Income, Health and Health Insurance: Longitudinal Health Selection in Logged Income by Health Insurance Status in Canada*

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Abstract *Social inequalities in health are assumed to be economically determined. Health is, however, a possible selector for many opportunities throughout the life course. In Canada, public healthcare was created in part to help mitigate any selection effects that health might have on socioeconomic position. Supplemental insurance may allow for the accumulation of a greater health advantage for individuals over time. This paper assesses the impact of health selection and health change on logged income, while testing whether health insurance moderates outcomes. Data were compiled by the Cross National Equivalence File (CNEF) and represent data gathered by Statistics Canada. Analyses are run using a combination of OLS Regression and Fixed-Effects Regression. Results show that there health affects income. Moreover, the relationship between is modified by health insurance status in both the OLS and the fixed effects. Findings support theories of health selection in income, particularly in older age groups.*

Health in Canada

Being a healthy Canadian means more in our current health-conscious system than it ever has before. We are now more interested in keeping tabs on our own health, and we are all able (at least in theory) to use a doctor to make sure that we are well situated. Yet the inevitable question arises – why are we health conscious? Why is health so precious (O'Rand 1996)? Is it enough that we are simply interested as a cultural or stylistic artefact, or is there some proportional status gain inherent in being careful about our health? Is it not really a status at all, but simply a biological reality that we have to deal with every day (Musgrove, Creese *et al.* 2000)?

The public health answer is that if we are careful to live a healthy lifestyle, then we are likely to live a longer and healthier life. However, such a possibility carries with it the undisputed, but mostly ignored, implication that individuals will also be able to work longer, or be more productive for longer, and do so more consistently over their lives. They may even be able to continue working without problems until they retire, and they should also be able to extend the age at which they retire significantly.

Health is also strongly related to the acceptance into some status groups. There are gym crowds who meet each-other at the gym, spend their lives at the gym, or simply require others to be in good health to interact with them on a regular basis. Thus, being in poor health can arrest some opportunities that may have otherwise arisen, and can even stop some people from being able to completely connect and network in some high-stress or high-status situations. As such, health

has become a stigmatization element in Canadian society, one that can be used to discern between mates, employees, or business partners (Goffman 1963).

Health Inequalities

The health of an individual can become an advantage in the occupational sphere as individuals challenge themselves to stay on the job as much as possible to gain those promotions and in some cases simply to maintain their jobs past the probationary period. Furthermore, individuals that are in poorer health are more likely to be found out as their sicknesses become more visibly tangible, thus taking up more and more of their time to cope with or hide, and decreasing their ability or suitability to work in others' eyes (Goffman 1956). Those in poor health are also more likely to require long periods away from the occupational sphere, thus either losing, or at least losing ground on, their employment opportunities.

Research into inequality and health in Canada has focused on the ways in which health is affected by income (Hay 1988; Humphries & Doorslaer 2000), and by income inequality (McLeod, Lavis *et al.* 2003). This parallel's the literature in much of the rest of the world as well (Lynch, Smith *et al.* 2004; Mellor & Milyo 2002; Torsheim, Currie *et al.* 2004). Researchers have even begun to point to a link between the welfare of a child and their adult health prospects (Kaplan, Turrell *et al.* 2001; Lynch, Kaplan *et al.* 1997; Wikström & Loeber 2000). If we understand that such health carries benefits for people, and that these benefits have effects on income as well, then as they age they will also be better situated to support their children and thus buy their children's education, social status and health as well.

Intergenerational transmission of health habits and advantages could support a pattern of social stratification in which those that get ahead are those that are more able and thus stronger, or are otherwise fitter to do the work. Thus, there is the possibility of some feedback from health to income, thus selecting individuals differently depending on the health that they have and can properly use (Hurd & Kapteyn 2003; Mulatu & Schooler 2002).

Some studies have begun to point to the possibility and the existence of a selection into income statuses based on health both in Canada and abroad (Adams, Hurd *et al.* 2003; Hay 1988; Hurd & Kapteyn 2003; McDonald & Kennedy 2004; Mulatu & Schooler 2002). However, none of these adequately tackle the problem of selection bias in health and healthcare while also looking at the effects of changes in health status on a person's ability to maintain their incomes.

Since working in Canada comes with benefits, this relationship should not simply be that health changes income. Benefits in Canada are more comprehensive and better for some than for others, and thus it is through such benefits that social inequality can exist. Simply being a Citizen in Canada brings with it the social support that universal healthcare coverage provides (Blendon, Schoen *et al.* 2003). Extra benefits may be bought, worked for and gained through the employment realm in many situations and by many people. Other benefits such as employment insurance, paid maternity leave, and sick leave without job loss, are only a few others. Canadians recognize these health advantages that exist by maintaining employment, it is a source of concern to many who worry that the point to healthcare in Canada, of having a needs-based equitable healthcare system, is not in practice an actuality (Blendon, Schoen *et al.* 2002; Rochefort 1999). However, in working there are still a number of possible inequalities that creep

into the system due to unavoidable individual differences and the selection for more employable and marketable differences throughout the life course.

Health Care

Health selection within the employment sector consists either of the loss or gain of employment, or the ability to get promotions, raises or other such benefits. Classically, the possibility of job loss due to illness has plagued policy makers, researchers and workers alike (Engels 1886; Ogle 1885). It is one of the reasons that we have health care, look back at the creation of healthcare in Germany – Bismarck resolved this problem in part by implementing the world's first comprehensive healthcare programme (Brenner & Rublee 2002). Yet it is important to know whether the *type* of healthcare that a person receives matters to their health and economic statuses (Quesnel-Vallée 2004; Ross, Bradley *et al.* 2006; Shi, Macinko *et al.* 2005). As such, it is important to know whether healthcare fulfills one of its primary avowed functions and protects the socioeconomic position of individuals who fall ill (Mackenbach 1996; McKeown 1976). Similarly, it is essential that we further our understanding of what role healthcare plays, if any, in affecting the overall well-being, in all parts of life, of the workers and the unemployed.

