The power of self-rated health for predicting mortality in Canada and the United States

James Falconer
Dept. of Sociology
McGill University

Amélie Quesnel-Vallée
Dept. of Sociology and
Dept. of Epidemiology, Biostatistics,
& Occupational Health
McGill University
Self-Rated Health

How would you rate your general state of health?

1. Poor
2. Fair
3. Good
4. Very good
5. Excellent
Self-Rated Health has a *predictive power* for mortality

(Idler & Benyamini, 1997)
(Stenholm et al., 2014)
Individual determinants of predictive power

• Use of health care
• Human capital

(Blackwell, Martinez, Gentleman, Sanmartin, & Berthelot, 2009)
(Falconer & Quesnel-Vallée, 2014)
Predictive power is moderated by social covariates

Self-rated health → Gender Culture SEP → Mortality

(Case & Paxson, 2005)
(Deeg & Kriegsman, 2003)
(Burström & Fredlund, 2001)
(Van Doorslaer & Gerdtham, 2003)
(Quesnel-Vallée, 2007)
(Sen, 2002)
Social determinants of predictive power

• Socioeconomic stratification
• Poverty rate

(Conference Board of Canada, 2013)
(Congressional Budget Office, 2013)
(Statistics Canada, 2015)
Predictive power varies cross-nationally

Self-rated health \( \rightarrow \) Mortality

(Beckfield, Olafsdottir, & Bakhtiari, 2013)
(Jürges, 2007)
(McDonough, Worts, & Sacker, 2010)
(Salomon, 2004)
Hypotheses

H1: Canadians will report better self-rated health than Americans

H2: Canadian self-rated health will be a better predictor of mortality
# Data sources

<table>
<thead>
<tr>
<th></th>
<th>HRS</th>
<th>NPHS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency</strong></td>
<td>Biennial</td>
<td></td>
</tr>
<tr>
<td><strong>SRH Measure</strong></td>
<td>Poor, Fair, Good, Very Good, Excellent</td>
<td>Poor Health, Good Health</td>
</tr>
<tr>
<td><strong>Mortality Measure</strong></td>
<td>Linked to mortality register in national vital statistics database</td>
<td></td>
</tr>
<tr>
<td><strong>Control variables</strong></td>
<td>Age, Sex, Income, Education, Race, Marital status, Health behaviors, Diagnosed diseases</td>
<td></td>
</tr>
<tr>
<td><strong>Cases / Controls</strong></td>
<td>6,618 / 10,225</td>
<td>1,537 / 2,633</td>
</tr>
</tbody>
</table>
## Control variables

<table>
<thead>
<tr>
<th>Sociodemographic</th>
<th>Health behaviors</th>
<th>Diagnosed diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sex</td>
<td>• Body-mass index</td>
<td>• Heart disease</td>
</tr>
<tr>
<td>• Age</td>
<td>• Smoking</td>
<td>• Stroke</td>
</tr>
<tr>
<td>• Income</td>
<td>• Blood pressure</td>
<td>• Lung disease</td>
</tr>
<tr>
<td>• Education</td>
<td></td>
<td>• Cancer</td>
</tr>
<tr>
<td>• Race</td>
<td></td>
<td>• Diabetes</td>
</tr>
<tr>
<td>• Marital status</td>
<td></td>
<td>• Psychiatric disease</td>
</tr>
</tbody>
</table>
Inclusion criteria

• Age 30 and older
• Died 1998-2010
• Minimum 2 previous self-rated health measures
  • 1 proximal (0-6 years prior to death)
  • 1 distal (7-12 years prior to death)

(Stenholm et al., 2014)
Method

• Nested case-control design
• Deceased cases matched with up to 3 surviving controls (Age, Sex, Race, and Survey cohort)
• *Generalized Estimating Equation* (Logit-binomial, exchangeable correlation)
• Formal hypothesis test for whether U.S. and Canadian effect estimates are statistically distinguishable

(Stenholm et al., 2014)
Prevalence of reporting "poor self-rated health" up to 12 years prior to death, Canada and USA (Men)
Prevalence of reporting "poor self-rated health" up to 12 years prior to death, Canada and USA (Women)
Results

H1: Canadians will report better self-rated health than Americans:

• Canadians reported better health than Americans – whether they died or survived.
Results

H2: Canadian self-rated health will be a better predictor of mortality:

• Canadian predictive power estimates were consistently higher than American estimates.
Results

H2: Canadian self-rated health will be a better predictor of mortality:

- Canadian predictive power estimates were consistently higher than American estimates.
- However, a hypothesis test did not permit us to infer statistically significant differences between U.S. and Canadian self-rated health trajectories, when differences were expected.
Next steps

Validate the presumed mechanisms:
• Access to health care
• Cause of death
Thank you


### GEE ratios for the likelihood of reporting poor health 11-12 years and 1-2 years prior to death, by sex and age: U.S. vs. CANADA

<table>
<thead>
<tr>
<th>Canada/U.S. Comparative Table</th>
<th>Model 1: Age</th>
<th>Model 2: + Education, Income, Marital Status</th>
<th>Model 3: + BMI, Smoking, Blood Pressure</th>
<th>Model 4: + Heart disease, Stroke, Lung disease, Cancer, Diabetes, Psychiatric disease</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age 30-65</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distal</td>
<td>1.943***</td>
<td>5.019***</td>
<td>1.653**</td>
<td>3.550***</td>
</tr>
<tr>
<td><strong>Age 65-80</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distal</td>
<td>2.364***</td>
<td>2.219***</td>
<td>2.006***</td>
<td>1.771*</td>
</tr>
<tr>
<td><strong>Age 80+</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distal</td>
<td>1.855***</td>
<td>1.501</td>
<td>1.517***</td>
<td>1.419</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age 30-65</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distal</td>
<td>4.325***</td>
<td>4.190***</td>
<td>2.828***</td>
<td>2.883***</td>
</tr>
<tr>
<td><strong>Age 65-80</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distal</td>
<td>2.112***</td>
<td>2.278***</td>
<td>1.737***</td>
<td>1.852**</td>
</tr>
<tr>
<td>Proximal</td>
<td>4.912***</td>
<td>5.602***</td>
<td>4.434***</td>
<td>5.254***</td>
</tr>
<tr>
<td><strong>Age 80+</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distal</td>
<td>1.881***</td>
<td>2.244***</td>
<td>1.684***</td>
<td>1.999**</td>
</tr>
<tr>
<td>Proximal</td>
<td>3.605***</td>
<td>3.400***</td>
<td>3.345***</td>
<td>3.306***</td>
</tr>
</tbody>
</table>
Relative risk ratios and 95% confidence intervals for reporting poor health, US and Canada, Men 65-79
U.S. replication

(Stenholm et al., 2014)