Gender differences in socioeconomic inequalities in health:
Trends in the Canadian population, 1994-2003

Serena Luchenski[1], MSc Student

Co-Supervisors: Amélie Quesnel-Vallée[1,2] and John Lynch[1]

McGill University

[1]Department of Epidemiology, Biostatistics and Occupational Health
[2]Department of Sociology

Gender, Socioeconomic Position and Health Inequality

- Gender is a measure of both biological/genetic and social differences
  - Gender differences in health are well-known
    - Women have longer life expectancy, but experience more morbidity
  - Gender differences in socioeconomic position are also known
    - Women have less income, lower education and are more likely to be unemployed than men over the lifecourse
- What about gender differences in socioeconomic inequalities in health?
  - Do women and men embody socioeconomic position differently over time?
  - Previous research is cross-sectional and inconsistent

Canadian National Population Health Survey (NPHS)

- Denton et al. (2004)
  - Using the 1st cycle of the NPHS (1994), she demonstrated gender differences in health and gender differences in the social determinants of health (behaviour for men, social structure and psychosocial factors for women)

- NPHS
  - Nationally representative longitudinal household survey
  - Rich source of health-related and socio-demographic information
  - Cycles 1-5 (1994-2003) available for analysis, but participants will be followed for 10 cycles

Objectives

1. To determine if there are gender inequalities in health over time.

2. To determine if there are socioeconomic inequalities (SEI) in health over time.

3. To examine whether there are gender differences in SEI in health (gender*SEP interaction).

Measurement

○ Sample: Restricted to middle-aged individuals (35-54 years)
- 3 other age cohorts did not display SEI's

○ Outcomes –multiple measures for general overview of health
- **Number of Chronic Conditions (NCC):** 22 Possibilities
- **Self-Rated Health (SRH):** Coded 1 (Poor) – 5 (Excellent)
- **Functional Health - Health Utilities Index (HUI):** 1 = Perfect health, 0 = Dead, <0 = Worse than dead
- **Mental Distress (DIST):** Index 1- 24 (higher values, more distress)

○ Socioeconomic Position (SEP)
- **Income adequacy:** Low income or Middle/high income (ref)
- **Education:** < High school (ref), High school graduate, Post-secondary graduate
- **Employment Status:** Employed or Not employed/retired/disabled (ref)

Measurement

- Denton's Social Determinants (Controls)
  - **<u>Structure</u>**
    - **Age:** continuous
    - **Marital (partner) status:** Married/common-law/living with partner or single/widowed, separated/divorced (ref)
    - **Household size:** continuous
    - **Social support:** 0-4 index, higher values, more support

  - **<u>Behaviour</u>**
    - **Smoking:** pack-years (continuous), never smoked (smoker is ref)
    - **Physical activity index:** active (ref), moderately active, inactive
    - **Body mass index (BMI):** underweight, normal (ref), overweight, obese

  - **<u>Psychosocial</u>***
    - **Chronic stress index:** 0-16 index, higher values indicate more stress
    - **Mastery:** 0-28 index, higher values indicate more control over one's life
    - *Only available for cycles 1, 4, 5: sensitivity analyses revealed similar results for 3 vs 5 cycles of data, therefore only used 3 waves

Models

- GEE: Population Averaged (PA) Models
  - How does the *average* health status of women versus men depend on changes in SEP

  - Estimate main effects of gender and SEP and their interaction effects

  - Unbiased: accounts for correlation of responses within individuals without specifying the source of the correlation

  - Efficient: robust to model misspecification

- Fixed-Effects: Subject Specific (SS) Models
  - How does a given *individual's* health status depend on changes in SEP

  - Estimate main effects of SEP and gender*SEP interaction, but main effects of gender are not estimable:
    - *Model controls for all 'fixed' characteristics*

  - Unbiased: accounts for correlation of responses AND explains the source of it (time invariant intra-individual characteristics)

