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ORIGINAL ARTICLE

The role of sense of community belonging on unmet health care needs in Ontario, Canada: findings from the 2012 Canadian community health survey

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Abstract
Aim This article examines the association between sense of community belonging and unmet health-care needs among individuals in Ontario, Canada, after adjusting for predisposing, enabling, and need factors associated with health-service use.
Subjects and methods This study is based on data from Statistics Canada's 2012 Canadian Community Health Survey. A sample of 21,257 individuals aged 12 and older was analyzed. Logistic regression was conducted to examine the association between sense of community belonging and unmet health-care needs.
Results The study found that one in ten individuals reported having unmet health-care needs. Sense of community belonging had a significant independent effect on unmet health-care needs. Respondents with a weak sense of community belonging were 1.27 times more likely to report having unmet health-care needs. Respondents who were younger, were females, had a higher education, or were without a regular doctor were more likely to have unmet health-care needs. Other factors associated with unmet health-care needs included poor physical health, poor mental health, difficulties in carrying out instrumental activities of daily living, and chronic conditions.
Conclusion The findings of this study emphasize the need to develop health-care policies and programs that appropriate and meet the needs of individuals with different health-related problems alongside the need to increase sense of community belonging.

Keywords Unmet health-care needs · Sense of community belonging · Access to health services · Canadian community health survey

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Introduction

Although the Canada Health Act seeks to facilitate reasonable access to health-care services without financial or other barriers for Canadians, studies have shown that some groups of Canadians are still not receiving the required amount and quality of health-care services (Allin et al. 2010; Bryant et al. 2009; Sanmartin et al. 2002). Access to health care is a complex process that can be influenced by individual as well as systemic factors (Aday and Andersen 1974; Andersen 1995; Andersen and Newman 2005). A generally used indicator of access to health care is the proportion of individuals having unmet health-care needs in a population (Arku et al. 2013; Bonuck et al. 1996; Chen et al. 2002; Momtaz et al. 2012; Sanmartin et al. 2002; Shippee et al. 2012; Sibley and Glazier 2009).

Unmet health-care needs as a concept has been defined differently by various scholars. However, a widely accepted definition of unmet health-care needs has been provided by Carr and Wolfe (1976) to mean "the differences, if any, between those services judged necessary to deal appropriately with defined health problems and those services actually being received…an unmet need is the absence of any, or of sufficient, or of appropriate care and services" (p. 418). As opposed to objective measures of utilization of health care, such

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as the number of physician visits, unmet health-care needs captures the subjective perception of an individual's access to health care. Prevalence rates of unmet health-care needs vary from country to country. Within the Canadian context, Sanmartin et al. (2002) analyzed data from the first three cycles of the Canadian Community Health Survey (CCHS) and the National Population Health Survey (NPHS) and found that unmet health-care needs rose from 4.2 % in 1994/1995 to 12.5 % in 2000/2001. Another study by Sibley and Glazier (2009) found 12 % of Canadians reported having unmet health-care needs. It is worth noting that the foregoing references to unmet health-care needs refer to self-assessed unmet needs.

Past studies have classified factors influencing unmet health-care needs into three main categories based on the behavioral model of access to health services developed by Aday and Andersen (1974). The model posits that health-care service use is influenced by predisposing, enabling, and need factors (Aday and Andersen 1974). Predisposing factors describe an individual's tendency to use health-care service and include demographic factors (such as age, gender, and race/ethnicity). The enabling factors describe the resources individuals have and can draw on in order to access health-care services in times of need. Some of these factors include income, health insurance, distance to health facility, access to transportation, and access to a regular medical doctor. The needs factors of the model describe the level of illness and individual's psychosocial level of functioning that affects health-care service use (Aday and Andersen 1974; Andersen and Newman 2005).

Numerous studies have theorized and examined the effect of social capital, features of neighborhood, and place on health outcomes (see, e.g., Arku et al. 2013; Baiden et al. 2011; Ellen, et al. 2001; Katz et al. 2001; Lochner et al. 1999; Luginaah et al. 2010; Macintyre et al. 2002; Putnam 2001; Young et al. 2004). However, few studies have looked at sense of community belonging. Social capital and sense of community belonging are similar concepts in that they both relate to social networks, but there are distinct differences that are important to note. Social capital relates to "features of social organization, such as networks, norms, and trust, that facilitate coordination and cooperation for mutual benefit…It enhances the benefits of investment in physical and human capital" (Putnam 1993, p. 36). In contrast, sense of community belonging is a psychosocial construct that relates to the level of attachment individuals have toward their community, network of friends, family, and activities of interest (Kitchen et al. 2012). Social capital is usually defined as an objective characteristic of a place or polity, whereas sense of community belonging is more subjective and describes the extent to which individuals are emotionally attached to their community. It has been argued that sense of belonging is important for understanding individual health (Kitchen et al. 2012). For instance, individuals may learn about doctors and health care through their community networks. They may hear from their community networks about which doctors are responsive, which health-care facilities are open during weekends, holidays, and so on (Ellen et al. 2001). Members may also remind each other, particularly seniors, about their medical appointments (Bryant et al. 2009).

