The effect of social capital on the use of general practitioners: A comparison of immigrants and non-immigrants in Ontario

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Abstract

Social capital, a resource arising from the social interaction between individuals, may be a determinant of medical care use. This study used a lagged model to explore the interaction between community and individual level social capital and immigrant status on the propensity and frequency of physician visits. The results showed that community social capital, as measured by the Petris Social Capital Index, was not significant in any of the analyses.. However, a sense of belonging to the local community tended to decrease the number of doctor visits made by immigrants and tangible social support increased and affection decreased the frequency of GP consultations of non-immigrants. Further research is required to determine which types of social capital affect utilization of different health services. These findings also highlight the importance of being aware of potential interactions between the formal and informal components of the health care system.

The effect of social capital on the use of general practitioners: A comparison of immigrants and non-immigrants in Ontario Current health services utilization research has shifted to an exploration of social determinants of health, such as social capital. Social capital is a resource found in the relations between individuals and within the community that can generate positive externalities. Social capital is a resource found in the relations between individuals and within the community that can generate positive externalities. Social capital can be conceptualized as a property of individual relationships and/or community networks. Individual social capital (ISC) can be defined as the *level* of trust, networking, or cooperation that an individual has with the larger society, whereas community social capital (CSC) is the *density* of trust, networks, or cooperation within a given society (emphasis in the original) (Brown et al. 2006). Sources of social capital include social networks and religious and community organizations (Miltiades and Wu 2007; Brown et al. 2006; Putnam 2000). Social capital is theorized to affect health services utilization by providing information about the health care system, enabling access to the health care system, and substituting for formal health care (Deri 2004; Miltiades and Wu 2007; Aroian et al. 2001; Viladrich 2005; Devillanova 2006; Laporte et al. 2008; Mellor and Milyo 2005).

Social capital may also have a differential effect on immigrants' utilization of health care services when compared with native-born individuals. The provision of information about the health care system has been identified by researchers as perhaps the most important function of social capital in enabling access and utilization of health care services for immigrants (Aroian et al. 2001; Kao 2004; Bhattacharya 2005; Mellor & Milyo 2005; Viladrich 2005; Devillanova 2008). Leclere et al. (1994) find that the family, as perhaps the primary source of social capital for immigrants, plays an important role in how and when individuals seek formal health care by facilitating access and serving as a substitute for formal care. Neighbors and friends who are part of the same ethno-cultural group are also instrumental in influencing health services utilization decisions. Deri (2005) suggests that if formal health care is not part of the norms of one's social network, more social capital may lead to decreased utilization of formal health care; this may be particularly true for immigrants who have strong beliefs in the superiority of traditional medicine (Ma 1999). Leduc and Proulx (2004) state that a high concentration of immigrants in the neighborhood allows for many opportunities to communicate with other immigrants (either the same or

different ethnicity) who are familiar with the health care system and who influence the new arrival's initial utilization of services. Moreover, having a high concentration of doctors in the local community who speak the same language increases the probability of utilization for immigrants who prefer to have a doctor from the same ethnic group (Leduc & Proulx 2004; Deri 2005).

Researchers disagree on how immigrants develop their stock of social capital in the new society. Some studies claim that immigrants arrive with social networks already in place in the new community; for example, one of the most important reasons to immigrate to Canada may have been to maintain ties with family and friends who had arrived earlier (Kunz 2005). Wu and Hart (2002) find that immigrants may immigrate with their families, thus maintaining their former network, or also actively create new networks within their ethnic community and/or the host society. Conversely, other researchers report that immigrants have few friends and family in the new society and may experience loneliness and depression (Ma 1999; Aroian et al. 2001; McMichael & Manderson 2004). Regardless of how immigrants recreate new social networks, the family is the most important source of social capital for immigrants (Leclere et al.1994). Moreover, social capital may be more important for immigrants than non-immigrants. A comparison of the impact of social capital between immigrant and non-immigrant youth finds that immigrant youth have less social capital, but that they reap greater rewards from the little they have as compared to native-born youths (Taggart et al. 2003, as cited in Kao 2004). Social capital may be particularly important for immigrants since they may face difficulty accessing formal channels for medical care and other social services.