The solution to selection in the employment market in Canada has been to the universal health insurance programme that covers the health needs of all of its citizens. Since it has at its core the idea that access to healthcare should be based solely on medical need and not social or economic capital, in theory there are essentially no concerns that individuals are missing healthcare access (Ross, Nixon *et al.* 1999). What defines medically necessary interventions, however, is a topic of some debate and variation throughout the country as many types of medical care, such as

alternative forms of medicine, pharmaceuticals, dental care and plastic surgery remain generally, though not always, uncovered by healthcare (Goldsmith 2002). Interventions that fall outside the purview of public health insurance can either be paid for out-of-pocket or covered in part or in whole through supplemental private insurance. In fact, few Canadians are aware of the extent of the private dimensions of health care, which accounts for 30% of all health care spending (Harding & Picard 2005). In the same way that out-of-pocket payments require disposable income, supplemental insurance is not randomly distributed throughout the Canadian populations, but rather is available only to those whose job or status gives them more comprehensive access to a wider range of services than those who are either not employed or not in jobs that offer such benefits (Harding & Picard 2005). It is these extra benefits that may make a difference for individual income and employment security in the face of health problems, simply because these individuals are more likely to be back at work over time, as they may be more likely to successfully access healthcare.

The problem

The goal of this research is to explore the effect that health has in creating selection in the occupational force, and in creating an income gradient for Canadians. Health in Canada does not exist in a vacuum; rather health in Canada is situated in a universal healthcare system that affects the discourse and outcomes of health throughout Canada. As such, this paper also explores the ways in which healthcare, specifically the use of more comprehensive health insurance programmes versus regular healthcare coverage, has in moderating the association between health and income. In order to study any impact that healthcare may have on a population, it is important to use both cross-sectional and longitudinal approaches to analysis. Moreover, since

selection bias is also an important confounder in this relationship, this study uses a combination of time-lagged Ordinary Least Squares (OLS) regression with Fixed Effects regression to help control for the effects that selection may have.

Data

This study will use data from the Cross-National Equivalence File (CNEF) component of the Survey of Labour and Income Dynamics (SLID), collected by Statistics Canada. These confidential micro-data have been accessed through the Québec Inter-university Centre for Social Statistics (QICSS). The dataset is a six-year refreshing household panel study, the years included in the analyses use years 1999 to 2002. Analyses have been run using Stata 9.2/ Special Edition. Weighting has been done using population weights provided as part of the dataset for all of the analyses. Missing data have been excluded listwise from the analysis. In view of the research questions, we have restricted the sample to those individuals who are of 'working age', conservatively defined as being between 18 and 65 years of age. The final individuals included in the analyses for this study are 2720, 5910, and 2609 for each age group. This translates into 9130, 23270, and 10285 observations in each respective age group to be used in the fixed effects models and ANOVA models. Each model has been run while controlling for household clustering in the data sampling design, to control for the grouping of 2399, 4644, and 2164 households in each respective age group.

Measures

Income

Income in the CNEF dataset includes all wages and salaries that are earned from all types of employment, net income from farm workers, owners, and income of non-incorporated businesses. Income is measured in Canadian Dollars ($). This variable is highly skewed, thus income has been transformed on a logarithmic scale, with the addition of unity to keep those with '0' income in the analyses. As can be seen from table 1, the mean for income is 9.081, 10.11 and 9.757 with standard errors of 2.001, 1.679 and 2.307 for each consecutive age group respectively. (*Table 1 around here)

Health

Health in the SLID is self-rated. Health is coded on a five point scale from very-good to poor. In the SLID file, it is available for the six years preceding 2002. Self-rated health has been included because it is a strong measure of individual physical health, and has been shown to be statistically correlated with both morbidity and mortality (Mossey & Shapiro 1982). In this paper, health has been treated as a continuous variable. As such, all of the analyses have been run as either categorical or dummy variables as well, but these analyses do not add anything to the argument that is not shown with health as a continuous linear variable. Health has means of 1.875, 2.117, and 2.286 for each consecutive age group. Standard errors for these means are 0.873, 0.904, and 0.984 respectively. Table 1 also shows the proportions of individual who changed their health status: Δhealth shows that (via the Δ category) a proportion 0.509, 0.504, and 0.522 of each consecutive age group changed their health status over the four years in the panel study. Here a score of '0' or '1' indicates that individuals have maintained their health status as either all good (being an agglomeration of a score of 3, 4 or 5 on SRH) or all poor (a score of 1 or 2 on SRH) for the entire four years of the study. Finally, as is shown in the

bivariate regressions in table 2, health shows a significant negative relationship with income in the middle and oldest age groups. (*Table 2 around here)

Health Insurance

Governmentally issued health insurance in Canada is universally available to all Canadian citizens and covers medically necessary services and procedures. As such, there was no question in the SLID study that specifically targeted this issue until 1999. Even then, the question that was included was whether or not individuals have supplemental insurance, which is available through the workplace and covers a wider range of services than the generally available counterpart. Thus, anyone who did not reply that they had supplemental insurance has been assumed to be covered by governmentally-provided health insurance, without any supplemental insurance coverage at all. In our sample, the proportion of people with supplemental insurance is 0.356, 0.725, and 0.711 for the consecutive age groups. These high proportions indicate that while many people have a supplemental insurance, that a large proportion of the sample still has the Canadian universal insurance as their only source of health insurance. This implies that there is some possibility for health inequality based on supplemental health coverage. Finally, it can be seen that a large proportion of the sample changed their insurance status (specifically 0.694, 0.407, and 0.399 by age group), implying that there is a suitably large sample of individuals whose status changed, and thus fixed effects modeling will be appropriate. Table 2 shows that insurance status is significantly related to income in all age groups.

