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Aging, social capital, and health care utilization in Canada

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Abstract: This paper examines relationships between aging, social capital, and healthcare utilization. Cross-sectional data from the 2001 Canadian Community Health Survey and the Canadian Census are used to estimate a two-part model for both GP physicians (visits) and hospitalization (annual nights) focusing on the impact of community- (CSC) and individual-level social capital (ISC). Quantile regressions were also performed for GP visits. CSC is measured using the Petris Social Capital Index (PSCI) based on employment levels in religious and community-based organizations [NAICS 813XX] and ISC is based on self-reported connectedness to community. A higher CSC/lower ISC is associated with a lower propensity for GP visits/higher propensity for hospital utilization among seniors. The part-two (intensity model) results indicated that a one standard deviation increase (0.13%) in the PSCI index leads to an overall 5% decrease in GP visits and an annual offset in Canada of approximately $225 M. The ISC impact was smaller; however, neither measure was significant in the hospital intensity models. ISC mainly impacted the lower quantiles in which there was a positive association with GP utilization, while the impact of CSC was strongest in the middle quantiles. Each form of social capital likely operates through a different mechanism: ISC perhaps serves an enabling role by improving access (e.g. transportation services), while CSC serves to obviate some physician visits that may involve counseling/caring services most important to seniors. Policy implications of these results are discussed herein.

How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness

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> necessary to him, though he derives nothing from it, except the pleasure of seeing it. . . . That we often derive sorrow from the sorrow of others, is a matter of fact too obvious to require any instances to prove it; for this sentiment, like all other original passions of human nature, is by no means confined to the virtuous and humane, though they perhaps may feel it with the most exquisite sensibility. The greatest ruffian, the most hardened violator of the laws of society, is not altogether without it.
>
> Adam Smith, *The Theory of Moral Sentiments*, Chapter 1, Part first.

Introduction

Recently, the economics literature has taken a broader population health approach to understanding the determinants of health by considering the influence of social capital in addition to determinants like income, education, employment status, and housing. Under one conception, social capital has been described as a community-level phenomenon that affects the health and health behaviours of individuals. Social capital, in this sense, is a collective resource used to achieve common goals that could not be achieved by individuals operating alone (Macinko and Starfield, 2001). Putnam (2001) for example, developed an index using per capita membership rates in voluntary organizations to measure civic participation levels and found them to be negatively associated with both adverse health behaviours and mortality (Folland, 2006).[1]

While the Putnam index measures the extent of participation or engagement in community social capital (CSC), the Petris Social Capital Index (PSCI) measures per capita employment in a range of community and social service organizations, capturing the extent of CSC infrastructure (Petris Center on Health Care Markets and Consumer Welfare, 2004). Brown *et al.* (2006) found that the proportion of the PSCI attributable to religious groups had a strong negative effect on the number of cigarettes consumed. Others have used measures of relative income inequality as a proxy for CSC and have found that higher inequality leads to worse health outcomes (Kawachi *et al.*, 1997).

Others suggest that social capital is better understood at the individual level in which people use personal social networks to strengthen social support, social influence, social engagement, and attachment (i.e., interpersonal bonding), and access to scarce resources (Portes, 1998; Berkman and Glass, 2000) The list of varied measures includes: number or presence of friends (Rose, 2000; Hyyppä and Mäki, 2001), membership in a formal or informal group (Rose, 2000; Hyyppä and Mäki, 2001), trust (Veenstra, 2000; Rose, 2000; Hyyppä and Mäki, 2001; Barefoot *et al.*, 1998), sense of control over one's life (Rose, 2000). Much evidence shows that ISC has a positive impact on

1 Folland (2006) also uses marriage rates and family size as proxies for state-level social capital.

physical and mental health (Hawe and Schiell, 2000; Kawachi *et al.*, 1997; Kawachi *et al.*, 1999; Lomas, 1998; Subramanian *et al.*, 2002).

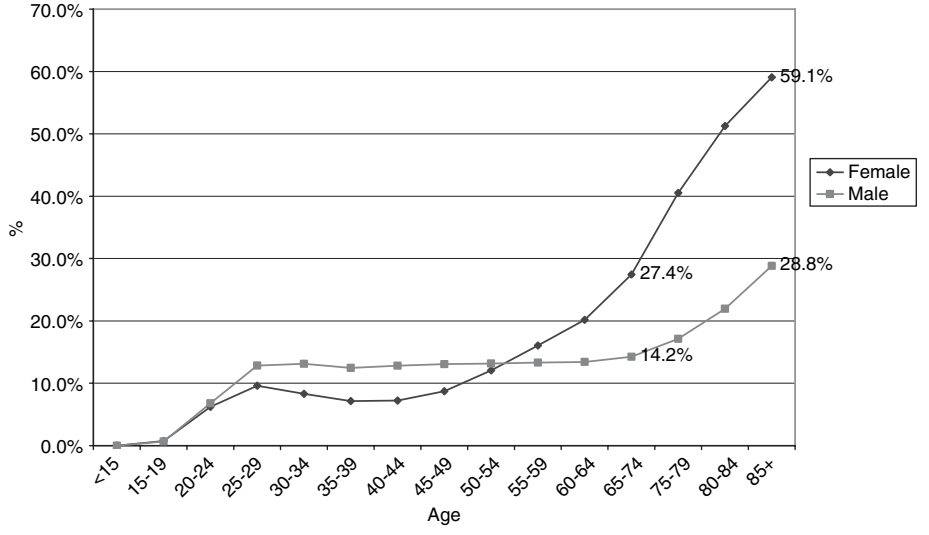
What is less evident is whether social capital has an impact on health services – an important process outcome as illustrated in Figure 2 of Richard Scheffler's introduction – since there are very few studies that consider this question (Scheffler, 2008). Individual-level social capital (ISC) in the form of neighbours and friends may improve knowledge about available health resources or increase awareness that treatment is needed (Deri, 2005; Aizer and Currie, 2004; Hendryx *et al.*, 2002). These links may also provide transportation that can increase access to the health system.[2] Increases in the supply of CSC – as measured by the PSCI – may also be associated with reduced utilization if these resources substitute for formal health services.

