

# Impact of a guaranteed annual income program on Canadian seniors' physical, mental and functional health

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## ABSTRACT

**OBJECTIVE:** Although there is widespread recognition that poverty is a key determinant of health, there has been less research on the impact of poverty reduction on health. Recent calls for a guaranteed annual income (GAI), defined as regular income provided to citizens by the state regardless of work status, raise questions about the impact, relative to the costs, of such a population health intervention. The objective of this study was to determine the impact of Canadian seniors' benefits (Old Age Security/Guaranteed Income Supplement, analogous to a GAI program) on the self-reported health, self-reported mental health and functional health of age-eligible, low-income seniors.

**METHODS:** We used the 2009–2010 Canadian Community Health Survey to examine unattached adult respondents with an annual income of \$20,000 or less, stratified by seniors' benefits/GAI eligibility (55–64 years: ineligible; 65–74 years: eligible). Using regression, we assessed self-reported health, self-reported mental health and functional health as measured by the Health Utilities Index, as outcomes for seniors' benefits/GAI-eligible and -ineligible groups.

**RESULTS:** We found that individuals age-eligible for seniors' benefits/GAI had better health outcomes than recipients of conditional income assistance programs. Eligibility for seniors' benefits/GAI after age 64 was associated with better self-reported health, functional health and self-reported mental health outcomes, and these effects were observed until age 74.

**CONCLUSION:** Using seniors' benefits as an example, a GAI leads to significantly better mental health and improved health overall. These improvements are likely to yield reduced health care costs, which may offset the costs associated with program expansion.

**KEY WORDS:** Health; mental health; HUI; Canada; poverty; Guaranteed Annual Income; seniors

La traduction du résumé se trouve à la fin de l'article.

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Four million Canadians (12.9%) live in poverty.<sup>1</sup> There is a persistent negative correlation between low income and self-reported health, increased risk of chronic diseases (coronary heart disease, type 2 diabetes), respiratory disease, lung cancer and decreased life expectancy.<sup>2</sup> Poverty is also related to adverse impacts on mental health<sup>3</sup> and is associated with conditions such as major depression.<sup>4</sup>

Over the last decade, Canadian governments have implemented a variety of targeted anti-poverty measures, such as increased minimum wage, housing programs, services for low-income individuals and those with disabilities, and programs directed at families with children.<sup>2</sup> Despite these efforts, poverty rates remain high, possibly because such measures fail to mitigate lack of sufficient income to cover the basic costs of living.<sup>2</sup> An alternative anti-poverty strategy that has been gaining public policy consideration and media attention in recent years is a guaranteed annual income (GAI).<sup>5,6</sup> Conceptually, GAI is regular income provided by the state to citizens below a pre-determined economic threshold, regardless of work status.<sup>7</sup> The Canada Child Tax Benefit/National Child Benefit Supplement available to Canadian households with age-eligible children could be construed as a form of GAI.<sup>8,9</sup> Because GAI has few restrictions, it differs from the current income assistance programs, in which means-testing and stigma might limit access. In essence, GAI provides people with a sense of financial security, as it is a

guaranteed payment ensuring that citizens can afford the basic necessities, such as food, clothing and shelter, needed to sustain life.<sup>10</sup> Other than the Manitoba-based MINCOME study of the 1970s<sup>10</sup> and a public policy study that reported simple descriptive statistics on food insecurity, health and mental health among Canadian seniors and near seniors,<sup>11</sup> the evaluation of GAI as a poverty reduction strategy for improved health outcomes has not occurred in this country.

In Canada, seniors 65 years and older are eligible for public pension benefits, delivered through the federal tax system, which collectively function like a GAI (see Appendix A for details). The objective of this study was to determine the impact of seniors' benefits/GAI on self-reported health, self-reported mental health

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and functional health in Canada using unattached, low-income seniors who are and are not age-eligible for seniors' benefits/GAI. This study is timely in light of the recent call by Ontario physicians and the Special Senate Committee on Aging for implementation of a GAI to address poverty-related illnesses and to provide income security for all Canadians.<sup>12,13</sup>