Control Variables

Age is measured in years, and is interpolated from year at birth. Age in this study has two major roles. The first is that individuals who are too old or too young are unable to garner an income must be excluded from the analyses. The second is that income and the changes that income growth varies over the life course – income tends to follow an inverted-U shape through life, as young individuals make less money and tend to hold less stable jobs, while older individuals are able to retire/work longer depending on their jobs and their lifestyles and health. Thus, all analyses have been run only among the population of working aged (defined here as 18 – 65), and have also been stratified by age group (18 – 29, 30 – 49 and 50 – 65) of which, the mean ages are 23.261, 40.056, and 55.276 respectively. The bivariate regressions in table 2 show that age is a significant positive predictor of income in every age group.

Gender is a complex issue that must be controlled for in all studies in health and inequality (Jaakkola & Gissier 2004; Meyer 1994; Rieker & Bird 2005). Women in Canada generally earn less, and their health patterns throughout the life course are different and as such, this variance must be accounted for statistically. The proportions of men in the study by age group are 0.477, 0.497, and 0.507 respectively. Finally, the bivariate case suggests that gender is a significant predictor of income in Canada.

Education is an important determinant of both health and income. As such, education was included in the analysis as a three-level categorical variable, indicating whether residents had less than a high-school degree, had earned a high-school degree, or had more than a high-school education. People that had earned a high-school degree, but no more, were used as the reference category. The proportions of people with less than high school are 0.099, 0.117 and 0.222. The proportions of high school educated people in this sample, separated by age group, are 0.462,

0.286, and 0.522. Finally, as is seen in table 2, education is a highly significant predictor of income when comparing people with high school and those without in the first two age groups, and when comparing to those with more than high school in the last two age groups.

Employment status is an important variable to consider when looking at the effects of health on inequality. While it is important to understand that health affects income, it is also important to see what the mechanism for such an effect actually is. Employment status is one such possibility, as individuals may be selected into and out of income by health through employment status. In the CNEF dataset, employment status has been included as a question of major life activity, which has two responses – working (1) or not working (0). Each age group's employed proportion is 0.600, 0.878 and 0.800 respectively. Employment status is significantly associated with income in all age groups at the bivariate level.

Marital status is a well-known control for significant life events and lifetime positions that affect individuals' income and health in all parts. Marital status can affect income by allowing some individuals the time and security to wait for better jobs, get more education or training, or to forgo employment entirely to have children while still being covered by private supplemental healthcare and other employment benefits through their spouse. Marital status in the Canadian portion of the CNEF dataset includes five measures: Married or Cohabiting; Divorced; Widowed; Separated; and Never Married. The group that was married or cohabiting has been included as the reference category in the analyses. As is obvious from table 1, the largest group of people in the marital status group change by age group, with the largest being Single (0.708), Married (0.766), and Married (0.786). The results of the bivariate case suggest that the only significant differences between the marital statuses when using married or cohabiting as the reference case

is single in the first two age groups, divorced in the youngest age group, and finally separated in the oldest age group. All bivariate relationships are fairly weak.

Household size has been included as a measure of responsibility in the home to dependents. Income can be more important to people who are required to provide for children or other dependents. Similarly, life can be much more stressful and less healthy as these dependents may require a lot of care and emotional resources. However, health can also be increased due to the inclusion and love that often accompany children in a household. As such, family size, a straight measure of the number of people included in the family unit of the household, has been included in the analyses as a measure of these private factors that may correlate to the public lives of the individuals involved. The mean household sizes, by age group, in the sample under study were 3.157, 3.350, and 2.513 respectively. Household size shows strongly significant negative effects on income in the youngest age group, which then disappear in the middle age group, only to return as a significant positive relationship in the oldest age group as is shown in table 2.

Methods

The first part of this study regresses income on health using a longitudinal time-lagged approach. This methodology entails regressing income on temporally previous health status variables, to help ensure causality. Thus, $income_{(t)}$ is regressed on $controls_{(t),}$ then $health_{(t-1)}$ is added to the control model. Nested models are then estimated by including supplemental health insurance ($PHI_{(t-1)}$), and finally the interaction between health and health insurance is modeled to help model the moderating effects, if any, that health insurance has on the relationship between health

and income. Between-model ΔR^2 assesses the contribution of each additional conceptual block of variables to the previous model.

Such an approach solves many problems inherent in cross-sectional analyses, but is also limited due to causal feedback relationships such as has been proposed in this paper to be the case between health and income. This type of feedback may result in a biased result, and it ignores the longitudinal components of individual lives. These models will therefore yield estimates that reflect both effects from health to income, and from income to health as well. Moreover, these estimates may be biased if both income and explanatory variables are affected by a common, unmeasured factor that is intrinsic to, and time-invariant within, individuals, such as cognitive capacity or genetic tendency for instance.

Consequently, fixed effects regression will be used to test the robustness of these findings. Simply put, this type of regression involves transforming the variables in the regression by subtracting off their longitudinal mean, including the part of the error term that is due to unmeasured within-individual factors. Moreover, we can estimate the intra-individual correlation in income to see how much of the variance is due to time-invariant individual characteristics. Limitations to these approaches exist, and will be discussed later.

The use of a household study such as the SLID that includes individuals based on their household inclusion, rather than simply randomizing on the individual, requires that we control for the clustering that such selection causes. Heteroscedasticity in any income study is a concern, as is strongly skewed data. Thus, for the purposes of this study I have used robust standard errors that also control for inter-individual correlation due to household groupings.