Most studies do not simultaneously consider the impact of ISC and CSC on health, health behaviours, or health service utilization. Some authors have constructed a CSC variable as an aggregation of individual social capital values (see Poortigna, 2006, for example). In such instances, CSC may appear insignificant alongside ISC since the former is derived from the latter. Moreover, a measure of CSC must not assume that the average person's ISC applies to the entire population (i.e., fallacy of composition). Berkman *et al.* (2000) and Veenstra *et al.* (2005) explore the ways in which health, health care utilization, and social capital (particularly ISC) interact, and suggest that social networks may influence the health of members through physiologic pathways like health behaviours that are partially influenced by health care access and utilization. However, the reverse could hold. The direct impact of social capital on health may also have an effect on health care utilization.

Another element that has not been fully explored is the interaction between age and social capital. One reason to think that the effect of social capital, at whatever level, may differ by age group is that seniors may be more likely to live alone. Presumably, the importance of interactions between individuals and community resources becomes more paramount for health the more isolated the living situation. Those living alone may be at greater risk for poor physical and mental health because the support of an immediate family structure may be missing. This may occur at various stages of life: examples include early adulthood, when a person first leaves their original family unit, and later life, when children leave home and/or a spouse becomes ill or dies. According to the 1971 Canadian Census, the average household size was 3.7. This average declines to 3.0 by 2006 with over 26% of households – one-third of them seniors – containing an individual living alone. Further, lone-person households increased by approximately 25% from 1996 to 2006 (Statistics Canada, 1971–2006; Canadian Community Health Survey 1.1, 2000–2001). As can be seen in Figure 1, there

2 Deri (2005) cautions that greater social capital may lead to decreased utilization if reliance on the formal health care system is not part of the norms of ones social network.

Figure 1. Persons living alone by sex: Canada, 2006



Source: Statistics Canada, Census of Population, 2006

is a strong age–sex gradient with females more likely than males to live alone at older ages.

While isolation may occur at all ages, there is particular concern about the health risks of social isolation among seniors (Abbott and Sapsford, 2005). A growing segment of the population, seniors may therefore be able to benefit more from the presence of social capital than others (Marziali and Donahue, 2001). Consequently, it is important to understand the implications of social capital for health care utilization both as populations age and as social norms shift away from reliance on extended family in most developed countries.

In this paper, CSC is measured by the PSCI and ISC is measured through a survey-derived perception of attachment to community. The aim is twofold: first, to determine whether CSC influences health care utilization independently and in the same direction as ISC and, second, to determine whether the impact of social capital on utilization differs by age group. These relationships are examined using data from Canada – an optimal laboratory in which to examine these effects since there is no cost sharing at point of service within its national health system. Hence, a major financial barrier to seeking care is removed allowing for a clearer determination of the effects of social capital on utilization.

Data sources

The Canadian Community Health Survey (CCHS) is a cross-sectional survey produced by Statistics Canada of 133,300 individuals across Canada.

The CCHS targets persons aged 12 years or older who live in private dwellings in the ten provinces and the three territories.[3] For this study, data from the first wave (1.1) (2000–2001) are used because they contain the most extensive information on social capital. CCHS sampling master weights were used to simulate results at the population level.

The survey includes data on the economic, social, demographic, occupational, and environmental correlates of health. This includes information regarding age, gender, income, labour force participation, education, living arrangements, drinking and smoking habits, nutrition, health status, health care access, and health care utilization (GP physician visits and number of annual nights as a hospital inpatient). GP visits were the primary measure of utilization because they are driven by both patient choice (behavioural factors) and biomedical factors (illness/physician clinical judgment). Specialist visits were excluded because GPs function as gatekeepers to such services in Canada, impeding the contribution of social capital – or lack thereof – toward initiating specialist utilization as sometimes happens with GP services.