## METHODS

### Data source

The data for this study were obtained from the Canadian Community Health Survey Cycle 5.1 (2009–2010), accessed as microdata through the Prairie Regional Data Research Centre following disclosure rules. The Canadian Community Health Survey is a cross-sectional survey that collects health and socio-demographic data from a large representative sample of the Canadian population.<sup>14</sup> Analyses were restricted to respondents in four age groups – two groups that are ineligible for seniors' benefits, as a GAI exemplar (55–59 and 60–64 years), and two that are eligible (65–69 and 70–74 years). We restricted our analysis to single, low-income individuals, as this demographic group is most vulnerable to experiencing food insecurity, a metric of both poverty and health risk.<sup>15–17</sup> To identify these individuals, we included only those respondents who a) had an annual household income of CAD \$20,000 or less, b) had a personal income of \$20,000 or less, so that personal and household were likely equivalent, and c) were not married or attached (e.g., were single, divorced, separated or widowed).

The Canadian Community Health Survey categorizes annual income in \$10,000 increments. We used a maximum annual income of \$20,000 in this study as the income cut-off for economic vulnerability; this best matched the seniors' benefits/GAI income amount and also remained less than the low-income cut-off (LICO) for a single person living in Canada at the time.<sup>18</sup> Exclusions were made for those without reported income and without a response to the food security module (including New Brunswick and Prince Edward Island residents who were not administered the module), and territorial respondents, for whom there were confounding factors for both poverty and food insecurity.<sup>19</sup>

### Measures

To determine whether seniors' benefits/GAI improved health in eligible age groups, the health outcome measures we examined were self-reported health, self-reported mental health (excellent/very good/good versus fair/poor for each measure) and functional health, as measured by the Health Utilities Index (HUI) (mild to no disability HUI = 0.9 to 1.0 versus moderate to severe disability HUI  $\leq$  0.89, as validated by Feng et al.<sup>20</sup>). These three health measures were used to obtain a comprehensive picture of the effects of seniors' benefits/GAI on physical and mental health. Self-reported health/mental health reflects the respondent's perception of his or her health at the time of the questionnaire.<sup>21</sup> In contrast, HUI is a composite measure and describes an individual's functional health on the basis of eight attributes: vision, hearing, speech, mobility, dexterity, emotion, cognition and pain.<sup>22</sup> These measures have been validated in multiple studies as being correlated with physical health and general state of mental health, and are reliable predictors of morbidity and mortality.<sup>21,23,24</sup>

Household food insecurity, the inability to acquire food due to insufficient income,<sup>25</sup> is a consumption-based indicator of material deprivation.<sup>16</sup> As such, food insecurity was used as a general measure of deep financial need in this sample of poor individuals. Food insecurity is measured through the internationally validated Household Food Security Survey Module,<sup>26</sup> which for adults consists of 10 questions related to the inability to acquire food over the preceding 12 months because of financial constraints. Using Health Canada scoring, we dichotomized individuals as food secure or food insecure.

To demonstrate whether income source mattered to the health outcomes, we examined income source and income level. Main income source was divided into wages (includes income from employment and self-employment); Employment Insurance/Workers' Compensation/Social Assistance (because of sample size we aggregated these sources following the similar grouping employed by Statistics Canada for the public use files, and although these are unique programs, each represents conditional income sources that are intended to provide short-term financial relief to Canadians facing economic hardship);<sup>2</sup> seniors' benefits (funds obtained through the Old Age Security program, Guaranteed Income Supplement and the Canada Pension Plan/Québec Pension Plan, see Appendix A); and other income (which includes such sources as job-related retirement pensions, alimony and income from investments). Income level was divided into three categories: <\$10,000, \$10,000–14,999 and \$15,000–19,999.

### Statistical analyses

Using descriptive and analytic statistics, we compared differential rates of self-reported poor/fair health and mental health, and moderate/severe disability HUI among the four age groups of interest. Linear trend analyses were conducted to examine the association between age and the health outcomes using the Cochran-Armitage trend test for categorical variables. We also used probit regression while controlling for several covariates to model the likelihood of a respondent reporting fair/poor health and mental health, and moderate/severe HUI. Probit models for fair/poor self-reported health and mental health, and moderate/severe disability HUI were run as a function of sex, income group and income source. Because ethnicity, education and marital status are determinants of poor health and mental health,<sup>27</sup> these variables were also considered in adjusted models. Home ownership was incorporated to control for a potential confounding effect of wealth on health outcomes. The addition of ordinal age and food insecurity in our models did not change the results (data not shown). We used population and bootstrap weights as recommended by Statistics Canada. Data were analyzed using STATA 11.0 (Stata Corp, College Station, TX).