Results

In table 3, the Ordinary Least Squares (OLS) regressions are split by age group. Model 1 shows the baseline effects of the control variables, with models 2, 3 and 4 representing consecutive additions of health, insurance status and the interaction effect respectively. In the youngest age group, Gender shows a significant negative correlation, such that women make less than men. A greater than high school education is significantly related to an increase in earnings. Having less than high school education is significantly related to lowered earnings. Employment is significantly related to higher income. Marital status at this age does not seem to be significantly related to the dependent variable. Moreover, due to the small sample size and co-linearity, widowed individuals have been dropped from the analyses in the youngest age group. Finally, household size is weakly, and negatively, related to income. (*Table 3 around here)

Health, in the earliest age group, shows a significant relationship such that worse health is significantly correlated with a lowered income. Interestingly, this relationship is robust to the inclusion of both health insurance status, and the interaction term. Indeed, the inclusion of the interaction term seems to elevate the coefficient, with the standard error, of health. The addition of health to the model results in a smaller, and less significant, gender coefficient. The use of supplemental insurance is associated with a positive increase in income in this, youngest age group. The inclusion of health insurance also reduces the effects of having more than high school education. However, this same use of supplemental insurance, when interacting with health, shows no significant association with income. This is different than public insurance, which *continues* to show a significant relationship between poor health and lowered income. Note that all except the last model show significant changes in the ΔR^2.

The middle age group shows no significant relationship between age and income. Being female at this stage is still significantly related to lowered income. Having more than high school education is significantly related to heightened earnings in the 30 – 49 year age group. Less than high school education is significantly related to a lowered income. Being employed shows a strong positive relationship with income. Being married or cohabiting shows significant negative differences from being separated, divorced or single. Finally, household size is negatively related to income, implying that being part of a larger family is correlated with a lower income.

The second age group also shows a highly significant relationship between health and income such that poorer health is correlated with a lowered income. Table 2 also shows that supplemental insurance is correlated with a significantly higher income. Finally, the inclusion of the interaction effects does not increase the explained variation, implying that the effect of individual's health on income is not modified by their receipt of supplemental insurance. This is in direct contrast to individuals who are using public health insurance, wherein poor health is still significantly correlated with a lowered income. The inclusion of health insurance lowers the significance and size of the coefficients of both, people having less than high school education, as well as being separated as compared to married or cohabiting. Finally, the inclusion of the health interaction term lowers the value and the significance of the effect of health insurance on income. The R^2 analysis shows that there is each model is a significant addition to the previous except for model 4.

The final age group shows the same gender and education relationships as the earlier age groups, though having less than high school education is not statistically different than being high school

educated in this age group. Employment shows a very strong relationship with income in this age group. There are no significant relationships when comparing marital statuses, using married or cohabiting as a reference group, and income in this age group. Household size has lost its strength in this age group as well.

Poor health is significantly related with lowered income, and this relationship is robust through all models. Again, the use of supplemental insurance is significantly correlated with an elevated income. However, with the inclusion of the interaction term, we see that there is a significant increase on income to having supplemental private insurance for individuals who are of poor health. Poor health, for individuals who do not have supplemental health insurance, shows a strong and highly significant negative correlation with income. Finally, the R^2 analysis shows that each model is a significant addition to the last.

Table 4 shows the longitudinal one-way ANOVA results. These results suggest that there is a lot of change in the social strata that are of interest. The R^2 of 0.538 for income shows that much of the score that individuals have on the log income scale is mostly able to change over the span of the panel study. The R^2's of education, marital status, and insurance status are a little higher; thus pointing to the possibility that many people do not change their insurance status. As people age even fewer are liable to change their educational and marital statuses over the ages that are present in the study. Employment status shows a strong tendency to variability over time, though this tendency does not change much over time. Household size shows strong path dependency over time. The somewhat lower R^2 on health status shows that health is variable within individuals, and in fact this also shows that health changes as much later in life as it does

earlier in life. Most of the independent variables, including all of the health variables and the dependent variable, show a strong tendency to change over time. (*Table 4 around here)

Table 5 shows the results from the fixed effects modeling. These show that in the youngest age group, each year in age does have a significant positive effect on the income level. Changes in education from less than high school to high school are significantly related to an elevation in income as compared to high school levels, though there is no significant difference between high school and more than high school. Changes in marital status between married or cohabiting and other marital statuses do not show any significant effect on income levels. The widowed group is excluded from this age group due to lack of cases. Changes in household size do not have any significant effect on income in the youngest age group. Finally, changes in employment status are significantly related to positive increases in income.

As shown by model 2, adding health into the model does not show any significant effect in the youngest age group. Model 3, however, shows that with the addition of the health insurance dichotomous variable, that the gain in supplemental insurance is correlated with a positive change in income. The addition of the interaction term is not significant, implying that health shocks are not important in this age group to either the individuals with healthcare, or to those with supplemental insurance.

The 30 – 49 year old age group shows a smaller, though strongly significant relationship between changes in age and changes in income. Changes in education remain similarly associated with the dependent variable in model 1. Marital status shows no significant changes between married and widowed, divorced or separated. There is a significant difference between married or

cohabiting individuals and individuals who are single such that single, never married, people make less than people who are either cohabiting or married. Household size at this level is negatively correlated with income levels to a moderately significant degree. Changes in employment status are positively correlated with changes in income in this age group. (*Table 5 around here)

Changes in health in the middle age group do not show any initial signs of an associated change in income. The inclusion of health insurance in the model shows a significant correlation with an increase in income. Finally, the inclusion of the interaction variable shows three important changes. The first is that the relationship between health and income has become significant and negative such that individuals who do not have supplemental insurance are showing a negative relationship between changes into poorer health and a lowering of income. With this, there is also a significant *positive* relationship between health and income for those individuals with supplemental insurance. Finally, the inclusion of the interaction term has decreased the value of the health insurance association in half, though it has remained strongly significant.