Since the number of nights as a hospital inpatient are mainly driven by biomedical factors and therefore less likely to be impacted by social capital than physician visits, this measure of utilization is used only to reinforce the results obtained regarding GP visits. Moreover, the sample size was small ($< 10\%$ registered hospital inpatient stays), and the question on hospital utilization focused on the aggregate number of annual nights rather than the more classic measure of length-of-stay.

Individual social capital (ISC) was measured by responses to the question: 'How would you describe your sense of belonging to your local community?' Survey participants could answer: A – very strong, B – somewhat strong, C – somewhat weak, D – very weak, E – don't know, F – refusal, and G – not stated. There were a total of 121,697 respondents in the foregoing analysis who answered one of the choices A through D.

To measure community social capital (CSC), the PSCI is employed. This validated index uses the percentage employed in religious and community-based organizations within a defined geographic area to measure supply-side community-level social capital (Brown *et al.*, 2006).[4] Data were obtained on paid employment in these organizations (North American Industry Classification System [NAICS] codes: 8131–8139) from the 20% of the population asked to

3 Persons living on Indian Reserves or Crown lands, residents of institutions, full-time members of the Canadian Armed Forces, and residents of certain remote regions are excluded from this survey.

4 We used a variant of this index that models employment in these organizations as a percent of the full-time equivalent employed population age > 15 rather than as a percent of the total population – as used in Brown *et al.* (2006) – to avoid bias from varying economic conditions across the country. In our formulation, local economic conditions will similarly impact the numerator and denominator of the proportion, whereas, in the original formulation, the numerator is solely impacted.

complete the long form of the 2001 Canadian Census. The categories of organizations used in constructing the PSCI include:

8131: Religious organizations
8132: Grant-making and giving organizations
8133: Social advocacy organizations
8134: Civic and social organizations
8139: Business, professional, labour and other membership organizations

The CCHS and Census data were merged based on the sole geographical variable, Census Metropolitan Area (CMA), shared between the two datasets. (There are 25 CMAs across Canada.) Since not all respondents lived in a CMA, there was substantial loss in the sample size from the merging process with the census data as well as from the elimination of observations with missing responses for the survey questions used in the analysis. The CCHS over-sampled residents in rural areas to ensure sufficient coverage of the vast geography of the country; therefore, only 49,480 of the 133,300 CCHS respondents (37.1%, which, when weighted, corresponds to 75% of the population) resided in census metropolitan areas – the common geographical designation between the two datasets. Missing data on income eliminated another 4,613, individual social capital eliminated 3,329, and various other right-hand side variables eliminated 2,183 more observations. The final sample size was 39,355 across all provinces with the exception of Prince Edward Island – the only province without a municipality meeting the criteria for a Census Metropolitan Area.

Methods

The analysis was structured as a two-part model (Greene, 2003). First, the probability of visiting a physician (GP) was estimated using a probit equation. Second, service intensity (number of GP visits in the last 12 months) was modeled separately, using ordinary least squares regression with a Heckman correction for clustering of errors within each of the CMAs (Cluster Error Correction OLS or CEC-OLS) (Greene, 2003). Since these data were skewed, service intensity was log transformed.

In addition to ISC and CSC, the explanatory variables included age (age <45, age 45–64, age 65, and over), sex, diet, education, income (household and CMA), home ownership, labour force participation, living arrangements (e.g., living alone, with others, common law/married), health status (number of chronic health conditions), immigrant status, region, urban location, having a regular GP and degree of migration within a CMA. Behavioural risk factors (e.g., smoking, alcohol consumption) were also included since they have been found to influence utilization of physician services (Sturm, 2002). ISC and CSC were also interacted with the age categories to determine whether the

impact of social capital differed by age while holding health status and the other explanatory variables constant.[5]

Quantile regression – a semi-parametric method – was also applied to GP physician utilization allowing for the analysis of these data without imposing a distribution (Winkelmann, 2006). This approach enabled us to determine if changes in any of the explanatory variables affected the shape of the distribution around the conditional mean. Specifically, we examined whether the impact of social capital differed between those with high and low numbers of GP visits. The 'jittering' technique[6] was used to adapt quantile regression to count data permitting examination of lower-end quantiles with large numbers of observations with no observed physician visits (Machado and Santos Silva, 2002). Statistical analyses were performed using SAS v9.1 and STATA v8.0.

It should be noted that the results from the CEC-OLS and the quantile regression are not strictly comparable. The quantile approach used the entire distribution, whereas the second stage CEC-OLS equation excluded those without any GP visits. To see the implication of this, consider the case of a mean-preserving spread (e.g. increasing the proportion of the distribution in the top quantile and in the bottom quantile by amounts that leave the average (mean) of the distribution unchanged). Since the quantile regression includes the entire distribution, the measure of the central tendency of the distribution will not change. Because, in the truncated distribution, the proportion of observations in the upper tail will have increased but the extra observations moved into the bottom tail will drop out, the mean of the truncated distribution will increase. In the regression context, it would then be possible to find a variable that increases the mean of the truncated distribution (CEC-OLS) and has no effect on the mid-point of the full distribution (quantile).