  - Less efficient than PA: more sensitive to misspecification

Analytic Strategy

1. Gender Inequalities in Health
   - Age-adjusted and fully adjusted (structure, behaviour, psychosocial) PA models

2. Socioeconomic Inequalities in Health
   - Age-adjusted and fully adjusted PA models

3. Gender-SEP Interaction
   - Age-adjusted and fully adjusted PA models
   - Fully adjusted SS models (fixed-effects)

4. Robustness of the Models:
   - Used weighted data with "robust" option ("Huber Sandwich Estimator") for PA and SS models to account for sample attrition, heteroskedascity, and model misspecification
   - Checked residual vs fitted plots for outcomes to determine correct link function, correlation structure and distribution for PA models: compared to default spec's with "robust" option

Results

Gender Differences in Health (x-sec)
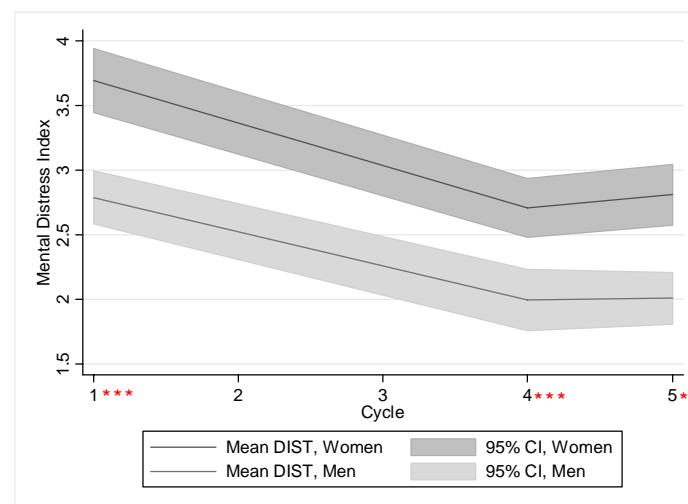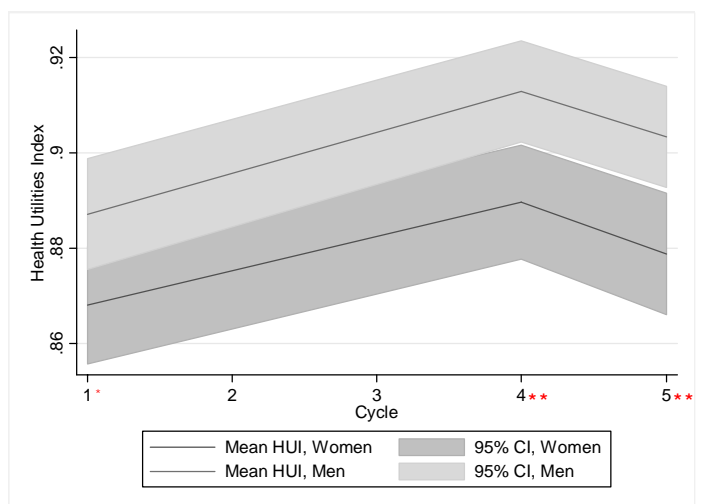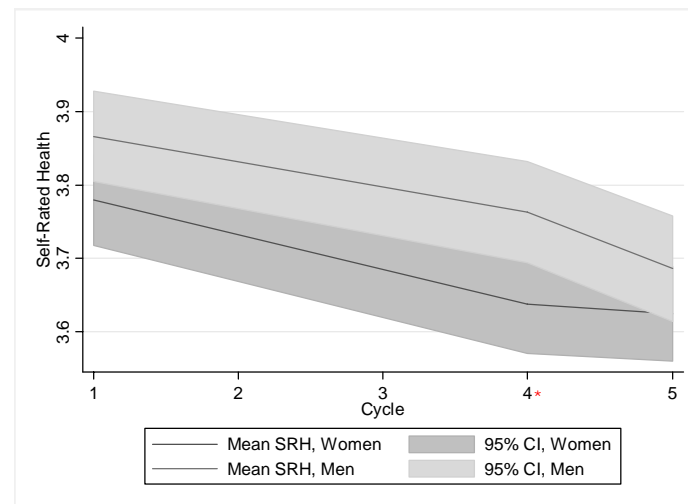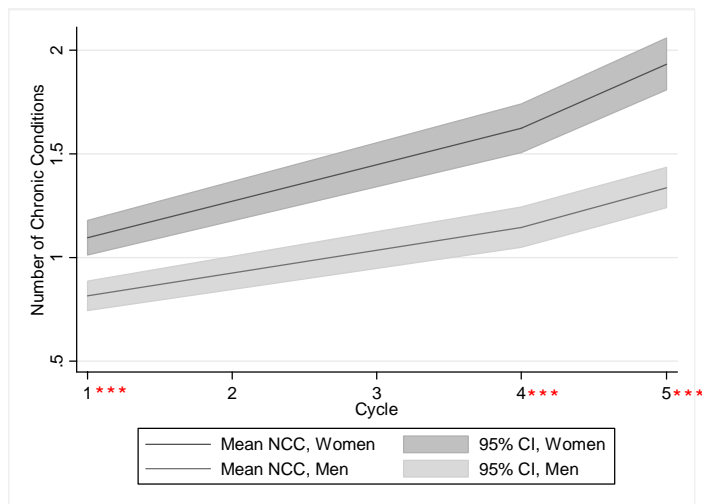
Gender and Socioeconomic Inequalities in Health (PA Models)