In the oldest age group, incrementing age shows no significant correlation with changes in income. Changes in education now show no association with change in income. Changes in marital status have no significant effect on income. Employment status continues to show a strong significant positive effect on income in the oldest age group. Household size continues to shows no significant relationship.

Changes in health show a weakly significant negative correlation in the oldest age group. Health insurance status continues to be significantly associated with changes in income, such that

changes to supplemental insurance are correlated with increases in income. The inclusion of the interaction term shows a strong significant relationship between health and income in the oldest age group. As such, changes towards poorer health amongst those without supplemental insurance are showing a negative relationship with income, while those same changes in people with supplemental insurance show a highly significant increase in income.

Finally, as is seen in the fixed effects models, the within-individual R^2 for the all the age groups is lower numerically, often by as much as half, when compared to the between-individual R^2. The between-individual findings show that health selection, and in particular longitudinal health average, has measurable effects on income. However, the within-individual results suggest that changes in health are still an important part of the relationship between health and income.

Discussion

This study shows that in fact health is a very important predictor of income throughout life. These health effects were robust in the OLS regression to all additions of control variables. However, it is not the small health shocks and sicknesses that are likely to create long term problems for individuals. Rather it is the use of health as a selection agent that makes an important contribution to income. Thus, this study supports the theory that people in poorer health make less money than do those individuals who are healthier (Hurd & Kapteyn 2003; Mulatu & Schooler 2002).

The use of health as a selection agent points to an important finding – health matters even when controlling for employment, marital status and other demographic variables – however, health

insurance status defines *how* it matters. From the OLS models, it is clear that health is an important distinguisher of income throughout the life course, though this relationship is stronger later in life. The fixed effects models suggest that health shocks are significantly related to income, again in older life. However, since health status is highly related to historical trend, it is also clear that the actual relationship between health and income could be even stronger than is suggested here. What is clear is that health acts oppositely depending on health insurance status, suggesting that if health insurance were not taken into account that health may have little to no apparent effect.

There remains the possibility in these findings that there are two separate mechanisms through which health influences income. The first, as suggested by the importance of the OLS models, is that health selects people into the higher income employments. In particular health may help individuals when people are considering retirement or are in positions of occupational mobility. The fixed effects models, however, suggest a direct change in income is related to changes in health, suggesting that individuals are either losing their income due to health shocks, or are using their health status to gain income, depending on their health insurance status.

The simple reality shown by the longitudinal one way analyses is that health itself is often determined by previous scores over the four year period. The implications of such predetermination are that people whose early lives are characterized by poor health may be at a definite disadvantage throughout their lives. Such a determination is doubly important, as has been shown, since health affects later life income. It is unclear, however, how large this relationship may be, and which populations it will affect is yet to be determined.

The very strong correlation between current and previous health points to a strong selection mechanism not only throughout an individual's life course, but across generational boundaries as well. Thus, it may not be enough to judge individual health as a distinct subject that can change equally for all individuals. Rather, as was shown using the OLS and fixed effects models, health acts as a personal attribute as well as a changing status, that helps individuals get more income – and since dependents rely on these individuals, and in accordance with the existing literature, to buy further health for themselves later on in life, or even for their dependents (Lynch, Kaplan *et al.* 1998; Shi & Starfield 2000; Subramanian & Kawachi 2004).

Health Insurance, and specifically supplemental insurance in Canada, has a strongly significant interaction with health as people age *even after controlling for employment status and familial characteristics* as is shown by the OLS models (Quesnel-Vallée 2004; Ross, Bradley *et al.* 2006; Shi, Macinko *et al.* 2005). Thus, as people get older, health insurance becomes more important to continued employment and the heightened income in the face of worse health as was suggested historically (Engels 1886; Ogle 1885). Moreover, the type of health insurance does matter to how health is related to income, and since health insurance varies by employment and marital statuses in Canada, health inequalities could arise simply from differences in health insurance plans (Harding & Picard 2005).

The importance of the interaction of health with health insurance, suggests that people act differently in their employment depending on whether they have health benefits. Since people with benefits are actually gaining income when their health gets worse, the possibility exists that these individuals are using health status to pay for an increase in income. Such a possibility could suggest that people are possibly working overtime for long periods of time, or are making

a point to go to work when they are sick, knowing that they are able to get good treatment if they need it. In direct contrast, those without supplemental insurance simply lose income when their health becomes problematic, thus reifying the barrier between those who have better jobs versus those without. This suggests that health is precious because it can be used by those with the opportunity, and the health coverage, to increase economic standing – it buys money (O'Rand 1996).

Future research, then, should take these possibilities into account. Looking at the cumulative effects of health on income, and the life course events that help to choose individuals into high- or low-paying jobs, is necessary to understand what the actual relationship between health and income actually is. The correlation between current health and previous health status points to the need for studies to take that stability into account over time, with mandates to understand this stability and its relationship to income.

Limitations

There are some concerns that there are a small number of individuals in Canada whose status as a citizen is suspect or suspended for a time and are therefore not covered by the universal health plan. The assumption is that a universal system covers universally, however such may or may not be the case and should be studied in greater depth.

Finally, the focus on lessening selection bias has its benefits and its limitations. While this study arguably lessened the influence of health selection bias, there remains the possibility that the changes themselves differ by selection, and thus may bias the results through covert selection

processes. If individuals change their health status differently depending on their previous health status or some other extenuating circumstance, then such a methodology as this will *continue* to report biased results.