## RESULTS

Table 1 presents the summary statistics for the study population as a whole and by age group. The population-weighted proportions after all exclusions were similar for all age groups. Wages and Employment Insurance/Workers' Compensation/Social Assistance were the main income sources for most individuals between the ages of 55 and 64. For those aged 65–74, seniors' benefits/GAI were the main source of income for most individuals. The level of annual income also differed with age. For individuals over 65, the

**Table 1.** Summary statistics, Canadian Community Health Survey, cycle 5.1 (2009–2010), weighted population size approximately 369,000 (weighted population size of Health Utilities Index respondents 359,000)

	Percentage distribution (95% CI)				Overall
	By age group (years)				
	55–59	61–64	65–69	70–74	
<i>Socio-demographic variables</i>					
Age group	27.0 (23.0–31.0)	22.0 (20.0–25.0)	27.0 (24.0–29.0)	24.0 (22.0–27.0)	100.0
Sex					
Male	46.0 (38.0–54.0)	40.0 (34.0–46.0)	29.0 (24.0–33.0)	25.0 (21.0–30.0)	35.0 (32.0–38.0)
Female	54.0 (46.0–62.0)	60.0 (54.0–66.0)	71.0 (67.0–76.0)	75.0 (70.0–79.0)	65.0 (62.0–68.0)
Education					
High school	23.0 (14.0–35.0)	17.0 (13.0–21.0)	12.0 (9.0–15.0)	12.0 (9.0–15.0)	16.0 (13.0–19.0)
Any post-secondary	47.0 (39.0–55.0)	47.0 (41.0–53.0)	44.0 (39.0–49.0)	36.0 (32.0–41.0)	43.0 (40.0–46.0)
Other	30.0 (24.0–37.0)	37.0 (31.0–42.0)	45.0 (40.0–50.0)	52.0 (47.0–57.0)	41.0 (38.0–44.0)
Marital status					
Single	43.0 (34.0–52.0)	29.0 (23.0–35.0)	23.0 (19.0–28.0)	14.0 (11.0–18.0)	28.0 (24.0–31.0)
Divorced	35.0 (29.0–42.0)	42.0 (36.0–47.0)	40.0 (36.0–45.0)	27.0 (23.0–31.0)	36.0 (33.0–39.0)
Separated	13.0 (9.0–18.0)	10.0 (7.0–13.0)	6.0 (4.0–9.0)	6.0 (4.0–8.0)	9.0 (7.0–11.0)
Widowed	9.0 (6.0–12.0)	20.0 (16.0–23.0)	30.0 (26.0–35.0)	53.0 (48.0–58.0)	27.0 (25.0–30.0)
Ethnicity					
White	83.0 (69.0–92.0)	83.0 (76.0–88.0)	85.0 (80.0–89.0)	88.0 (82.0–91.0)	85.0 (81.0–88.0)
Aboriginal	4.0 (3.0–7.0)	6.0 (4.0–9.0)	3.0 (2.0–6.0)	3.0 (2.0–4.0)	4.0 (3.0–5.0)
Other	13.0 (5.0–29.0)	11.0 (7.0–19.0)	12.0 (8.0–17.0)	10.0 (6.0–15.0)	11.0 (8.0–16.0)
Home ownership					
Homeowners	24.0 (19.0–29.0)	33.0 (27.0–38.0)	34.0 (30.0–39.0)	39.0 (34.0–43.0)	32.0 (29.0–35.0)
Non-homeowners	76.0 (71.0–81.0)	67.0 (62.0–73.0)	66.0 (61.0–70.0)	61.0 (57.0–66.0)	68.0 (65.0–71.0)
<i>Income-related variables</i>					
Income group (\$ CAD/year)					
<\$10,000	35.0 (25.0–45.0)	32.0 (27.0–38.0)	8.0 (4.0–11.0)	4.0 (2.0–5.0)	19.0 (16.0–23.0)
\$10,000–\$14,999	45.0 (37.0–53.0)	38.0 (33.0–43.0)	39.0 (34.0–43.0)	33.0 (29.0–38.0)	39.0 (36.0–42.0)
\$15,000–\$19,999	20.0 (15.0–25.0)	30.0 (25.0–37.0)	53.0 (48.0–58.0)	63.0 (59.0–68.0)	42.0 (39.0–45.0)
Income source					
Wages	31.0 (21.0–42.0)	15.0 (11.0–19.0)	2.0 (1.0–3.0)	1.0 (0.2–2.0)	12.0 (9.0–16.0)
EI/WC/SA	41.0 (34.0–49.0)	35.0 (30.0–42.0)	4.0 (1.0–6.0)	3.0 (0.0–7.0)	21.0 (18.0–23.0)