		Age-Adjusted Gender Inequality			
	Variable	β Coef	LCL	UCL	Sig.
NCC	Male	-0.458	-0.565	-0.350	***
SRH	Male	0.095	0.025	0.165	**
HUI	Male	0.022	0.010	0.035	**
DIST	Male	-0.803	-1.044	-0.563	***

Gender and Socioeconomic Inequalities in Health (PA Models)

	Variable	Age-Adjusted Gender Inequality				Age-Adjusted SEI			
		β Coef	LCL	UCL	Sig.	β Coef	LCL	UCL	Sig.
NCC	**Male**	-0.458	-0.565	-0.350	***	-	-	-	-
	Low income	-	-	-	-	0.095	-0.076	0.265	
	High school graduate	-	-	-	-	0.265	0.120	0.411	***
	Post-secondary graduate	-	-	-	-	0.224	0.078	0.370	**
	Employed	-	-	-	-	-0.541	-0.690	-0.391	***
SRH	**Male**	0.095	0.025	0.165	**	-	-	-	-
	Low income	-	-	-	-	-0.138	-0.254	-0.022	*
	High school graduate	-	-	-	-	0.139	0.039	0.240	**
	Post-secondary graduate	-	-	-	-	0.270	0.169	0.370	***
	Employed	-	-	-	-	0.376	0.284	0.467	***
HUI	**Male**	0.022	0.010	0.035	**	-	-	-	-
	Low income	-	-	-	-	-0.036	-0.058	-0.014	**
	High school graduate	-	-	-	-	0.016	-0.003	0.036	
	Post-secondary graduate	-	-	-	-	0.027	0.008	0.046	**
	Employed	-	-	-	-	0.101	0.077	0.125	***
DIST	**Male**	-0.803	-1.044	-0.563	***	-	-	-	-
	Low income	-	-	-	-	1.015	0.604	1.427	***
	High school graduate	-	-	-	-	-0.122	-0.442	0.198	
	Post-secondary graduate	-	-	-	-	-0.210	-0.556	0.136	
	Employed	-	-	-	-	-1.041	-1.445	-0.637	***

Gender and Socioeconomic Inequalities in Health (PA Models)