Immigrants are an under researched population in Canada and consequently little is known about the determinants of their health services utilization. There is evidence, however, that their utilization of health services tends to be sub-optimal (Hyman 2001). There is also little information on the impact of social capital on their utilization of health care. An understanding of how social capital influences primary care utilization decisions of immigrants is essential when developing policies and programs to ensure that the different immigrant communities receive the health care they need. In addition to improving access to health care among immigrants, understanding the factors that affect immigrant utilization of health care services helps policy-makers assess the impact of immigration on the healthcare system and to monitor the accessibility of the system (Laroche, 2000; Pavlic et al. 2007). Moreover, immigrants represent

valuable "economic, social and demographic assets to their host country" and as such, it is important to ensure they maintain their health over time (Asanin & Wilson, 2008: 1271).

Using a similar dataset, this paper explores Laporte and colleagues' (2008) finding that despite controlling for differential access and health status, immigrants were less likely to visit a general practitioner (GP). The purpose of this analysis was to determine how CSC and ISC affect health services utilization for immigrants as compared to non-immigrants, controlling for differences in social capital measured both at the individual and community level. It is hypothesized that CSC will be associated with a decrease in the propensity and intensity of GP consultations for immigrants and non-immigrants although the magnitude of the effect will be greater for non-immigrants. Canadian-born individuals may find it easier than immigrants to access the community resources that are part of the CSC supply. Given the extensive literature showing the importance of ISC for immigrants and the association between ISC and health services utilization, it is hypothesized that ISC will increase the propensity and intensity of physician consultations for immigrants. It is further hypothesized that the complementary and substitution effects noted by Laporte and colleagues (2008) will be seen in the non-immigrant sub-sample.

Methods

Data sources

Input variables, such as the ISC variables, were selected from Cycle 1.2 of the 2002 Canadian Community Health Survey (CCHS). The CCHS is a cross-sectional survey that contains information related to health status, health care use and health determinants of the Canadian population. Cycle 1.2 of the CCHS targeted all Canadians aged 15 years and over living in private dwellings in the ten provinces. Full-time members of the armed forces, individuals residing in institutions, residents in some remote areas, and residents of Crown Lands or Indian Reserves were excluded.

Primary care GP visits were obtained from the Ontario respondents to the CCHS by using their health card number to link their responses to their 2006-2006 physician claims from the Ontario Health Insurance Program (OHIP). Out of 12,376 individuals, 10,985 people voluntarily agreed to share their information, yielding an agreement rate of 88.8% (Statistics Canada 2004). After removing respondents with missing values, the final sample was composed of 7,711 individuals, of which 6,042 had at least one

doctor visit in fiscal year 2006. Individuals were identified using a unique anonymous identifier to maintain confidentiality. A doctor visit associated with at least one of 57 fee service codes (This information is available upon request) used to define the basket of services provided by primary care physicians in Ontario was defined as a primary care GP visit. GP service use is a good measure of health care use and access because these visits are initiated by the patient, whereas hospitalizations and specialist visits are more likely to be driven by physician characteristics (Dunlop et al. 2000; Nabalamba and Millar 2007). Furthermore, in Ontario, general practitioner (GP) services are publicly funded and provided free at point-of-service to all citizens, including landed immigrants. Thus, monetary barriers should not prevent access to GP services for population sub-groups.

Social capital measures

The 2002 CCHS was selected because it contains four ISC variables that have been used in the literature: community belonging, religious attendance, tangible social support and affection. Sense of belonging is operationalized in the CCHS as how would the respondent describe his or her sense of belonging to the local community with a range of answers varying from very strong to very weak (Statistics Canada 2004). Religious attendance is defined in the CCHS as "not counting events such as weddings or funerals, during the past 12 months, how often did you participate in religious activities or attend religious services or meetings, with the following possible responses: 1) once a week or more, 2) once a month, 3) 3 or 4 times a year, 4) once a year, or 5) not at all" (Statistics Canada 2004: 240). Religious attendance was coded as equal to "1" if respondents attended at least one service in the previous year. Tangible social support is defined as the provision of material aid or behavioral assistance. Questions about affection ask whether or not the respondent receives or provides any affection (Statistics Canada, N.D.). These two latter variables were coded as equal to "1" if the respondent experienced tangible social support or affection, respectively.