Kitchen et al. (2012) analyzed data from the 2007/2008 CCHS and found that higher levels of self-perceived physical and mental health were associated with higher levels of sense of community belonging. In a longitudinal study, Choenarom et al. (2005) followed 90 men and women from the US over a period of 9 months and found that lower sense of community belonging had a significant direct effect on the severity of depression lasting throughout the study period. They also found that sense of community belonging mediates the effect of social support on self-perceived stress and depression. Other studies have also found support for the role of sense of community belonging in explaining physical health (Bailey and McLaren 2005; Holt-Lunstad and Smith 2012) as well as health behavior change (Hystad and Carpiano 2012).

The role of sense of community belonging in understanding unmet health-care needs has been understudied. Within the Canadian context, there is one known study by Bryant et al. (2009). This study examined unmet health-care needs in a sample of 2,536 urban residents in British Columbia from the Tri-City Survey. Respondents were drawn from 12 census subdivisions (CSD) in Vancouver, Surrey, and Kamloops based on postal code. They hypothesized that lack of social connection or community belonging would predict the presence of unmet health-care needs. Age and level of education were both not associated with the presence of unmet health-care needs. However, consistent with the structural approach that focuses on the role of gender and socioeconomic status as key social determinants of health, they found that female gender, having been formerly married, and reporting low income were all reliably associated with having unmet health-care needs. Poor physical health was the strongest factor associated with having unmet health-care needs. Residents in Vancouver did not differ from their counterparts in Surrey or Kamloops in reporting unmet health-care needs. However, individuals who did not have someone to depend on for help or belong to community organizations that shared their beliefs were more than two times as likely to report having unmet health-care needs. This was after they had controlled for predisposing, enabling, and need factors of health-care service use. This study highlights the role of sense of community belonging on unmet health-care needs. However, it should be noted that, although the study by Bryant et al. (2009) consisted of a relatively large sample, 65 % of households that were contacted refused to participate, leading to a response rate of about 17 %. Also, Bryant et al. (2009) failed to control for functional measures of

independencies such as instrumental activities of daily living (IADL) as noted by past studies as important predictors of health-care service use (Allen and Mor 1997; Gaugler et al. 2005; Park 2003).

Current study

Notwithstanding the growing epidemiological evidence, few studies demonstrate the potential role of sense of community belonging in mediating health-service use and those that do have significant limitations. It is important for health policy makers to understand factors that influence unmet health-care needs so as to institute measures to address these factors. The present study seeks to begin to address this gap in the literature as well as the limitations of previous research by examining the extent to which sense of community belonging influences the likelihood of having unmet health-care needs among residents of Ontario, Canada. We hypothesized that, adjusting for predisposing, enabling, and need factors, individuals with a weak sense of community belonging would be more likely to have unmet health-care needs.

Methods

Data

This study is based on data from Statistics Canada's 2012 CCHS (Statistics 2013) public use microdata files (PUMF). The CCHS is a cross-sectional survey that gathers information related to health status, health-care utilization, and social determinants of health for the Canadian population. As noted in Statistics Canada's data documentation (Statistics 2013), some of the main objectives of the CCHS were to: "1) support health surveillance programs by providing health data at the national, provincial, and intra-provincial levels, 2) provide a single data source for health research on small populations and rare characteristics, 3) provide timely release of information easily accessible to a diverse community of users, and 4) create a flexible survey instrument that includes a rapid response option to address emerging issues related to the health of the population."

The 2012 survey covers about 98 % of Canadians aged 12 and over residing in private dwellings in the 115 health regions across all provinces and territories. Individuals living on Indian Reserves and on Crown Lands, residents of institutions, full-time members of the Canadian Forces, and residents of certain remote regions were excluded from the survey. Each province has the option of selecting questions relating to their provincial or regional public health needs and priorities. Therefore, not all provinces have the same variables. Since only respondents from Ontario were asked questions on unmet health-care needs and the impact of health problems on participating in daily activities, which form the focus of our research, this study is limited to individuals from this province (n=21,257).