	Variable	Age-Adjusted Gender Inequality				Age-Adjusted SEI				Fully Adjusted Gender and SEP			
		β Coef	LCL	UCL	Sig.	β Coef	LCL	UCL	Sig.	β Coef	LCL	UCL	Sig.
NCC	**Male**	-0.458	-0.565	-0.350	***	-	-	-	-	**-0.399**	**-0.507**	**-0.291**	***
	Low income	-	-	-	-	0.095	-0.076	0.265		**0.048**	**-0.122**	**0.218**	
	High school graduate	-	-	-	-	0.265	0.120	0.411	***	**0.274**	**0.132**	**0.415**	***
	Post-secondary graduate	-	-	-	-	0.224	0.078	0.370	**	**0.285**	**0.144**	**0.426**	***
	Employed	-	-	-	-	-0.541	-0.690	-0.391	***	**-0.477**	**-0.625**	**-0.330**	***
SRH	**Male**	0.095	0.025	0.165	**	-	-	-	-	**0.036**	**-0.029**	**0.100**	
	Low income	-	-	-	-	-0.138	-0.254	-0.022	*	**-0.073**	**-0.188**	**0.042**	
	High school graduate	-	-	-	-	0.139	0.039	0.240	**	**0.075**	**-0.021**	**0.172**	
	Post-secondary graduate	-	-	-	-	0.270	0.169	0.370	***	**0.158**	**0.060**	**0.255**	**
	Employed	-	-	-	-	0.376	0.284	0.467	***	**0.351**	**0.268**	**0.434**	***
HUI	**Male**	0.022	0.010	0.035	**	-	-	-	-	**0.001**	**-0.010**	**0.011**	
	Low income	-	-	-	-	-0.036	-0.058	-0.014	**	**-0.013**	**-0.035**	**0.008**	
	High school graduate	-	-	-	-	0.016	-0.003	0.036		**0.004**	**-0.014**	**0.022**	
	Post-secondary graduate	-	-	-	-	0.027	0.008	0.046	**	**0.005**	**-0.013**	**0.023**	
	Employed	-	-	-	-	0.101	0.077	0.125	***	**0.091**	**0.069**	**0.112**	***
DIST	**Male**	-0.803	-1.044	-0.563	***	-	-	-	-	**-0.342**	**-0.543**	**-0.142**	**
	Low income	-	-	-	-	1.015	0.604	1.427	***	**0.478**	**0.155**	**0.800**	**
	High school graduate	-	-	-	-	-0.122	-0.442	0.198		**0.076**	**-0.176**	**0.327**	
	Post-secondary graduate	-	-	-	-	-0.210	-0.556	0.136		**0.226**	**-0.042**	**0.494**	
	Employed	-	-	-	-	-1.041	-1.445	-0.637	***	**-0.654**	**-0.943**	**-0.365**	***

Gender and Socioeconomic Inequalities in Health (PA Models)