Results

As Table 1 indicates, the survey sample is reflective of the age distribution of the entire population with age $< 45 = 58.9\%$, age 45–64 $= 28.1\%$, and age $65 = 13.0\%$ of the total. A majority (56.8%) had post-secondary education and owned their own dwelling (65.8%). The vast majority of people (79.7%) were married or in a common-law relationship. Approximately 26.8% were

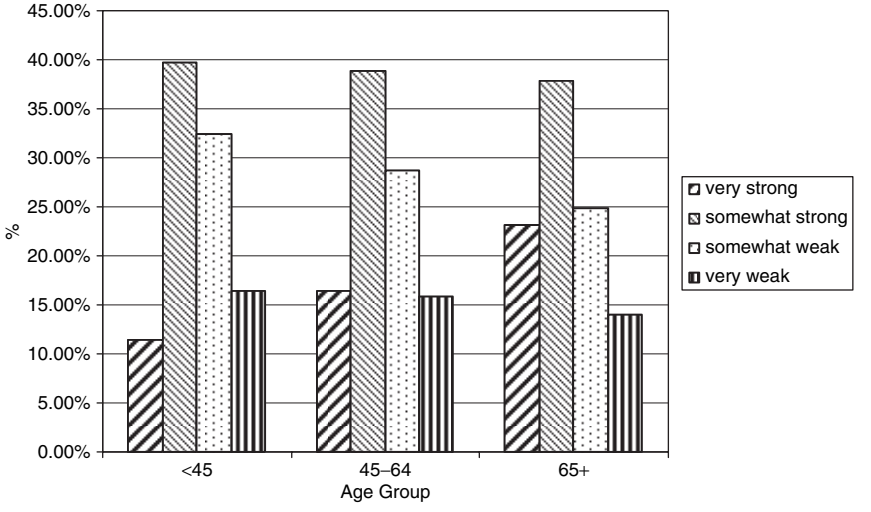
5 As per Ai and Norton (2003), we have reported the marginal effects rather than the log odds and used their method for calculating the marginal effects for the interaction terms. The magnitude and significance of the interaction terms will vary depending on the value of the probit. Unlike the marginal effects of single variables, the marginal effects associated with interaction terms have the largest magnitude and are more statistically significant at probit values far from 0.5. Further, the sign of the marginal effect for interaction terms can also vary widely for each observation, leading to some uncertainty in interpretation.

6 In part, this procedure involves applying a normally distributed random error term to the dependent variable.

Table 1. Descriptive statistics (weighted data)

	n	Mean/%	St dev	5%	95%	99%
Physician visits (annual)	39,355	3.3	6.1	0	12	24
Has a regular family physician	39,355	82.6%				
Hospital nights (annual)	39,355	0.6	5.4	0	2	14
Daily servings of fruits/ vegetables	39,355	4.8	2.8	1.5	9.6	14
Age	39,355					
Age < 45		58.9%				
45 – 64		28.1%				
65+		13.0%				
# of chronic conditions	39,355	1.8	6.35	0	5	8
Mobility (last 5 years)	39,355	44.7%	3.7%	37.1%	48.3%	54.6%
Income	39,355	30,551	34,117	0	80,000	150,000
Employed full time-past year	39,355	54.9%				
Education	39,355					
< secondary school		24.5%				
secondary school graduation		18.7%				
post secondary		56.8%				
CMA avg. income	39,355	$25,879	$2,870	$21,598	$30,725	$30,725
Own dwelling	39,355	65.8%				
Community Social Capital (PSCI)	39,355	1.12%	0.13%	0.98%	1.42%	1.49%
Individual Social Capital/ Community connection	39,355					
very strong		14.4%				
somewhat strong		39.2%				
somewhat weak		30.4%				
very weak		16.0%				
Behaviours	39,355					
Daily drinker		6.4%				
Smoking						
Daily smoker		20.5%				
Occasional smoker		4.8%				
Former smoker		36.7%				
Never smoker		38.0%				
Living arrangements	39,355					
Living alone		14.5%				
Unattached living with others		5.8%				
Married/common law		79.7%				
Immigrated to Canada	39,355	26.8%				
Urban dweller	39,355	93.9%				

Figure 2. Individual social capital by age group (level of self-reported connection to local community)



immigrants and 82.6% reported having a regular GP. In terms of health behaviours, 20.5% were daily smokers and 36.7% were former smokers. Approximately 6.4% reported that they were daily drinkers. Less than 10% of the sample registered an overnight stay in hospital and the average number of annual GP visits was 3.3 with a maximum in excess of 24 visits. The average value of the PSCI was 1.12%.

The distribution of the ISC variable by age group is depicted in Figure 2. The gradient strongly suggests that current seniors have much stronger ISC than the generations following them. Over 23% of seniors report having very strong community connections, while less than 17% of those age 45–64 and less than 12% of those < 45 reported likewise. The opposite age-based gradient is observed with the other levels of ISC reported.

Propensity and intensity of GP visits

The probit and CEC-OLS regressions for physician visits and hospital nights were estimated both with and without the ISC variables included to establish whether the inclusion of ISC added new information to the models and/or confounded the effects of CSC. Since the exclusion of ISC did not impact the magnitude or significance of the other variables, only the full model results are shown in Table 2.