The measure of CSC employed in this analysis is the Petris Social Capital Index (PSCI). The PSCI measures the supply of resources that facilitate the development and maintenance of CSC, such as the density of associations available in a particular area for individuals to join (Scheffler and Brown 2008). The PSCI was constructed from the long form of the 2001 Canadian Census which contains data on the number of paid employees aged 15 years and over in various organizations as a percentage of the population[1].. The 2001 Census was linked to the 2002 CCHS according to Census Metropolitan Area (CMA, a large urban center with a population greater than 100,000) and Census Agglomeration area (CA, an urban region with a population of 10,000 to 100,000) (Statistics Canada 2004). These were the two geographic variables in common between the two datasets. Rural areas were excluded from the analyses because the PSCI could not be constructed for regions smaller than a CA.. North American Industrial Classification System (NAICS) codes for the following categories of employment were used to construct the PSCI:

8131: Religious organizations

8132: Grant-making and giving organizations

8133: Social advocacy organizations

8134: Civic and social organizations

8139: Business, professional, labor and other membership organizations

Alternatives to the PSCI, such as income inequality, aggregate measures of trust in the community and civic participation, and the Putnam Index, exist in the literature (Devillanova 2006; Ahern and Hendryx 2005; Bryant and Norris 2002; Hendryx et al. 2002; Macinko and Starfield 2001; Subramanian and Kawachi 2004). These indicators were rejected in favor of the PSCI for the following reasons. Income inequality is limited in utility since results from studies conducted outside the United States and for regions smaller than state-level are rarely significant (Subramanian and Kawachi 2004).

[1] This variant of the PSCI differs from the original PSCI constructed by Scheffler and Brown (2008) who used the total population as the denominator. This formulation avoids 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 (Laporte et al., 2008).

Average measures of individual trust in the community and civic participation tend to decrease in significance after adjustment for individual factors (Subramanian and Kawachi 2004) and these measures were not available for Ontario. Finally, the Putnam Index, a popular indicator which measures participation in civil associations, is U.S. based and could not be constructed from Canadian data. Macinko and Starfield (2001) argue that the Putnam Index may capture the openness or oppressiveness of the government instead of community engagement. The PSCI is attractive because it is not an aggregate of individual measures of social capital and it has been used successfully in the Canadian context (Brown et al. 2008; Laporte et al. 2008).

Socio-demographic and health variables include participation in social physical activity (e.g., team sports) in the past three months; age; sex; continent of origin (for immigrants only) (South America, Asia, Africa, Europe – reference group: North America); number of years since immigration to Canada (YSM); married or common-law; living alone; education (obtained a college degree or higher); household income; full-time employment; drink at least one alcoholic beverage daily; very good, good or poor self-assessed health status (reference group: very poor); reported at least one chronic condition as listed in the CCHS; residence in a Census Agglomeration (area with population of 10,000 to 100,000). **Statistical analysis**

Economists tend to think about the use of medical care along two dimensions. The first dimension corresponds to the patient's decision to initiate contact with the health care system which determines an individual's *propensity* to utilize GP services, and the second corresponds to the number of visits or *intensity* of GP services use in which the physician may play a significant role. Several empirical analyses are consistent with this approach and various modeling strategies have been proposed to study the idea that the propensity and intensity of health care service utilization are determined by two different stochastic processes (e.g., Pohlmeier & Ulrich 1995; Gerdtham 1997). In order to generate hypotheses about how the utilization (i.e., propensity and intensity) of general practitioner (GP) services by immigrants and non-immigrants is affected by community and individual social capital, this analysis uses stock of social capital as an input into the demand for medical care both in terms of propensity and intensity of use.