Seniors' benefits	16.0 (12.0–21.0)	31.0 (26.0–35.0)	86.0 (82.0–90.0)	87.0 (82.0–92.0)	55.0 (52.0–58.0)
Other	12.0 (8.0–15.0)	19.0 (16.0–24.0)	8.0 (5.0–12.0)	9.0 (5.0–12.0)	12.0 (10.0–14.0)
Food insecurity status					
Food secure	63.0 (56.0–70.0)	69.0 (64.0–74.0)	84.0 (80.0–88.0)	88.0 (85.0–91.0)	76.0 (74.0–79.0)
Food insecure	37.0 (30.0–44.0)	31.0 (26.0–36.0)	16.0 (12.0–20.0)	12.0 (9.0–15.0)	24.0 (21.0–26.0)
<i>Health outcome variables</i>					
Self-reported health					
Excellent/very good/good	58.0 (51.0–66.0)	64.0 (58.0–68.0)	65.0 (60.0–70.0)	66.0 (61.0–71.0)	64.0 (61.0–67.0)
Fair/poor	42.0 (34.0–49.0)	36.0 (32.0–42.0)	35.0 (30.0–40.0)	34.0 (29.0–39.0)	36.0 (33.0–39.0)
Self-reported mental health					
Excellent/very good/good	76.0 (71.0–82.0)	82.0 (78.0–86.0)	90.0 (86.0–93.0)	92.0 (89.0–94.0)	85.0 (83.0–87.0)
Fair/poor	24.0 (18.0–29.0)	18.0 (14.0–22.0)	10.0 (7.0–14.0)	8.0 (6.0–11.0)	15.0 (13.0–17.0)
Health Utility Index					
0.9 to 1.0 (no-mild disability)	37.0 (30.0–45.0)	40.0 (34.0–46.0)	50.0 (45.0–55.0)	51.0 (46.0–56.0)	45.0 (42.0–48.0)
<0.89 (moderate-severe disability)	63.0 (55.0–70.0)	60.0 (54.0–66.0)	50.0 (45.0–55.0)	49.0 (44.0–54.0)	55.0 (52.0–58.0)

CI, confidence interval; CAD, Canadian dollars; EI/WC/SA, Employment Insurance/Workers' Compensation/Social Assistance.

percentage of respondents in the highest income bracket (\$15,000–19,999) was higher than for individuals in cohorts under 65 years. A similar pattern was observed for food insecurity, as individuals in the seniors' benefits/GAI age-eligible groups exhibited a lower prevalence of food insecurity than age-ineligible cohorts. Table 1 also shows that individuals 65 years and over who were age-eligible for seniors' benefits/GAI possessed better self-reported health, self-reported mental health and HUI results compared with individuals under 65 years. Specifically, the proportion of respondents with poor/fair mental health in older adults receiving seniors' benefits/GAI was half that of the younger cohorts: 8%–10% in the 65–74-year age group and 18%–24% in the 55–64-year age groups. For self-reported health, the proportion of respondents over 65 years reporting fair/poor health was slightly lower than that of younger cohorts; 34%–35% of respondents aged 65–74 years and 36%–42% of those aged 55–64 years. Functional health was slightly better in respondents over 65 years compared with the younger age groups. For instance, moderate to severe

disability was noted in 49%–50% of respondents aged 65–74 years and 60%–63% of individuals aged 55–64. Cochran-Armitage trend analysis affirmed these findings; statistically significant negative trends were observed for all health outcomes. Specifically, the slopes for increasing age and fair/poor self-reported health, mental health and moderate/severe HUI were –0.025, –0.057 and –0.051 respectively, with  $p < 0.001$  for all analyses.