The results indicate that seniors are more likely (12%) than younger cohorts to visit a GP, although this effect is mitigated by increased CSC/PSCI (3% less likely for 1% increase in PSCI). The observed effect of CSC/PSCI on younger cohorts is the reverse with positive associations between CSC and GP visits.

Table 2. Two-part regression results for annual GP visits and hospital nights

	GP phys. visits/yr Propensity (marginal effects) (Probit) $n = 39{,}355$	Hosp. nights/yr (marginal effects) (Probit) $n = 39{,}355$	log (GP phys. visits/yr.) Intensity (CEC-OLS) $n = 31{,}652$	log (Hosp. nights/yr) Intensity (CEC-OLS) $n = 3{,}236$
Variable	*dy/dx*	*dy/dx*	β	β
Intercept	0.81***	0.07***	2.31***	4.30
Age < 45	–0.12***	–0.03***	–0.54***	0.13
Age 45–64	–0.12***	0.004	–0.28**	0.51
Male	–0.09***	–0.02***	–0.09***	0.56
Live with others? (Yes = 1)	–0.02***	–0.01***	0.03	0.26
Married/Common law? (Yes = 1)	0.01***	0.01***	–0.01	–0.35
Education = HS grad.	–0.01***	–0.003***	–0.06***	0.09
Education post-secondary	–0.003***	–0.001***	–0.11***	0.03
Full-time employment	–0.02***	–0.05***	–0.17***	0.65
(log) Household income	0.004***	0.002***	0.01***	–0.03
(log) CMA avg. income	0.11***	–0.05***	–0.03	0.29
Own place of residence?	–0.01***	–0.02***	–0.10***	0.33
Immigrant	–0.02***	–0.003***	0.08***	–0.01
Drinks daily? (Yes = 1)	–0.01***	–0.02***	–0.11***	0.40
Daily smoker? (Yes = 1)	–0.02***	0.02***	0.12***	–0.32
Occasional smoker? (Yes = 1)	0.01***	–0.006***	0.02	0.09
Former smoker? (Yes = 1)	0.02***	0.01***	0.03***	–0.20
Fruits/veg. daily servings	0.001***	0.001***	0.003*	–0.01
Newfoundland and Labrador	0.06***	–0.01***	0.03	0.37
New Brunswick	0.04***	–0.01***	–0.05	0.31
Alberta	0.03***	0.002***	0.11***	–0.14
Saskatchewan	0.06***	0.03***	0.03	–0.61
British Columbia	0.01***	0.002***	0.15***	–0.06
Manitoba	–0.02***	0.004***	–0.001	0.01
Quebec	–0.03***	0.01***	–0.18***	–0.51
Nova Scotia	–0.002*	–0.01***	0.07**	0.11
Urban	0.01***	–0.01***	0.03	0.17
% of pop. new in last 5 yrs.	–0.01**	–0.02***	–0.66***	1.13
Has family doctor? (Yes = 1)	0.26***	0.03***	–0.01	–0.75
PSCI (reference age 65+)	**–0.03*** **	**0.002*** **	**–0.25*** **	**0.29**
PSCI x age < 45	**0.05*** **	**0.01*** **	**0.32*** **	**–0.22**
PSCI x age 45–64	**0.06*** **	**–0.03*** **	**0.15**	**–0.15**
Belong-v. strong (ref. age 65+)	**0.01*** **	**–0.01*** **	**–0.10*** **	**0.17**
Belong-strong (ref. age 65+)	**0.01*** **	**–0.02*** **	**–0.10*** **	**0.23**
Belong-weak (ref. age 65+)	**–0.02*** **	**–0.01*** **	**–0.04**	**0.13**
Belong-v. strong x age < 45	**–0.04*** **	**–0.01*** **	**–0.001**	**0.27**
Belong-strong s age < 45	**–0.02*** **	**0.01*** **	**0.05**	**–0.10**
Belong-weak x age < 45	**0.01*** **	**0.003*** **	**0.001**	**–0.02**

Table 2. Continued

Variable	GP phys. visits/yr Propensity (marginal effects) (Probit) $n = 39{,}355$ *dy/dx*	Hosp. nights/yr (marginal effects) (Probit) $n = 39{,}355$ *dy/dx*	log (GP phys. visits/yr.) Intensity (CEC-OLS) $n = 31{,}652$ β	log (Hosp. nights/yr) Intensity (CEC-OLS) $n = 3{,}236$ β
Belong-v.strong x age 45–64	**–0.03*** **	**0.001**	**0.09***	**0.001**
Belong-strong x age 45–64	**–0.002**	**0.01*** **	**0.03**	**–0.13**
Belong-weak x age 45–64	**0.01*** **	**–0.004*** **	**–0.03**	**0.08**
# of chronic conditions	0.002***	0.001***	0.01***	–0.01
Mills ratio			–0.51***	–3.45

Notes: ***significant at the 1% level, **significant at the 5% level, *significant at the 10% level.