	Variable	Age-Adjusted Gender Inequality				Age-Adjusted SEI				Fully Adjusted Gender and SEP			
		β Coef	LCL	UCL	Sig.	β Coef	LCL	UCL	Sig.	β Coef	LCL	UCL	Sig.
NCC	**Male**	-0.458	-0.565	-0.350	***	-	-	-	-	**-0.399**	**-0.507**	**-0.291**	***
	Low income	-	-	-	-	0.095	-0.076	0.265		**0.048**	**-0.122**	**0.218**	
	High school graduate	-	-	-	-	0.265	0.120	0.411	***	**0.274**	**0.132**	**0.415**	***
	Post-secondary graduate	-	-	-	-	0.224	0.078	0.370	**	**0.285**	**0.144**	**0.426**	***
	Employed	-	-	-	-	-0.541	-0.690	-0.391	***	**-0.477**	**-0.625**	**-0.330**	***
SRH	**Male**	0.095	0.025	0.165	**	-	-	-	-	**0.036**	**-0.029**	**0.100**	X
	Low income	-	-	-	-	-0.138	-0.254	-0.022	*	**-0.073**	**-0.188**	**0.042**	X
	High school graduate	-	-	-	-	0.139	0.039	0.240	**	**0.075**	**-0.021**	**0.172**	X
	Post-secondary graduate	-	-	-	-	0.270	0.169	0.370	***	**0.158**	**0.060**	**0.255**	**
	Employed	-	-	-	-	0.376	0.284	0.467	***	**0.351**	**0.268**	**0.434**	***
HUI	**Male**	0.022	0.010	0.035	**	-	-	-	-	**0.001**	**-0.010**	**0.011**	X
	Low income	-	-	-	-	-0.036	-0.058	-0.014	**	**-0.013**	**-0.035**	**0.008**	X
	High school graduate	-	-	-	-	0.016	-0.003	0.036		**0.004**	**-0.014**	**0.022**	
	Post-secondary graduate	-	-	-	-	0.027	0.008	0.046	**	**0.005**	**-0.013**	**0.023**	X
	Employed	-	-	-	-	0.101	0.077	0.125	***	**0.091**	**0.069**	**0.112**	***
DIST	**Male**	-0.803	-1.044	-0.563	***	-	-	-	-	**-0.342**	**-0.543**	**-0.142**	**
	Low income	-	-	-	-	1.015	0.604	1.427	***	**0.478**	**0.155**	**0.800**	**
	High school graduate	-	-	-	-	-0.122	-0.442	0.198		**0.076**	**-0.176**	**0.327**	
	Post-secondary graduate	-	-	-	-	-0.210	-0.556	0.136		**0.226**	**-0.042**	**0.494**	
	Employed	-	-	-	-	-1.041	-1.445	-0.637	***	**-0.654**	**-0.943**	**-0.365**	***

Effect Modification: Gender*SEP

	Variable	β Coef	LCL	UCL	Sig
		Age-adjusted (PA)			
NCC	Male	-0.153	-0.519	0.214	
	Low income	0.062	-0.180	0.304	
	Low income*male	0.051	-0.285	0.387	
	High school graduate	0.268	0.044	0.491	*
	High school graduate*male	-0.036	-0.324	0.252	
	Post-secondary graduate	0.200	-0.023	0.422	
	Post-secondary graduate*male	0.049	-0.239	0.338	
	Employed	-0.397	-0.578	-0.216	***
	Employed*male	-0.286	-0.615	0.043	
DIST	Male	-0.691	-1.537	0.155	
	Low income	1.236	0.641	1.831	***
	Low income*male	-0.493	-1.297	0.310	
	High school graduate	-0.488	-1.013	0.038	
	High school graduate*male	0.666	0.027	1.305	*
	Post-secondary graduate	-0.539	-1.095	0.016	
	Post-secondary graduate*male	0.660	-0.036	1.355	
	Employed	-0.724	-1.251	-0.197	**
	Employed*male	-0.544	-1.337	0.249	

Effect Modification: Gender*SEP

	Variable	Age-adjusted (PA)				Fully Adjusted (PA)			
		β Coef	LCL	UCL	Sig	β Coef	LCL	UCL	Sig
NCC	Male	-0.153	-0.519	0.214		-0.172	-0.522	0.177	
	Low income	0.062	-0.180	0.304		0.017	-0.224	0.258	
	Low income*male	0.051	-0.285	0.387		0.053	-0.285	0.390	
	High school graduate	0.268	0.044	0.491	*	0.291	0.077	0.505	**
	High school graduate*male	-0.036	-0.324	0.252		-0.046	-0.320	0.229	
	Post-secondary graduate	0.200	-0.023	0.422		0.262	0.050	0.475	*
	Post-secondary graduate*male	0.049	-0.239	0.338		0.031	-0.242	0.304	
	Employed	-0.397	-0.578	-0.216	***	-0.390	-0.568	-0.212	***
	Employed*male	-0.286	-0.615	0.043		-0.256	-0.572	0.059	
DIST	Male	-0.691	-1.537	0.155		-0.161	-0.828	0.506	
	Low income	1.236	0.641	1.831	***	0.704	0.262	1.147	**
	Low income*male	-0.493	-1.297	0.310		-0.516	-1.155	0.122	
	High school graduate	-0.488	-1.013	0.038		-0.119	-0.506	0.269	
	High school graduate*male	0.666	0.027	1.305	*	0.368	-0.133	0.869	
	Post-secondary graduate	-0.539	-1.095	0.016		0.046	-0.362	0.454	
	Post-secondary graduate*male	0.660	-0.036	1.355		0.351	-0.174	0.875	
	Employed	-0.724	-1.251	-0.197	**	-0.474	-0.835	-0.113	*
	Employed*male	-0.544	-1.337	0.249		-0.504	-1.095	0.087	