Concern has been raised in the literature that consulting a doctor may result in respondents reporting higher levels of ISC (Laporte et al. 2008), which could result in biased estimates of the observed effects of ISC on utilization. Employing a lagged model (i.e. use future GP visits as a function of past levels of ISC), however, as in this paper, addresses this issue. This approach breaks the intra-temporal link between current social capital and current GP use and also accounts for the possibility that it may take time for social capital to impact utilization. A study by Laporte and colleagues (2008), which uses current GP visits as the outcome measure, finds evidence for a strong role for both the PSCI and community belonging in affecting the health services utilization of Canadians (without differentiating between immigrants and the native-born). Two statistical approaches were compared since the lagged model may be sensitive to regression technique. In the two-part model with the Heckman correction, the propensity of immigrants to visit a doctor was first estimated with a probit equation. In the second stage, the frequency of physician visits (conditional on having had at least one visit) was estimated by ordinary least squares. (The Heckman correction (Heckman 1979; Puhani 2000) is employed to control for the possibility of a selection effect (i.e., the existence of unobservable factors that influence the likelihood that an individual will have a GP visit). Failure to account for this possibility could yield biased estimated coefficients in the intensity equation). A one-stage negative binomial (NEGBIN) regression was also employed, which examined determinants of the frequency of GP visits.

The probability of at least one visit to a GP and the frequency of GP visits were estimated as a function of CSC, ISC, demographic characteristics (e.g., age and sex), socioeconomic status (e.g., household income and education), and health status (e.g., self-reported health and number of chronic conditions). These equations were estimated on separate immigrant and non-immigrant sub-samples as well as on a pooled sample of immigrants and non-immigrants.. In the pooled models, a dummy variable was included to indicate immigrant status along with interaction terms consisting of the social capital variables and a variable to indicate duration of residency in Canada (number of years since immigration to Canada for the immigrant sub-sample and age for the non-immigrant sub-sample).All analyses were conducted using STATA v. 10.1 IC. Approval was obtained from the University of Toronto's Research Ethics Board.

Results

Immigrants are older, self-report poorer-health, and made 30.6% more GP visits than non-immigrants (Table 1). On average, the immigrants in our sample have lived in Canada for 27.7 years with a standard deviation of 15 years. Moreover, given that 95% of the immigrants have resided in Canada for 13 to 75 years, the sample is primarily composed of long-term immigrants. The stock of CSC in the areas where immigrants and non-immigrants reside is similar as were the proportions of immigrants and non-immigrants who reported tangible support and affection. Differences religious attendance and a sense of belonging to the local community. Table 1 presents the sample characteristics.

2

Descriptive results for immigrants, non-immigrants and the pooled sample

Variable	Immigrants (mean/%) n = 1858	Std. Deviation	Non-immigrants (mean/%) n = 5853	Std. Deviation	Full Sample (mean/%) n = 7711	Std. Deviation
GP visit	4.91	5.07	3.86	4.64	4.21	4.81
PSCI	1.12	0.14	1.13	0.21	1.13	0.19
Belonging						
Very strong	25.12	---	15.62	---	15.73	---
Strong	15.95	---	41.83	---	41.57	---
Weak	41.03	---	28.86	---	28.29	---
Very weak	15.87	---	13.68	---	14.41	---
Religious	34.11	---	21.00	---	25.35	---
Tangible	13.33	3.46	13.62	3.24	13.52	3.32
Affection	10.39	2.39	10.82	2.11	10.68	2.22
Age*	54.81	17.19	45.04	17.51	50.96	17.62
Female	50.29	---	50.92	---	50.71	---
YSM*	31.71	15.22	---	---	---	---
Continent of origin						
North America	3.38	---	---	---	---	---
South America	14.71	---	---	---	---	---
Asia	33.55	---	---	---	---	---
Africa	4.63	---	---	---	---	---
Europe	40.40	---	---	---	---	---
Married	67.41	---	59.12	---	61.87	---
Alone	7.98	---	11.00	---	10.00	---
Household size	3.64	1.64	3.09	1.43	3.24	1.51
College	57.84	---	57.81	---	57.82	---
Income	65,676	49,513	75,136	59,276	71,946	56,532
Employed fulltime	61.03	---	60.58	---	60.73	---

Alcohol	5.46	---	8.72	---	7.64	---
SAH						
Very poor	12.26	---	9.62	---	10.48	---
Poor	29.22	---	25.61	---	26.31	---
Good	35.77	---	40.25	---	38.77	---
Very good	22.75	---	24.52	---	23.94	---
Chronic condition	65.48	---	70.58	---	68.89	---
CA	2.12	---	9.17	---	6.83	---

* This value includes the extra four years resulting from the lagged analyses (i.e., utilization data collected four years after the sociodemographic variables). Thus, the mean number of years since immigration to Canada in 2002 was 27.71.