Table 2 presents nine probit models for fair/poor self-reported health and mental health, and moderate/severe disability HUI run as a function of unadjusted and adjusted blocks of covariates. The unadjusted models include the basic set of income-related variables, whereas the adjusted models add a larger set of socio-demographic variables. The home ownership models allow for the consideration of the impact of wealth through home ownership. We found no direct effect of income group on the health outcomes for our study sample in any model, likely because all respondents were of low income. On the other hand, by income source, the probability of reporting fair/poor health and mental health, and

**Table 2.** Probit marginal effects for the likelihood of self-reporting fair/poor health, fair/poor mental health and moderate/severe Health Utilities Index (HUI), Canadian Community Health Survey Cycle 5.1 (2009–2010), total weighted population size 369,000 (weighted population size for HUI respondents 359,000)

	Marginal effects (standard error)								
	Fair/poor self-reported health			Fair/poor self-reported mental health			Moderate/severe disability HUI		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	Unadjusted	Adjusted	Home ownership	Unadjusted	Adjusted	Home ownership	Unadjusted	Adjusted	Home ownership
<i>Sex (Ref: Female)</i>									
Male	-0.009 (0.028)	-0.002 (0.030)	0.003 (0.030)	0.045* (0.021)	0.037 (0.023)	0.040 (0.023)	-0.050 (0.030)	-0.062 (0.032)	-0.059 (0.032)
<i>Income group (\$ CAD/year) (Ref: &lt;\$10,000)</i>									
\$10,000–\$14,999	-0.018 (0.044)	-0.032 (0.043)	-0.028 (0.043)	0.005 (0.030)	0.005 (0.003)	0.007 (0.029)	-0.028 (0.060)	-0.009 (0.052)	-0.006 (0.052)
\$15,000–\$19,999	-0.073 (0.049)	-0.085 (0.048)	-0.077 (0.048)	-0.058 (0.031)	-0.053 (0.031)	-0.047 (0.031)	-0.123 (0.063)	-0.098 (0.056)	-0.092 (0.056)
<i>Income source (Ref: Wages)</i>									
EI/WC/SA	0.482* (0.061)	0.467* (0.059)	0.455* (0.060)	0.128* (0.059)	0.119* (0.056)	0.108 (0.055)	0.216* (0.081)	0.241* (0.065)	0.232* (0.065)
Seniors' benefit	0.312* (0.054)	0.290* (0.053)	0.288* (0.053)	0.024 (0.040)	0.027 (0.038)	0.026 (0.038)	0.086 (0.075)	0.139* (0.060)	0.138* (0.060)
Other	0.341* (0.072)	0.331* (0.070)	0.341* (0.069)	0.029 (0.057)	0.035 (0.056)	0.042 (0.056)	0.092 (0.085)	0.123 (0.072)	0.131 (0.071)
<i>Ethnicity (Ref: Other)</i>									
White		0.075 (0.059)	0.078 (0.058)		-0.001 (0.039)	0.001 (0.038)		-0.122 (0.073)	-0.120 (0.073)
Aboriginal		0.178* (0.087)	0.176* (0.086)		0.011 (0.060)	0.009 (0.058)		0.063 (0.093)	0.063 (0.094)
<i>Education (Ref: Some post-secondary)</i>									
High school		-0.037 (0.04)	-0.041 (0.040)		-0.020 (0.030)	-0.023 (0.029)		0.058 (0.048)	0.053 (0.047)
Other		0.021 (0.030)	0.015 (0.029)		0.032 (0.022)	0.028 (0.021)		-0.017 (0.030)	-0.023 (0.030)
<i>Marital status (Ref: Divorced)</i>									
Single		-0.055 (0.037)	-0.056 (0.036)		-0.003 (0.025)	-0.004 (0.025)		0.025 (0.040)	0.024 (0.04)
Separated		0.061 (0.047)	0.063 (0.047)		0.067 (0.039)	0.068 (0.038)		0.019 (0.056)	0.023 (0.056)
Widowed		-0.003 (0.035)	0.016 (0.035)		-0.039 (0.023)	-0.029 (0.024)		-0.057 (0.033)	-0.042 (0.034)
<i>Home ownership (Ref: Non-homeowner)</i>									
Homeowner			-0.092 (0.026)			-0.058* (0.017)			-0.074 (0.031)