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Table 1 *Descriptive Statistics*

Age Group			Proportion		Mean	Min/Max
18 - 29	Sex	Male	0.477	Age	23.261	18
		Female	0.523		(3.449)	29
	Education	< High School	0.099	HH Size	3.157	1
		High School	0.462		(1.382)	10
		> High School	0.439	SRHealth	1.875	1
	Employment Status	Unemployed	0.400		(0.873)	5
		Employed	0.600	Income	9.081	0
	Marital Status	Married	0.256		(2.001)	11.719
		Single	0.708			
		Widowed	.			
		Divorced	0.005			
		Separated	0.031			
	Insurance Status	General	0.645			
		Supplemental	0.356			
	ΔHealth	0	0.467			
		Δ	0.509			
		1	0.025			
	ΔInsurance	0	0.211			
		Δ	0.694			
		1	0.096			
30 - 49	Sex	Male	0.497	Age	40.056	30
		Female	0.503		(5.488)	49
	Education	< High School	0.117	HH Size	3.350	1
		High School	0.286		(1.335)	10
		> High School	0.597	SRHealth	2.117	1
	Employment Status	Unemployed	0.122		(0.904)	5
		Employed	0.878	Income	10.111	0
	Marital Status	Married	0.766		(1.679)	13.665

		Single	0.118			
		Widowed	0.004			
		Divorced	0.060			
		Separated	0.052			
	Insurance Status	General	0.275			
		Supplemental	0.725			
	ΔHealth	0	0.418			
		Δ	0.504			
		1	0.078			
	ΔInsurance	0	0.120			
		Δ	0.407			
		1	0.474			
50 - 65	Sex	Male	0.507	Age	55.276	50
		Female	0.493		(4.061)	65
	Education	< High School	0.222	HH Size	2.513	1
		High School	0.522		(1.123)	9
		> High School	0.256	SRHealth	2.286	1
	Employment Status	Unemployed	0.200		(0.984)	5
		Employed	0.800	Income	9.757	0
	Marital Status	Married	0.786		(2.307)	12.712
		Single	0.056			
		Widowed	0.038			
		Divorced	0.090			
		Separated	0.030			
	Insurance Status	General	0.289			
		Supplemental	0.711			
	ΔHealth	0	0.344			
		Δ	0.522			
		1	0.134			
	ΔInsurance	0	0.128			
		Δ	0.399			
		1	0.472			

NB: Numbers in parentheses are Standard Errors

Table 2 *Bivariate OLS Regressions of Income on Independent Variables by Age Group*

Age Group			β (SE)		R^2		
18 - 29	Household Size		-0.216	***	0.022	***	N_{Inds}
			(0.040)				2720
	Marital Status	Single	-0.513	***	0.013	***	
	Reference Married/Cohabiting		(0.110)				N_{HHs}
		Widowed	.				2399
			.				
		Divorced	0.661	**			
			(0.224)				
		Separated	-0.501				
			(0.317)				
	Sex		-0.369	***	0.008	***	
			(0.101)				
	Employment Status		-1.941	***	0.219	***	
			(0.109)				
	Age		0.140	***	0.057	***	
			(0.016)				
	Education	< High School	0.785	***	0.048	***	
	Reference High School		(0.100)				
		> High School	-0.372				
			(0.221)				
	Health		-0.088		0.002		
			(0.074)				
	Insurance Status		1.236	***	0.088	***	
			(0.088)				
30 - 49	Household Size		-0.049		0.002		N_{Inds}
			(0.026)				5910
	Marital Status	Single	-0.236	*	0.005	*	
	Reference Married/Cohabiting		(0.101)				N_{HHs}
		Widowed	-0.911				4464
			(0.485)				
		Divorced	-0.227				
			(0.120)				
		Separated	-0.193				
			(0.137)				
	Sex		-0.566	***	0.030	***	
			(0.054)				
	Employment Status		-2.388	***	0.209	***	

			(0.170)				
	Age		0.012	*	0.002	*	
			(0.005)				
	Education	< High School	-0.420	***	0.048	***	
	Reference High School		(0.107)				
		> High School	0.262	***			
			(0.061)				
	Health		-0.231	***	0.017	***	
			(0.036)				
	Insurance Status		1.164	***	0.095	***	
			(0.081)				
50 - 65	Household Size		0.097	***	0.002		N_{Inds}
			(0.056)				2609
	Marital Status	Single	0.080		0.004		
	Reference Married/Cohabiting		(0.187)				N_{HHs}
		Widowed	-0.644				2146
			(0.366)				
		Divorced	0.035				
			(0.175)				
		Separated	0.347	*			
			(0.167)				
	Sex		-0.526	***	0.013	***	
			(0.106)				
	Employment Status		-3.125	***	0.282	***	
			(0.240)				
	Age		-0.106	***	0.036	***	
			(0.015)				
	Education	< High School	-0.343		0.048	***	
	Reference High School		(0.205)				
		> High School	0.413	**			
			(0.134)				
	Health		-0.377	***	0.027	***	
			(0.085)				
	Insurance Status		1.521	***	0.088	***	
			(0.149)				

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

NB: Numbers in parentheses are Standard Errors

Table 3 *OLS Regressing Income on Nested Health and Health Insurance by Age Group*

			Model 1		Model 2		Model 3		Model 4		
			β		β		β		β		
Age Group			(SE)		(SE)		(SE)		(SE)		
18 - 29	Age		0.016		0.021		-0.003		-0.001		
			(0.022)		(0.021)		(0.023)		(0.023)		
	Female		-0.294	***	-0.269	**	-0.244	**	-0.248	**	
			(0.086)		(0.088)		(0.087)		(0.087)		
	Education	< High School	-0.710	***	-0.662	***	-0.648	***	-0.649	***	
	Reference High School		(0.189)		(0.192)		(0.190)		(0.190)		
		> High School	0.237	*	0.207	*	0.179		0.180		
			(0.102)		(0.102)		(0.100)		(0.100)		
	Employment Status		1.791	***	1.807	***	1.703	***	1.704	***	
			(0.130)		(0.129)		(0.124)		(0.124)		
	Marital Status	Single	-0.019		-0.029		0.033		0.037		
			(0.113)		(0.112)		(0.109)		(0.109)		
		Widowed	.		.		.		.		
	Reference Married/Cohabiting		.		.		.		.		
		Divorced	0.328		0.343		0.306		0.281		
			(0.195)		(0.194)		(0.177)		(0.179)		
		Separated	-0.224		-0.230		-0.165		-0.161		
			(0.277)		(0.275)		(0.264)		(0.264)		
	Household Size		-0.070	*	-0.078	*	-0.063	*	-0.064	*	
			(0.032)		(0.032)		(0.032)		(0.032)		
	Health				-0.165	*	-0.159	*	-0.194	*	
					(0.067)		(0.065)		(0.095)		
	Insurance						0.599	***	0.401		
							(0.098)		(0.221)		N_{Inds}
	Health*Insurance								0.102		2720
									(0.106)		