The first stage of the two-part model revealed that tangible social support tended to increase the propensity of immigrants (0.047; p = 0.085) to consult with a physician (Table 2[2]). Tangible social support was significantly associated with an increase in the likelihood that non-immigrants (0.038; p = 0.046) would visit a GP. The pooled regression did not show a main effect for any of the social capital variables. The PSCI was not significant in the propensity (first-stage) or intensity (second-stage) analysis of any of the two-part models with the Heckman correction. Although none of the social capital variables were significant in the immigrant intensity analysis, reporting affection tended to decrease the number of physician visits for non-immigrants (-0.036; p = 0.09).

2

Propensity and intensity of GP visits for immigrants

	1st Stage			2nd Stage		
Variable	**Coefficient**	**Std. Error**	**p-value**	**Coefficient**	**Std. Error**	**p-value**
Constant	-1.063	0.723	0.141	1.857	0.519	0.000
PSCI	0.133	0.484	0.783	-0.306	0.355	0.389
PSCI*YSM	-0.005	0.011	0.665	0.011	0.008	0.150
Belonging	-0.230	0.198	0.244	-0.109	0.144	0.449
Belonging*YSM	0.005	0.005	0.339	0.003	0.003	0.331
Religious	-0.124	0.153	0.417	0.050	0.103	0.627
Religious*YSM	0.004	0.004	0.300	-0.002	0.003	0.357
Tangible	0.047	0.027	0.085*	-0.022	0.020	0.284
Tangible*YSM	-0.001	0.001	0.171	0.001	0.001	0.282
Affection	-0.049	0.041	0.227	0.027	0.030	0.366
Affection*YSM	0.001	0.001	0.274	-0.001	0.001	0.507
Phys Act	-0.089	0.078	0.250	-0.049	0.052	0.337
Age	0.055	0.013	0.000**	0.000	0.009	0.970

[2] Results only shown for the immigrant sample since this is the population of interest in this analysis. Results for the non-immigrant and pooled samples can be found in the appendix.

Age^2	0.000	0.000	0.000**	0.000	0.000	0.166
Female	0.332	0.072	0.000**	0.015	0.048	0.759
South America	0.108	0.165	0.512	0.124	0.102	0.223
Asia	0.030	0.150	0.842	0.163	0.094	0.083*
Africa	0.091	0.220	0.679	0.106	0.136	0.436
Europe	-0.031	0.140	0.824	-0.017	0.086	0.845
YSM	-0.001	0.015	0.943	-0.014	0.011	0.204
Married	0.167	0.102	0.100*	-0.048	0.068	0.481
Alone	-0.038	0.112	0.734	-0.002	0.076	0.982
College	-0.134	0.074	0.069*	0.008	0.046	0.868
Income	-0.007	0.016	0.662	-0.009	0.011	0.376
$Income^2$	0.001	0.001	0.358	0.000	0.000	0.563
Fulltime	-0.204	0.105	0.052*	0.113	0.067	0.094*
Alcohol	0.260	0.152	0.088*	-0.111	0.101	0.273
HDI Poor	0.088	0.111	0.427	-0.256	0.070	0.000**
HDI Good	0.306	0.113	0.007**	-0.385	0.070	0.000**
HDI Very good	0.135	0.129	0.295	-0.395	0.083	0.000**
Chronic	0.435	0.086	0.000**	0.121	0.058	0.038**
CA	-0.081	0.177	0.648	-0.066	0.111	0.551

**significant at the 10% level; ** significant at the 5% level*

With respect to the negative binomial regression on the immigrant sample (Table 3), reporting a very strong or strong sense of belonging to the community tended to decrease the number of GP visits (IRR = 0.77; p = 0.085). An interaction was observed between belonging to the community and the number of years since immigration (0.007; p = 0.070) indicating that community belonging was associated with a greater decrease in doctor visits in immigrants who have lived in Canada for a longer period of time.