Effect Modification: Gender*SEP

	Variable	Age-adjusted (PA)				Fully Adjusted (PA)				Fully Adjusted (FE)			
		β Coef	LCL	UCL	Sig	β Coef	LCL	UCL	Sig	β Coef	LCL	UCL	Sig
NCC	**Male**	-0.153	-0.519	0.214		-0.172	-0.522	0.177		-	-	-	-
	Low income	0.062	-0.180	0.304		0.017	-0.224	0.258		**-0.069**	**-0.386**	**0.247**	
	Low income*male	0.051	-0.285	0.387		0.053	-0.285	0.390		**0.248**	**-0.168**	**0.664**	
	High school graduate	0.268	0.044	0.491	*	0.291	0.077	0.505	**	**0.673**	**0.173**	**1.174**	**
	High school graduate*male	-0.036	-0.324	0.252		-0.046	-0.320	0.229		**-0.335**	**-1.304**	**0.634**	
	Post-secondary graduate	0.200	-0.023	0.422		0.262	0.050	0.475	*	**0.439**	**-0.083**	**0.961**	
	Post-secondary graduate*male	0.049	-0.239	0.338		0.031	-0.242	0.304		**-0.217**	**-1.217**	**0.783**	
	Employed	-0.397	-0.578	-0.216	***	-0.390	-0.568	-0.212	***	**-0.348**	**-0.572**	**-0.124**	**
	Employed*male	-0.286	-0.615	0.043		-0.256	-0.572	0.059		**-0.143**	**-0.484**	**0.198**	
DIST	**Male**	-0.691	-1.537	0.155		-0.161	-0.828	0.506		-	-	-	-
	Low income	1.236	0.641	1.831	***	0.704	0.262	1.147	**	**0.332**	**-0.343**	**1.007**	
	Low income*male	-0.493	-1.297	0.310		-0.516	-1.155	0.122		**-0.432**	**-1.287**	**0.423**	
	High school graduate	-0.488	-1.013	0.038		-0.119	-0.506	0.269		**3.055**	**0.810**	**5.299**	**
	High school graduate*male	0.666	0.027	1.305	*	0.368	-0.133	0.869		**-2.455**	**-4.983**	**0.074**	
	Post-secondary graduate	-0.539	-1.095	0.016		0.046	-0.362	0.454		**3.189**	**0.878**	**5.500**	**
	Post-secondary graduate*male	0.660	-0.036	1.355		0.351	-0.174	0.875		**-3.228**	**-5.870**	**-0.586**	**
	Employed	-0.724	-1.251	-0.197	**	-0.474	-0.835	-0.113	*	**0.024**	**-0.658**	**0.706**	
	Employed*male	-0.544	-1.337	0.249		-0.504	-1.095	0.087		**-0.381**	**-1.270**	**0.508**	

Conclusions

○ There are gender inequalities and socioeconomic inequalities in health across time in the Canadian population

○ There is little evidence to support the hypothesis that socioeconomic inequalities differ by gender.