994/95 - 2010/11) (N = 6627)

National Survey of Families and Households (NSFH) Wave 1 (1987-88) & Wave 2(1992-94)(N=3479)

Association between Community-level income inequality quartiles and well-being outcomes

Community-level	Self-rated poor health		Self-reported high depressive symptoms (Canada: K6 distress scale-4 or more; U.S.: CES-D scale-20 or more)	
	Canada	U.S.	Canada	U.S.
Province/State	Not sig.	**Sig.***	**Sig.***	Not sig.
County		Not sig.		Not sig.
Census Metropolitan Area	Not sig.		Not sig.	
Census Divisions	Not sig.		Not sig.	

Models control for individual socio-demographic characteristics.
*Increasing area inequality is associated with higher self-rated poor health (4th quartile vs. 1st quartile; ** (Increasing area inequality is associated with higher self-reported high depressive symptoms (Q3 vs. Q1)

Multilevel odds ratios of self-reported high depressive symptoms (Canada: K6 distress scale- 4 or more; U.S.: CES-D scale-20 or more) by Area level income inequality quartiles

Canada				U.S.	
	Province-level Gini Coefficient Quartiles	CMA-level Gini Coefficient Quartiles	CD-level Gini Coefficient Quartiles	State-level Gini Coefficient Quartiles	County-level Gini Coefficient Quartiles
1st (Lowest) Quartile	1.00	1.00	1.00	1.00	1.00
2nd Quartile	1.05	0.89	1.02	0.90	1.07
3rd Quartile	1.45***	0.88	1.02	1.06	1.05
4th (Highest) Quartile	.82**	1.00	0.99	1.29	0.90

 + p<.10 * p<0.05, ** p<0.01, *** p<0.001

Notes. Random intercept logit models, controlling for for individual socio-demographic characteristics (not show)

Canadian National Population Health Survey (NPHS) 9 cycles (1994/95 -2010/11) (N = 6627)

National Survey of Families and Households (NSFH) Wave 1 (1987-88) & Wave 2(1992-94)(N=3479)

Trajectories of self-rated poor health and self reported high depression symptoms by Province/State-level income inequality, adjusted for individual characteristics
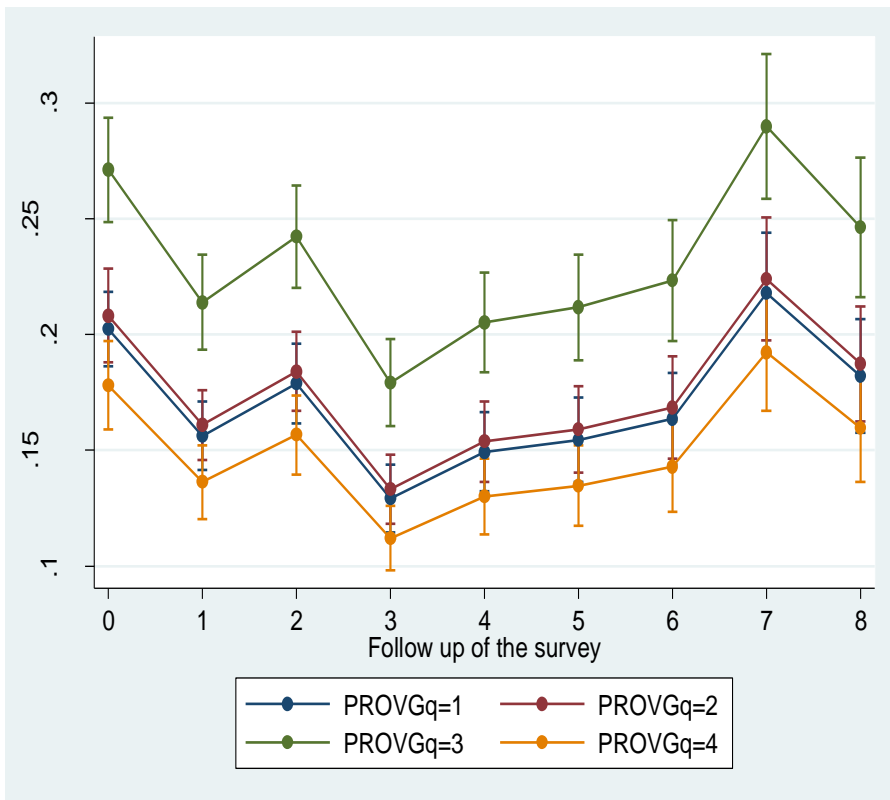
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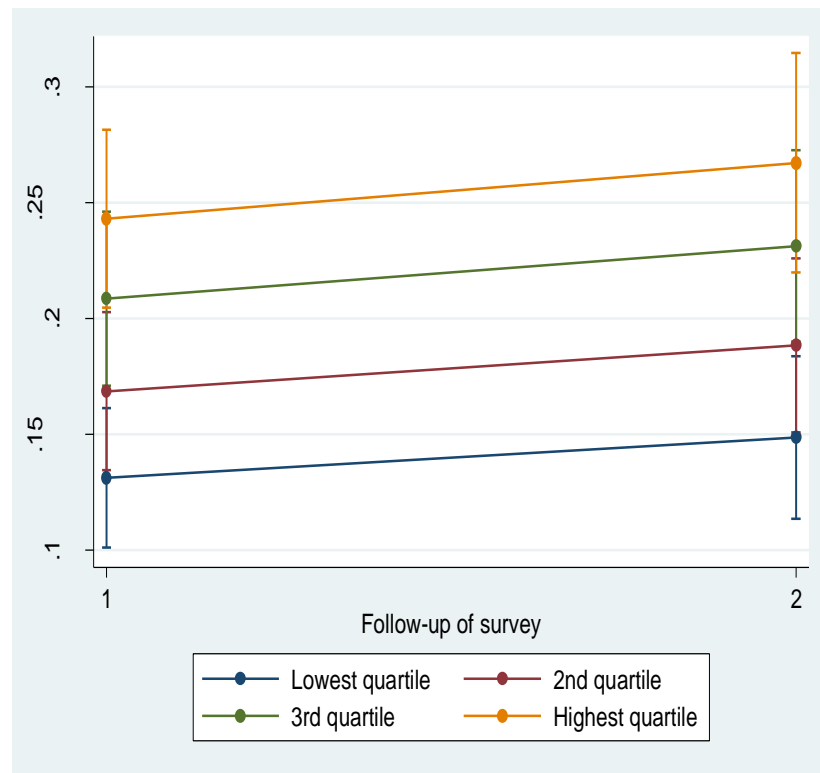
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Discussion and conclusions

- We examined relationships between income inequality and health longitudinally among Americans and Canadians in mid-life as they move into later life, with harmonized data
- Evidence for area income inequality hypothesis mixed
- No evidence that older people are more susceptible to harmful health effects of area inequality in Canada
- State-level income inequality associated with self-reported fair or poor health in U.S.
- Household income most strongly associated with each of the health outcomes in both two countries

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