	R^2		0.248	***	0.253	***	0.269	***	0.269	***	N_{HHs}
	ΔR^2				0.005	*	0.016	***	0.001		2399
30 - 49	Age		0.008		0.011	*	0.008		0.008		
			(0.005)		(0.005)		(0.005)		(0.005)		
	Female		-0.405	***	-0.397	***	-0.327	***	-0.328	***	
			(0.049)		(0.049)		(0.049)		(0.049)		
	Education	< High School	-0.330	***	-0.312	**	-0.206	*	-0.195	*	
	Reference High School		(0.094)		(0.093)		(0.092)		(0.092)		
		> High School	0.284	***	0.263	***	0.221	***	0.223	***	
			(0.053)		(0.053)		(0.052)		(0.051)		
	Employment Status		2.274	***	2.242	***	2.061	***	2.848	***	
			(0.174)		(0.173)		(0.169)		(0.234)		
	Marital Status	Single	-0.348	***	-0.338	***	-0.286	**	0.039	**	
			(0.097)		(0.096)		(0.092)		(0.162)		
		Widowed	-0.638		-0.599		-0.486		-0.181		
	Reference Married/Cohabiting		(0.510)		(0.519)		(0.520)		(0.298)		
		Divorced	-0.253	*	-0.250	*	-0.249	*	-0.198	*	
			(0.111)		(0.110)		(0.108)		(0.144)		
		Separated	-0.306	*	-0.303	*	-0.313	*	0.261	*	
			(0.135)		(0.134)		(0.129)		(0.246)		
	Household Size		-0.073	**	-0.074	**	-0.061	*	-0.060	*	
			(0.028)		(0.028)		(0.026)		(0.026)		
	Health				-0.138	***	-0.130	***	-0.235	**	
					(0.030)		(0.029)		(0.085)		
	Insurance						0.741	***	0.426	*	
							(0.068)		(0.191)		N_{Inds}
	Health*Insurance								0.146		5910
									(0.088)		
	R^2		0.246	***	0.251	***	0.287	***	0.288	***	N_{HHs}

	ΔR^2				0.006	***	0.036	***	0.001		4464
50 - 65	Age		-0.021		-0.020		-0.011		-0.010		
			(0.015)		(0.014)		(0.014)		(0.014)		
	Female		-0.461	***	-0.463	***	-0.350	***	-0.361	***	
			(0.096)		(0.095)		(0.094)		(0.093)		
	Education	< High School	-0.164		-0.063		-0.006		-0.012		
	Reference High School		(0.169)		(0.161)		(0.157)		(0.155)		
		> High School	0.422	***	0.404	***	0.368	***	0.379	***	
			(0.110)		(0.110)		(0.110)		(0.111)		
	Employment Status		3.034	***	2.995	***	2.844	***	2.848	***	
			(0.244)		(0.236)		(0.236)		(0.234)		
	Marital Status	Single	-0.064		-0.068		-0.030		0.039		
			(0.178)		(0.172)		(0.169)		(0.162)		
		Widowed	-0.264		-0.265		-0.190		-0.181		
	Reference Married/Cohabiting		(0.283)		(0.279)		(0.293)		(0.298)		
		Divorced	-0.197		-0.146		-0.202		-0.198		
			(0.156)		(0.152)		(0.144)		(0.144)		
		Separated	0.296		0.271		0.217		0.261		
			(0.288)		(0.257)		(0.237)		(0.246)		
	Household Size		-0.001		0.007		0.011		0.019		
			(0.055)		(0.054)		(0.052)		(0.051)		
	Health				-0.263	***	-0.233	***	-0.581	***	
					(0.062)		(0.061)		(0.115)		
	Insurance						0.887	***	-0.305		
							(0.116)		(0.302)		N_{Inds}
	Health*Insurance								0.498	***	2609
									(0.134)		
	R^2		0.309	***	0.321	***	0.349	***	0.358	***	N_{HHs}
	ΔR^2				0.013	***	0.027	***	0.010	***	2146

* p < 0.05, ** p < 0.01, *** p < 0.001

NB: Numbers in parentheses are Standard Errors

Table 4 *Longitudinal One-Way Analysis*

Age Group	Measure	Income	Health	Education	Insurance Status	Marital Status	Employment Status	Household Size	Sample Size
	R^2	0.538	0.571	0.778	0.601	0.644	0.573	0.745	
18 - 29	Intraclass Correlation	0.342	0.390	0.683	0.432	0.493	0.393	0.637	N_{Obs}
	Reliability	0.635	0.682	0.879	0.718	0.766	0.684	0.855	9130
	R^2	0.629	0.602	0.970	0.701	0.819	0.488	0.906	
30 - 49	Intraclass Correlation	0.503	0.467	0.959	0.599	0.757	0.314	0.874	N_{Obs}
	Reliability	0.799	0.775	0.989	0.855	0.925	0.643	0.965	23270
	R^2	0.605	0.637	0.988	0.723	0.924	0.499	0.881	
50 - 65	Intraclass Correlation	0.470	0.514	0.984	0.629	0.898	0.328	0.841	N_{Obs}
	Reliability	0.778	0.807	0.996	0.870	0.972	0.658	0.954	10285