Log likelihood	Log likelihood	R-sqr adj.	R-sqr adj.
–5910246.0 $p < 0.01$	–3230397.3 $p < 0.01$ 0.09	$p (> F) < 0.01$	0.13 $p (> F) < 0.01$

The effects for ISC were generally opposite and smaller in magnitude to those for CSC with seniors experiencing more physician visits, while younger cohorts experienced fewer visits in response to increased ISC.

Regarding other effects, higher education was associated with a slightly decreased likelihood of a visit, while higher household income and average community (CMA) income were associated with an increased likelihood. It is interesting to note that home ownership, a proxy for wealth, had the opposite effect to the income variables. Also, working full-time was negatively related to the probability of a visit.

The effects with regard to hospital nights were generally smaller in magnitude and in the same direction as those noted for visits with the notable exception of CMA average income and the social capital variables. Given that it is unknown whether a survey responder's aggregate hospital nights are referring to one or several hospital stays, it is difficult to definitively interpret the impact of these variables on hospital inpatient utilization.

A number of variables were included to capture differential access to GPs. Not surprisingly, those who indicated having a regular GP were more likely to have at least one visit (26% more likely than those without a regular GP). Higher average CMA income was positively related to likelihood of visits, perhaps reflecting greater supply of physicians in wealthier communities. Despite controlling for differential access and health status, immigrants were still less likely to visit a GP, possibly reflecting the delay newcomers face in finding a GP.

Regarding the intensity (CEC-OLS) equations, much the same relationship was observed between the explanatory variables and the number of GP visits

as in the propensity models. One exception involved immigrants who were less likely to initiate a GP visit than non-immigrants, even though there were more visits among those who utilized physician services. A one standard deviation increase in the PSCI (0.13%) is association with a 3.25% (=–0.25* 0.13) decrease in physician visits among seniors with a small net increase responding to age <45 (0.93% = 0.13*[–0.25 + 0.32]). Given that seniors account for 23.3% of primary care visits but only comprise 14.8% of the population, the overall decrease in physician visits from a one standard deviation increase in the value of the PSCI is approximately 5% or a $225 M annual offset (NPDB, 2001).[7] Likewise, those over age 65 with the strongest ISC had 1.3% (=–0.10*0.13) fewer physician visits compared to those reporting the weakest levels of ISC while no significant effects were noted for younger cohorts. It should be noted that both forms of social capital had no significant effects on the number of hospital nights.

A selection effect was also found as evidenced by the significance of the Inverse Mills Ratio in the CEC-OLS equation for GP physician visits.

Quantile regression

Table 3 reports the coefficient estimates for six different quantiles. CSC reduced seniors' GP utilization at the median and 70th quantiles – as well as at the 40th and 60th quantiles (not shown). The results suggest that the effect of the PSCI may be most prominent in the mid-range of utilization – those with three to five GP visits per year. Again, the effect of changes in the PSCI on younger age groups (under 45 and 45–64) was minimal.

ISC increased seniors' GP utilization, but the effects were both smaller and largely concentrated at the lower end of the utilization distribution. However, there was one quantile (the 70th) that showed a reverse effect. This result is important because it helps to indicate that the negative association between ISC and GP visits noted in the intensity models in Table 3 is not uniformly observed throughout all quantiles.

Discussion

Social capital had a noteworthy impact upon utilization of GP services but less so regarding hospitalization. The results suggested that greater CSC decreased the likelihood and number of visits for seniors, while the effects of ISC were both smaller and more ambiguous than those for CSC. While CSC had the largest impact on seniors in the mid-range of utilization – three to five GP visits per

7 There are approximately 27 M Canadians over the age of 15 (corresponding to CCHS sample) with an average of 3.3 annual GP physician visits (89 million annual visits). Assuming that the average GP visit costs approximately $50, a 5% reduction in overall visits leads to an annual offset of approximately $225 M.