\*  $p < 0.05$ .

CAD, Canadian dollars; EI/WC/SA, Employment Insurance/Workers' Compensation/Social Assistance.

moderate/severe HUI was notably lower in seniors age-eligible for seniors' benefits/GAI compared with individuals dependent on Employment Insurance/Workers' Compensation/Social Assistance, even after adjustments. Based on differences in marginal effects, the probability of reporting fair/poor self-reported health was 16.7 percentage points lower among respondents reliant on seniors' benefits/GAI compared with the cohort whose income was derived from Employment Income/Workers' Compensation/Social Assistance ( $0.455 - 0.288 = 0.167$ , model 3). Similar calculations for the same income source comparison yielded 8.2 percentage points lower for fair/poor self-reported mental health (model 6) and 9.4 percentage points lower for moderate/severe disability (model 9).

## **DISCUSSION**

This study extends previous work on the topic of age-eligibility for seniors' benefits as a GAI exemplar and seniors' self-reported health and mental health<sup>11</sup> by adding a third health outcome, functional health. It further provides a more refined analysis with the creation of probit regression models adjusted for a variety of covariates, including ordinal age and detailed income source, which are available only through secure access to Canadian Community Health Survey microdata.

The purpose of the study was to examine physical, mental and functional health outcomes in unattached low-income seniors at various stages of eligibility for federal pensions, to simulate the effects of a GAI on health in cross-sectional panels comprising the age cohorts that precede and follow seniors' benefits/GAI eligibility. We found seniors' benefits/GAI to be an effective poverty reduction strategy, as evident by the noticeably lower prevalence of food insecurity in our group of low-income seniors, as has been previously reported.<sup>11,28</sup> We further show how poverty reduction versus poverty elimination is likely sufficient to yield health benefits, given that income from seniors' benefits (approximately \$15,600/year) is below the maximum after-tax LICO for a single individual in urban Canada in 2009 (\$18,421).<sup>18</sup> Given that income level varied with age but did not independently produce significant improvements in health outcome, it appears that other factors besides the monetary amount are important in the improved health outcomes associated with seniors' benefits/GAI. Despite this, our modelling of health gains persisted even after consideration of socio-demographic factors and homeownership as a measure of wealth.

We found that seniors' benefits/GAI functioned in a way similar to wages, as respondents reliant on these income sources possessed statistically similar probabilities of reporting fair/poor mental health. Although modest, these mental health improvements are impressive given that they are observed despite the aging process, when chronic conditions are more prevalent and burdensome.<sup>29</sup> More importantly, our results show that individuals receiving seniors' benefits/GAI performed better on all health outcomes than those with income from conditional sources such as Employment Insurance/Workers' Compensation/Social Assistance.

Nelson and Fritzell<sup>30</sup> recently published a meta-analysis of the effect of minimum income benefits on mortality, as measured by age-standardized death rates and life expectancy, from 18 countries from 1990 through 2009. For the Canadian case, minimum income included social assistance but excluded the federal Old Age

Security/Guaranteed Income Supplement. Their findings showed a robust link between minimum income benefits and improved mortality. Forget<sup>10</sup> analyzed the health administration data derived from the 1970s GAI pilot project (i.e., MINCOME) conducted in Winnipeg and Dauphin, Manitoba. During MINCOME, the hospitalization rate (specifically for injuries, accidents and mental health issues) among GAI recipients from Dauphin fell significantly, by 8.5%, compared with the control group. These results may have accrued because GAI covers the cost of basic necessities, alleviating the material deprivation of poverty, which has been repeatedly linked with poor physical and mental health.<sup>2-4</sup> GAI may also provide low-income individuals with the discretionary funds necessary to access additional health care.<sup>2</sup>