3

Intensity of GP visits for immigrants

Variable	Coefficient	Std. Error	p-value	Mfx
Constant	0.360	0.550	0.513	---
PSCI	-0.186	0.375	0.620	0.249
PSCI*YSM	0.008	0.009	0.383	0.028
Belonging	-0.263	0.153	0.085*	-0.166
Belonging*YSM	0.007	0.004	0.070*	0.025
Religious	-0.022	0.113	0.847	-0.054
Religious*YSM	0.000	0.003	0.941	0.000

Tangible	0.014	0.020	0.484	0.038
Tangible*YSM	0.000	0.001	0.817	-0.001
Affection	-0.021	0.030	0.486	-0.005
Affection*YSM	0.001	0.001	0.458	0.002
Phys Act	-0.108	0.057	0.058*	-0.384
Age	0.038	0.009	0.000**	0.042
Age^2	0.000	0.000	0.004**	---
Female	0.207	0.053	0.000**	0.860
South America	0.210	0.119	0.077*	0.874
Asia	0.195	0.109	0.072*	0.808
Africa	0.185	0.161	0.251	0.759
Europe	0.013	0.101	0.897	0.049
YSM	-0.017	0.012	0.159	-0.010
Married	0.067	0.072	0.356	0.259
Alone	-0.003	0.082	0.969	-0.012
College	-0.073	0.053	0.165	-0.263
Income	-0.014	0.012	0.221	-0.039
$Income^2$	0.001	0.000	0.156	---
Fulltime	-0.006	0.075	0.934	-0.023
Alcohol	0.084	0.107	0.436	0.326
SAH Poor	-0.207	0.079	0.009**	-0.699
SAH Good	-0.198	0.080	0.013**	-0.671
SAH Very good	-0.323	0.093	0.001**	-1.032
Chronic	0.423	0.065	0.000**	1.973
CA	-0.090	0.129	0.486	-0.323

** significant at the 10% level; ** significant at the 5% level*

For non-immigrants (Table 4), having tangible social support increased physician services utilization by a factor of 1.03 (p = 0.035). The interaction between tangible social support and age was not significant. Affection, (IRR = 0.95; p = 0.037) was associated with a decrease in physician visits and a positive interaction term (0.001; p = 0.035) suggested that affection decreased utilization for younger individuals and increased utilization for older individuals.

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4

Intensity of GP visits for non-immigrants

	Coefficient	**Std. Error**	**p-value**	**Mfx**

Constant	0.794	0.331	0.017	---
PSCI	-0.282	0.189	0.136	0.028
PSCI*Age	0.006	0.003	0.084*	0.021
Belonging	0.118	0.116	0.308	0.157
Belonging*Age	-0.002	0.002	0.450	-0.004
Religious	-0.096	0.106	0.363	-0.093
Religious*Age	0.001	0.002	0.433	-0.001
Tangible	0.033	0.016	0.035**	-0.040
Tangible*Age	0.000	0.000	0.111	-0.001
Affection	-0.052	0.025	0.037**	-0.020
Affection*Age	0.001	0.000	0.035**	0.003
Phys Act	-0.035	0.031	0.265	-0.120
Age	0.016	0.008	0.043**	0.037
Age^2	0.000	0.000	0.001**	---
Female	0.398	0.031	0.000**	1.708
Married	-0.018	0.044	0.678	-0.063
Alone	-0.056	0.049	0.258	-0.189
College	-0.034	0.031	0.263	-0.117
Income	-0.006	0.006	0.288	-0.027
$Income^2$	0.000	0.000	0.295	---
Fulltime	-0.070	0.039	0.076*	-0.235
Alcohol	-0.026	0.050	0.601	-0.090
SAH Poor	-0.166	0.050	0.001**	-0.533
SAH Good	-0.238	0.049	0.000**	-0.739
SAH Very good	-0.297	0.055	0.000**	-0.896
Chronic	0.324	0.036	0.000**	1.334
CA	-0.144	0.044	0.001**	-0.467

** significant at the 10% level; ** significant at the 5% level*

The PSCI was not significant in any of the NEGBIN regressions nor were the social capital variables significant in the pooled NEGBIN regression (results not shown).