Table 3. Quantile regression results for GP visits

	10th quantile (Pseudo R2 = 0.03***)	20th quantile (Pseudo R2 = 0.04***)	30th quantile (Pseudo R2 = 0.05***)	50th quantile (Pseudo R2 = 0.05***)	70th quantile (Pseudo R2 = 0.07***)	90th quantile (Pseudo R2 = 0.11***)
	Dependent variable: log(GP visits) n = 39,355					
Variable	β	β	β	β	β	β
Intercept	–0.95	–1.22	0.41	1.05	3.67	9.37
Age < 45	–0.47***	–0.73***	–1.17***	–2.27***	–3.12***	– 2.57
Age 45–64	–0.53***	–0.56***	–1.03***	–1.87***	–2.22***	1.33
Male	–0.25***	–0.29***	–0.38***	–0.53***	–0.78***	–1.32***
Live with others? (Yes = 1)	–0.07*	–0.02	–0.02	–0.12*	–0.12	0.17
Married/common law-Yes = 1	0.02	0.02	0.02	0.02	0.07	0.16
Education = HS grad.	0.01	0.02	–0.06**	–0.11***	–0.24***	–0.40**
Education post-secondary	0.06***	0.05**	–0.03	–0.10***	–0.23***	–0.78***
Full-time employment	–0.08***	–0.12***	–0.19***	–0.37***	–0.77***	–2.03***
(log) Household income	0.01***	0.02***	0.02***	0.03***	0.05***	0.17***
(log) CMA avg. income	0.15	0.22*	0.12	0.28	0.26	–0.15
Own place of residence?	–0.06***	–0.08***	–0.12***	–0.28***	–0.41***	–1.19***
Immigrant	–0.04**	–0.01	0.02	0.04	0.12**	0.29**
Drinks daily? (Yes = 1)	–0.03	–0.06*	–0.09***	–0.24***	–0.32***	–0.75***
Daily smoker? (Yes = 1)	–0.03	–0.002	0.04*	0.15***	0.36***	1.08***
Occasional smoker? (Yes = 1)	0.05	0.04	0.06	0.11*	0.14	0.21
Former smoker? (Yes = 1)	0.07***	0.08***	0.12***	0.20***	0.26***	0.40***
Fruits/veg. daily servings	0.004	0.01**	0.003	0.01**	0.02***	0.05**
Newfoundland and Labrador	0.19***	0.33***	0.31***	0.31***	0.64***	1.23***
New Brunswick	0.13*	0.25***	0.19**	0.09	0.10	–0.40
Alberta	0.05	0.08*	0.09**	0.22***	0.37***	0.56*
Saskatchewan	0.16***	0.24***	0.23***	0.35***	0.38***	0.86**
British Columbia	0.01	0.08***	0.15***	0.31***	0.64***	1.32***
Manitoba	0.02	–0.03	–0.09**	–0.15**	–0.21**	–0.67**
Quebec	–0.06**	–0.11***	–0.19***	–0.41***	–0.74***	–1.55***
Nova Scotia	–0.04	0.03	–0.004	0.13	0.32***	0.24

Table 3. Continued

	10th quantile (Pseudo R2 = 0.03***)	20th quantile (Pseudo R2 = 0.04***)	30th quantile (Pseudo R2 = 0.05***)	50th quantile (Pseudo R2 = 0.05***)	70th quantile (Pseudo R2 = 0.07***)	90th quantile (Pseudo R2 = 0.11***)
	Dependent variable: log(GP visits) n = 39,355					
Variable	β	β	β	β	β	β
Urban	0.07**	0.08***	0.09***	0.09*	0.11	0.28
% of pop. new in last 5 yrs.	0.40	0.32	0.74*	–0.26	–1.17	–1.21
Has family doctor? (Yes = 1)	0.42***	0.66***	0.85***	1.07***	1.29***	2.27***
PSCI (reference age 65+)	**–0.26****	**–0.34*****	**–0.61*****	–1.06***	**–1.60*****	**–0.78**
PSCI x age < 45	**0.24***	**0.32****	**0.64*****	**1.17*****	**1.87*****	**1.80***
PSCI x age 45–64	**0.30****	**0.26***	**0.59*****	**0.98*****	**1.38*****	**–0.95**
Belong-v. strong (ref. age 65+)	**0.16*****	**0.17*****	**0.15****	**–0.10**	**–0.51*****	**–0.34**
Belong-strong (ref. age 65+)	**0.16*****	**0.15*****	**0.15****	**–0.12**	**–0.52*****	**–1.15*****
Belong-weak (ref. age 65+)	**0.05**	**0.07**	**0.17****	**0.08**	**–0.09****	**–0.29**
Belong-v. strong x age < 45	**–0.22*****	**–0.19*****	**–0.26*****	**–0.10**	**–0.03**	**–0.55**
Belong-strong s age < 45	**–0.20*****	**–0.18******	**–0.20*****	**0.02**	**0.26**	**0.57**
Belong-weak x age < 45	**–0.12***	**–0.11**	**–0.22*****	**–0.15**	**–0.13**	**–0.26**
Belong-v.strong x age 45–64	**–0.12**	**–0.17****	**–0.08**	**0.04**	**0.12**	**–1.01**
Belong-strong x age 45–64	**–0.08**	**–0.08**	**–0.13**	**0.10**	**0.16**	**–0.33**
Belong-weak x age 45–64	**0.03**	**–0.02**	**–0.17***	**–0.15**	**–0.23**	**–0.87**
# of chronic conditions	0.01***	0.01***	0.03***	0.08***	0.20***	0.80***

Notes: ***significant at the 1% level, ** significant at the 5% level, *significant at the 10% level.

year – ISC increased utilization among the lowest utilizers of GP services, while decreasing it among those at the 70th quantile. One possible interpretation is that having a network of friends and family assists mostly by arranging/encouraging the first few visits with a GP, but that at higher levels it is possible that ISC helps to avoid the need for further GP visits. That neither form of SC impacted upon the high end of the utilization distribution supports the contention that the highest levels of utilization are driven primarily by health status

and that, amongst people with low utilization, there is a significant proportion that are either healthy or are in need of some personal assistance in establishing initial GP contact. One key 'non-finding' was that living alone, in itself, is not determinative of GP utilization at any age since interactions between living alone and the age-group variables were insignificant and hence were left out of the models. In general, the issue of social isolation and health care utilization is more complex than simply considering one's residential situation.