Table 5 *Fixed Effects Models of Income on Health by Age Group*

			Model 1		Model 2		Model 3		Model 4	
			β		β		β		β	
Age Group			(SE)		(SE)		(SE)		(SE)	
18 - 29	Age		0.253	***	0.252	***	0.223	***	0.224	***
			(0.021)		(0.021)		(0.021)		(0.021)	
	Education	< High School	-0.860	***	-0.862	***	-0.876	***	-0.877	***
	Reference High School		(0.197)		(0.197)		(0.197)		(0.197)	
		> High School	-0.101		-0.101		-0.132		-0.131	
			(0.104)		(0.104)		(0.104)		(0.104)	
	Employment Status		1.202	***	1.202	***	1.118	***	1.118	***
			(0.071)		(0.071)		(0.069)		(0.069)	
	Marital Status	Single	0.103		0.104		0.158		0.158	

			(0.101)		(0.101)		(0.101)		(0.101)		
		Widowed	.		.		.		.		
	Reference Married/Cohabiting		.		.		.		.		
		Divorced	0.086		0.089		0.166		0.142		
			(0.390)		(0.393)		(0.397)		(0.403)		
		Separated	0.138		0.136		0.215		0.215		
			(0.233)		(0.233)		(0.228)		(0.228)		
	Household Size		-0.037		-0.036		-0.031		-0.032		
			(0.027)		(0.027)		(0.026)		(0.026)		
	Health				0.033		0.031		0.001		
					(0.032)		(0.032)		(0.041)		
	Insurance						0.495	***	0.336	***	N_{Obs}
							(0.055)		(0.101)		9130
	Health*Insurance								0.086		
									(0.050)		N_{Inds}
	R^2 Within		0.143	***	0.144	***	0.153	***	0.153	***	2720
	R^2 Between		0.232		0.230		0.257		0.258		
	R^2 Overall		0.191		0.190		0.214		0.214		N_{HHs}
	ρ		0.454		0.455		0.445		0.445		2399
30 - 49	Age		0.112	***	0.113	***	0.096	***	0.096	***	
			(0.008)		(0.008)		(0.008)		(0.008)		
	Education	< High School	-0.835	**	-0.833	**	-0.830	**	-0.821	**	
	Reference High School		(0.315)		(0.316)		(0.317)		(0.318)		
		> High School	-0.073		-0.074		-0.087		-0.089		
			(0.131)		(0.131)		(0.128)		(0.128)		
	Employment Status		1.403	***	1.401	***	1.336	***	1.335	***	
			(0.069)		(0.069)		(0.066)		(0.066)		
	Marital Status	Single	-0.298	*	-0.297	*	-0.269	*	-0.266	*	
			(0.119)		(0.119)		(0.115)		(0.115)		

		Widowed	-0.539		-0.537		-0.466		-0.450		
	Reference Married/Cohabiting		(1.050)		(1.051)		(1.036)		(1.042)		
		Divorced	0.081		0.081		0.079		0.084		
			(0.139)		(0.139)		(0.136)		(0.136)		
		Separated	0.022		0.022		0.014		0.011		
			(0.095)		(0.095)		(0.094)		(0.094)		
	Household Size		-0.001		-0.001		0.000		0.000		
			(0.023)		(0.023)		(0.023)		(0.023)		
	Health				-0.014		-0.013		-0.089	***	
					(0.014)		(0.014)		(0.034)		
	Insurance						0.623	***	0.375	***	N_{Obs}
							(0.045)		(0.084)		23270
	Health*Insurance								0.117	**	
									(0.037)		N_{Inds}
	R^2 Within		0.114	***	0.115	***	0.137	***	0.138	***	5910
	R^2 Between		0.137		0.138		0.248		0.248		
	R^2 Overall		0.125		0.126		0.207		0.208		N_{HHs}
	ρ		0.565		0.565		0.529		0.529		4464
50 - 65	Age		0.002		0.005		-0.001		0.001		
			(0.015)		(0.015)		(0.014)		(0.014)		
	Education	< High School	0.570		0.588		0.689		0.673		
	Reference High School		(0.376)		(0.374)		(0.370)		(0.368)		
		> High School	0.549		0.560		0.569		0.548		
			(0.399)		(0.398)		(0.398)		(0.397)		
	Employment Status		1.476	***	1.467	***	1.349	***	1.340	***	
			(0.096)		(0.096)		(0.089)		(0.089)		
	Marital Status	Single	-0.055		-0.055		0.055		0.027		
			(0.180)		(0.180)		(0.170)		(0.170)		
		Widowed	-0.129		-0.123		-0.139		-0.126		

Reference Married/Cohabiting		(0.236)		(0.237)		(0.229)		(0.226)		
	Divorced	0.193		0.186		0.190		0.182		
		(0.255)		(0.254)		(0.253)		(0.250)		
	Separated	0.174		0.171		0.089		0.057		
		(0.281)		(0.282)		(0.271)		(0.272)		
Household Size		0.011		0.013		0.011		0.010		
		(0.038)		(0.038)		(0.037)		(0.037)		
Health				-0.057	*	-0.056	*	-0.192	***	
				(0.025)		(0.025)		(0.059)		
Insurance						0.937	***	0.460	**	N_{Obs}
						(0.081)		(0.152)		10285
Health*Insurance								0.209	***	
								(0.063)		N_{Inds}
R^2 Within		0.094	***	0.095	***	0.133	***	0.136	***	2609
R^2 Between		0.282		0.286		0.428		0.437		
R^2 Overall		0.195		0.197		0.304		0.310		N_{HHs}
ρ		0.494		0.493		0.448		0.446		2146

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

NB: Numbers in parentheses are Standard Errors