Other analyses (i.e., two-part model with the Heckman correction and NEGBIN) were conducted to examine the sensitivity of the model to the different SC variables as well as to control for other types of primary care. Alternatives to GP visits were obtained from the CCHS, which asks respondents the number of times they consulted one of the following in the past 12 months for emotional problems, mental health or use of alcohol or drugs: psychiatrist, family doctor, psychologist, social worker, and religious advisor. Regressions that only included the ISC variables, alternative forms of medical care and other

covariates were run separately on the immigrant and non-immigrant samples without sample attrition due to the merging of the CCHS with the census. Results for the two-part model show that for immigrants none of the ISC indicators, when entered separately or all together in the model, were significant. When the ISC variables were entered separately, however, self-reported visits to a family doctor in 2002 increased the propensity to visit a GP in 2006-2007 (e.g., 0.167; p = 0.001) and consulting with a psychologist increased the number of future visits made to a GP (e.g., 0.163; p = 0.015). The regression results for the non-immigrant sample were more diverse. For example, when all the ISC variables were entered into the model, attending at least one religious service increased the propensity to make a GP visit and decreased the number of GP visits (propensity: 0.134; p = 0.001; frequency: -0.068; p = 0.007). When entered separately, religious attendance (0.144; p = 0.001), affection (0.022; p = 0.002) and tangible social support (0.016; p = 0.001) increased the propensity to consult with a GP. It should be noted that reporting consultations with a family doctor increased the intensity of GP consultations four years into the future in all models.

With respect to the one-stage NEGBIN, when all the ISC variables were entered, reporting a strong sense of belonging decreased the number of GP visits for immigrants (-0.289; p = 0.038). This finding was strengthened when belonging was entered separately in the model (-0.301; p = 0.029). None of the alternative sources of medical care were significant in any of the immigrant NEGBIN regressions. The findings from the non-immigrant NEGBIN show that none of the ISC variables were significant, although consulting a family doctor increased the frequency of future GP visits for all models.

Regressions that only included CSC and other covariates were based on the immigrant and non-immigrant sub-samples with missing data since two data sources are required to create the PSCI. For immigrants, the two-part model showed an interaction between the PSCI and the number of years since immigration in the intensity analysis (0.016; p = 0.039). Although the PSCI was not significant in the non-immigrant two-part model, living alone significantly decreased the propensity to visit the GP (-0.310; p = 0.000) and increased the number of visits (0.091; p = 0.028). The PSCI was not significant in the immigrant and non-immigrant NEGBIN regressions, respectively. We also re-ran the regressions from the main analysis using the PSCI derived from the 2005 Census (i.e., the future stock of CSC); the findings were unchanged.

Health status was the strongest driver of physician consultations. In the two-part regressions, having at least one chronic condition and self-reporting poorer health significantly increased the propensity to visit the GP and the intensity of GP visits for both immigrants and non-immigrants. Similar results were observed in the NEGBIN models. With respect to socio-demographic variables, only age and sex (i.e., female) were consistently significant in the immigrant and non-immigrant models. These variables were associated with an increased propensity to consult with a GP and an increased frequency of visits.

Discussion

Unexpectedly, our measure of CSC was not significant in any of the analyses. The descriptive results indicate an average value of the PSCI of 1.1% for communities in which immigrants and non-immigrants live, respectively. These numbers suggest that there are few CSC resources available within the CAs and CMAs, which may explain the weak performance with the PSCI. An alternative explanation is that the PSCI is not sensitive to CSC that is found outside of an employee-employer relationship. Moreover, this indicator excludes regions smaller than a CA; therefore, community effects which may operate at the level of the neighborhood may not be detected. The PSCI provides a proxy for the level of community resources; it does not, however, reveal how much of those resources are accessible to any particular individual.

It was expected that ISC would encourage immigrants to consult more often with the doctor and it is surprising that opposite results were found. The results suggest that for immigrants some aspect of community belonging (e.g., norms of behavior, network size and density, or degree of integration) may substitute for formal health services utilization (Deri 2004; Laporte et al. 2008; Shields 2008). Community belonging may be conceptualized as a measure of integration into the community (e.g., immigrant or ethnic community or the host society). Thus, the degree of community belonging may reflect use of community resources (e.g., religious or cultural groups) that substitute for formal health care and for the care normally given by relatives (Aroian et al. 2001). In general, recent immigrants who have not yet developed extensive social networks are more reliant on resources from family and friends; long-