These findings are not necessarily contradictory since each form of social capital probably operates through different mechanisms: ISC perhaps serves an enabling (complementary) role by improving access (e.g. transportation services) among low utilizers, while CSC might serve as a substitute for GP visits that might involve counseling/caring services. Regarding hospital services, the impact of CSC on the propensity to use such services – though statistically significant – was smaller than for GP services and the impact of ISC was also small though opposite in sign to that noted for GP services. Not surprisingly, social capital had little noticeable impact on the intensity of hospital utilization since hospital length of stay is mostly dependent on clinical judgment rather than behavioural and social capital factors. Future qualitative research is needed to better understand the precise mechanisms by which ISC and CSC impact utilization.

Since the PSCI measures employment in charitable, non-profit and social service sectors, it captures the structural aspects of social capital (Petris Center on Health Care Markets and Consumer Welfare, 2004). Therefore, it seems reasonable that more structural CSC would act to reduce the need for primary care. For example, 'Meals-on-Wheels' programs, by keeping seniors properly fed may improve or maintain their health and reduce their need for GP visits. However, it is possible that the coefficients on the PSCI may have been affected by selectivity bias if relatively ill people move to an area with high CSC. Health status (number of chronic conditions) was therefore included to addresses this concern.

ISC may operate via networks of friends and family. These networks ensure that an individual receives medical attention when necessary and may even provide transportation to access health services. Unfortunately, the CCHS questionnaire did not define 'community' so it is not possible to be definitive. Moreover, there is a possibility that the ISC measure may be endogenous. That is, an individual that visits a GP frequently may, as a result, have an increased sense of community attachment. To refute this, the quantile regressions show that ISC is more consistently significant at the low end of utilization rather than at the upper end of the distribution. If more frequent GP visits raised the stock of ISC, then one would expect the impact of ISC to increase with utilization not lessen as these results indicate. To be cautious given the lack of a suitable instrument, a variable indicating good access to a GP was included in the models to control for potential endogeneity from the direct

effect of health care utilization on social capital. Regarding whether there were still indirect endogenous effects through health, the health status variable involving the number of chronic conditions was removed to determine whether the social capital variables were impacted. Confounding would be expected if such endogeneity exists, but given there were no noticeable changes, this possibility is minimized. Further, given that health status is a stock variable accumulated over time, the direction of causality is thereby better determined in this cross-sectional data.

The finding that higher education is associated with a slightly decreased likelihood of a visit supports Grossman's argument that more educated people are more efficient producers of health and therefore require fewer visits ceteris paribus (Grossman, 1972). The positive relationship between household income and likelihood of a visit suggests that visits are viewed as a normal good consistent with the findings of van Doorslaer *et al.* (2004). However, home ownership, a proxy for wealth, was negatively related to likelihood of a visit. Also, working full-time was negatively related to the probability of a visit, suggesting that there was perhaps a higher opportunity cost associated with physician visits among these workers.

With regard to policy concerns, governments may consider a number of options in response to the results contained herein. While the tendency has been for increased funding of home care and institutional care in Western societies over the last number of years, it might be time to reconsider support for community-based programs targeting seniors and informal care providers to support 'ageing in place'. Many social problems become medicalized and, as these results imply, substantial improvements in utilization – in terms of both access and over-utilization – could be attained without relying on the medical community. Recognition that community-based programs and informal care providers constitute an important part of the health care continuum will help to deal with the impending burdens on health care systems dealing with an increasingly aged population in the coming years. Recently, many jurisdictions have sought to make health care provision more flexible by increasing choice among alternative providers. Cash-benefit programmes have been developed in various European countries in the form of personal budgets, consumer-directed employment of caregivers, and direct payments to caregivers or care recipients (Glendinning *et al.*, 2004). There are also tax breaks for informal care providers and community-based organizations as an incentive to locate in certain underserved areas – akin to free-enterprise zones – as available policy options. As well, improved navigation tools, such as '211' telephone numbers introduced in Toronto, will help to make better use of whatever supply of services is currently available.

This paper began with a question as to whether social capital had a differential impact by age group. The results suggested that social capital mattered more for seniors within the mid-range of GP utilization. This may simply be a cohort effect

if older people are part of a generation that had a stronger sense of volunteerism or community as compared to younger cohorts. Alternatively, older people may actually benefit more from both social networks and the types of services represented in the PSCI. What is of utmost concern, however, is the age gradient observed in Figure 2 in which younger cohorts appear less connected to their community than do the current lot of seniors. With the impending retirement of the much larger baby boom generation, the implication of lower levels of ISC among younger cohorts on future health care utilization cannot be ignored. Replication of the current analysis on subsequent years of data might provide further insight as to whether larger amounts of ISC are acquired at older ages or whether there are true differences between the generations in this regard.

It appears that social capital is an important factor affecting not only health, but that it has an impact earlier in the process-at the level of service utilization. This relationship was evident in cross-section and future research should assess whether it holds over time.

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