While our findings add support to these impacts, our results are novel in GAI argumentation, because we observed seniors' benefits, as a GAI exemplar, to be associated with differential health gains, particularly improved outcomes in self-reported mental health relative to the level of improvement seen in physical/functional health in this age-eligible cohort. Because seniors' benefits/GAI are a regular source of income, it likely reduces the financial stress experienced by those who live economically vulnerable lives.<sup>30</sup> The seniors' benefits/GAI amount can cover the cost of basic needs and buffer individuals from unforeseen budgetary shocks. Stress, genetic, biological and social factors are all important in the development of mental disorders such as major depression.<sup>2,31</sup>

Another pertinent finding in our study was that low-income seniors who were age-eligible for seniors' benefits/GAI as an income source achieved better health outcomes than those reliant on conditional income sources such as Employment Insurance/Workers' Compensation/Social Assistance. Because of the stringent eligibility criteria of current income assistance programs (i.e., means-tested, continual proof of eligibility), income from these sources is unreliable and insufficient to meet basic needs.<sup>2</sup> Thus, individuals dependent on these programs may experience stress brought on by stigma, marginalization and feelings of disempowerment and hopelessness, which are common experiences reported by social assistance recipients in Canada.<sup>2,32</sup> Such stressors have been demonstrated to be associated with an increased risk of mental illness and poor physical health in low-income individuals, a group already vulnerable to negative health outcomes.<sup>2,3</sup> In contrast, seniors' benefits provide not only economic stability but are also administered with fewer restrictions in Canada through the tax system, consequently reducing stress and anxiety levels. For low-income seniors, seniors' benefits/GAI may be operating directly on mental health through a reduction in stress and anxiety levels, and indirectly on physical health, as it may take longer to produce noticeable physiological changes leading to physical or functional health improvement.

Our findings are also relevant to discussions on the growing burden of chronic disease in Canada. For instance, in 1975, Canada spent 7% of its gross domestic product on health care, an amount that increased to 11% in 2015 – equivalent to \$219.1 billion or \$6,105 per person.<sup>33</sup> Chronic diseases and neuropsychiatric disorders are the two leading conditions that incur the most direct and indirect health care costs, with a combined total of \$24.6 billion in 2008.<sup>34</sup> Recent studies by Tarasuk and colleagues<sup>17</sup> and Fitzpatrick and colleagues<sup>35</sup> reiterate the high cost of poverty, particularly in the face of food insecurity, on health care utilization

and costs. Since our study demonstrates that health benefits can be achieved through seniors' benefits/GAI, we argue that such a program would not only improve the health of low-income Canadians but also reduce the high economic burden of poverty-related illnesses in the country. Moreover, the health-related savings generated from GAI may be able to offset the cost of implementing such a program, a common critique against a GAI in Canada.<sup>36</sup>

Our analysis was mainly limited by the dataset available to us – a cross-sectional national health survey restricted by the available health conditions and limited in the type of household configurations we could study, thus requiring us to focus on unattached, poor near-seniors and seniors. While our results may be most applicable to single low-income seniors, this group is highly vulnerable to poverty<sup>15</sup> and its negative health outcomes. As seniors' benefits/GAI can yield notable health improvements in this high-risk group, our findings are likely relevant to low-income Canadians who are less vulnerable to poverty.

**CONCLUSION**

Our findings suggest that a guaranteed annual income, simulated by Canadian seniors' benefits, can generate notable improvements in the physical, mental and functional health of low-income, age-eligible people. While a detailed cost-analysis of GAI is beyond the scope of this paper, we recommend consideration of health-related savings in future studies examining the projected cost of GAI in Canada.