term immigrants are more likely to depend on community services (Stewart et al. 2008). Thus, given that our sample was composed primarily of long-term immigrants, the variable "sense of belonging to the local community" may in fact be an indicator of CSC. This hypothesis is strengthened by findings from the sensitivity analysis that suggest that CSC is associated with a greater decrease in doctor visits for immigrants who have lived in Canada for a longer period of time. The results suggest a complex role for ISC in influencing health services utilization of non-immigrants. Experiencing and giving affection may substitute for formal health care services whereas tangible social support may be complementary to formal health care use. Social support, which is often provided by family and friends (Leclere et al.1994), seems to serve as a substitute for formal care in this case. Having a network of family and friends can assist formal health care services use by providing transportation to the clinic, transmitting information about the health care system, and lending money to purchase prescription drugs (Deri 2004; Viladrich 2005; Devillanova 2006; Laporte et al. 2008; Nakhaie et al. 2007). Future research efforts should perhaps make use of qualitative assessment techniques to characterize the precise nature of the various aspects of ISC that affect health services use.

There are important limitations to the merged CCHS and OHIP dataset. For example, very recent immigrants (i.e., less than 5 years in Canada) are excluded from the sample (there is a five-year lag between the collection of the socio-demographic information and the utilization data). This lack of more recent immigrants may be responsible for the nonsignificant findings in the pooled analysis. Given that the immigrants in this sample have resided in Canada for many years, they may not use GP visits differently than non-immigrants. Furthermore, the exclusion of certain types of health care (e.g., hospitalization, community health centre (CHC) visits, and alternative or traditional medicine) from the OHIP administrative data may lead to spillover effects in these unmeasured areas of health care use. Utilization statistics of these various services were unavailable; we were thus limited to examining frequency of the utilization of GP services.

Conclusion

The findings provide new evidence that the use of primary care services by immigrants may be influenced by their degree of belonging to the local community and support the existing literature in documenting the enabling and substitution effects of ISC. This analysis attempts to highlight the importance of recognizing that the health care system has both formal and informal components and that policy makers should be aware of the potential for interactive effects between the two. Moreover, social capital may be a key factor in eliminating the barriers immigrants face to accessing the health care system or providing alternatives to formal health care. Investment in community resources may be beneficial to various immigrant communities since previous research has determined that the community is an important provider of health care to immigrants, and, that segments of this population have a noted preference for traditional medicine. Shifting investment from the formal health care system to community organizations that may substitute for formal health care may not be the best solution. Conducting primary data collection on recent immigrants may help researchers determine ways to develop supports for this group in order to prevent the negative outcomes seen in their long-term counterparts.

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Conflict of interest

No conflicts of interest are reported.

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5

Appendix 1: Characteristics of sample without missing data due to matching CA with the Census

Variable	Immigrants (mean/%) n=2091	Std. Deviation	Non-Immigrants (mean/%) n=8073	Std. Deviation
GP visit	4.94	5.16	3.96	4.77
Belonging				
Very strong	18.51		18.25	
Strong	40.27		42.60	
Weak	26.64		26.94	
Very weak	14.59		12.21	
Religious	33.05		21.88	
Tangible	13.04	3.77	13.32	3.58
Affection	10.29	2.54	10.63	2.36
Age	55.80	18.83	48.79	19.03
Female	54.94		53.54	
YSM	33.61	17.92		
Continent of origin				
North America	5.69			
South America	12.29			
Asia	21.43			
Africa	3.87			
Europe	54.66			
others	2.06			
Married	58.15		52.07	
Alone	24.39		24.33	
Houeehold size	2.65	1.51	2.56	1.36
College	57.29		54.22	
Income	36152	50646	41510	53781
Employed fulltime	49.54		55.42	
Alcohol	6.22		9.39	
SAH				
Very poor	14.30		12.38	
Poor	29.60		26.06	
Good	35.15		38.85	
Very good	20.95		22.71	
Chronic condition	73.08		74.90	
Visit for mental health				
psychiatrist	0.42	8.29	0.37	2.66
family doctor	0.19	2.11	0.32	3.53
pychologist	0.00	0.08	0.06	3.72
social worker	0.26	8.03	0.48	7.57
religious advisor	0.11	1.92	0.22	5.30