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**APPENDIX A. Guaranteed annual income in Canada: A seniors' benefit example**

The term "guaranteed annual income" (GAI) is used interchangeably with "basic income" in Canada. While there are similarities between the two concepts, differences exist. GAI, like basic income, would function to ensure that every citizen has a pre-defined income floor. GAI, in practice, might provide income transfers to only low-income individuals and would claw back the level of benefits if non-transfer income, from sources like employment, increases. In contrast, basic income would be a universal demogrant benefit provided to every citizen regardless of income.<sup>7</sup> Thus, the GAI would be a universal entitlement to protection through an income floor, whereas basic income would be a universal entitlement to an income transfer.

In Canada, seniors 65 years and older are eligible for public pensions that are financed through the general tax revenues. The proper characterization of the Canadian seniors' benefits program is that it functions like negative income tax. Canadians aged 65 and over receive a demogrant benefit through Old Age Security (OAS) benefit. Low-income seniors (defined below) have additional income transfers from the Guaranteed Income Supplement (GIS). In general, seniors are eligible for OAS and GIS if they are Canadian citizens or legal residents and have resided in the country for a minimum of 10 years after 18 years of age. At 65 years of age and older, seniors are eligible for a full OAS pension that amounts to a maximum monthly amount of \$564.74, but the amount declines with annual incomes greater than \$118,055.<sup>37</sup> Low-income seniors are eligible for additional financial assistance through the GIS, and the amount they receive is dependent on their income and marital status. Single, widowed or divorced seniors with an annual individual income below \$17,088 can obtain a GIS payment up to \$764.40 per month.<sup>37</sup> On the basis of OAS and GIS alone, low-income single seniors 65 years of age and above can currently expect to receive a minimum annual basic income of \$15,949.68. Pension payments are evaluated each year in January to adjust for increases to the cost of living.<sup>37</sup> Because the amount provided through these seniors' benefits are contingent on the external income earned by recipients, they collectively function like a GAI.

**RÉSUMÉ**

**OBJECTIF :** On reconnaît en général que la pauvreté est l'un des grands déterminants de la santé, mais on a moins étudié l'impact de la réduction de la pauvreté sur la santé. Les demandes récentes en faveur d'un revenu annuel garanti (RAG), défini comme étant un revenu régulier offert aux citoyens par l'État peu importe leur statut d'emploi, soulèvent des questions à propos de l'impact d'une telle intervention en santé des populations par rapport à ses coûts. Notre étude visait à déterminer l'impact des prestations aux Canadiens âgés (la Sécurité de la vieillesse/le Supplément de revenu garanti, semblables à un programme de RAG) sur la santé autodéclarée, la santé mentale autodéclarée et la santé fonctionnelle des personnes âgées à faible revenu ayant l'âge d'admissibilité.

**MÉTHODE :** Nous avons utilisé l'Enquête sur la santé dans les collectivités canadiennes de 2009–2010 pour examiner les répondants adultes sans attaches ayant un revenu annuel de 20 000 \$ ou moins, stratifiés selon leur admissibilité aux prestations aux aînés/au RAG (55–64 ans : inadmissibles; 65–74 ans : admissibles). Au moyen d'une régression, nous avons évalué la santé autodéclarée, la santé mentale autodéclarée et la santé fonctionnelle, mesurées par le Health Utilities Index, en tant qu'effets dans les groupes admissibles et inadmissibles aux prestations aux aînés/au RAG.

**RÉSULTATS :** Nous avons constaté que les personnes ayant l'âge d'admissibilité aux prestations aux aînés/au RAG avaient de meilleurs résultats sanitaires que les bénéficiaires des programmes d'aide au revenu assortis de conditions. L'admissibilité aux prestations aux aînés/au RAG après l'âge de 64 ans était associée à de meilleurs résultats de santé autodéclarée, de santé fonctionnelle et de santé mentale autodéclarée, et ces effets étaient observés jusqu'à l'âge de 74 ans.

**CONCLUSION :** En ce qui concerne les prestations aux aînés, un RAG mène à une amélioration significative de la santé mentale et à une amélioration globale de la santé. Ces améliorations sont susceptibles d'entraîner des baisses des coûts des soins de santé, ce qui pourrait compenser les coûts associés à l'expansion des programmes.

**MOTS CLÉS :** santé; santé mentale; HUI; Canada; pauvreté; revenu annuel garanti; personne âgée