Measures

Outcome variable

The outcome variable examined in this study was unmet health-care needs and was measured as a binary variable. Survey respondents were asked, "During the past 12 months, was there ever a time when you felt that you needed health care but you didn't receive it?" Respondents who answered in the affirmative were coded 1, having unmet health-care needs, whereas those who answered in the negative were coded as 0, meaning no unmet health-care needs. This subjective operationalization has been used in many prior studies (see, e.g., Argintaru et al. 2013; Arku et al. 2013; Chen et al. 2002; Herr et al. 2013; Momtaz et al. 2012; Sanmartin et al. 2002; Shippee et al. 2012; Sibley and Glazier 2009).

Explanatory variables

Explanatory variables examined in this study were based on the behavioral model of access to health care and includes predisposing, enabling, and need factors. Predisposing factors examined in this study include age (12 to 19 years, 20 to 29 years, 30 to 39 years, 40 to 49 years, 50 to 59 years, 60 to 69 years, and 70 years and above), gender (male versus female), cultural or racial origin (White versus visible minority), and marital status (married, common law, widowed/separated/divorced, and single/never married).

Enabling factors examined in this study include level of education (less than secondary school education, secondary school education, some post-secondary graduate, and post-secondary graduate) and annual personal income (no income/less than $20,000, $20,000 to $39,999, $40,000 to $59,999, $60,000 to $799,999, and $80,000 and above). Given that there were a lot of missing data on income (23 %), respondents who had missing data on income were coded as a separate category in order to keep these respondents in the analysis. Under enabling factors, whether the respondent has a regular medical doctor or not was also examined. Survey respondents who answered affirmatively to the question "Do you have a regular medical doctor" were coded as 1 and those who answered no were coded as 0.

Four measures of need factors were examined in this study: perceived physical health, perceived mental health, difficulty in carrying out instrumental activities of daily living (IADL), and chronic condition. Perceived physical health is generally considered as an indicator of overall health status of the individual, not just the absence of disease or injury. This

variable was originally measured as an ordinal variable on a five-point Likert scale ranging from excellent to poor. We dichotomized this variable into two categories by collapsing excellent, very good, and good together into a category called "good physical health" (score=0), whereas fair and poor were collapsed together into a category called "poor physical health" (score=1). Similarly, perceived mental health was measured as a dichotomous variable by collapsing excellent, very good, and good together into a category called "good mental health" (score=0), whereas fair and poor were collapsed together into a category called "poor mental health" (score=1).

IADL classifies respondents according to their need for help (due to health reasons) in carrying out IADL such as preparing meals, shopping for groceries or other necessities, doing ordinary housework, doing heavy household chores (e.g., washing walls, yard work), personal care (e.g., washing, dressing, or eating), moving about inside the house, or paying bills. This variable was measured as a binary variable and coded 1 if the respondent needed help in carrying out IADL; otherwise, it was coded as 0.

Respondents were also asked the following question: "Now I'd like to ask about certain long-term health conditions which you may have. We are interested in 'long-term conditions' which are expected to last or have already lasted 6 months or more and that have been diagnosed by a health professional." The list of chronic conditions[1] includes the following: asthma; arthritis (excluding fibromyalgia); back problems (excluding fibromyalgia and arthritis); high blood pressure; emphysema and chronic obstructive pulmonary disease (COPD); migraine headaches; chronic bronchitis; diabetes; heart disease; cancer; intestinal or stomach ulcers; effects of a stroke; urinary incontinence; bowel disorder; mood disorder, such as depression, bipolar disorder, mania, or dysthymia; and anxiety disorder, such as a phobia, obsessive-compulsive disorder, or a panic disorder. The reported chronic conditions were summed to arrive at a chronic condition variable with scores ranging from 0 to 12. A score of 0 indicates the absence of a chronic condition, whereas higher scores indicate more chronic conditions.

Survey respondents were also asked to describe their sense of belonging to their local community with the following response options: very strong, somewhat strong, somewhat weak, and very weak. For the purposes of this study, respondents who described their sense of community belonging as very strong or somewhat strong were grouped together and coded as "strong" (score=0), whereas respondents who described their sense of community belonging as somewhat weak or very weak were grouped together and coded as "weak" (score=1). The odds ratios for very strong and somewhat strong were not sufficiently distinct to warrant categorization into a separate type.

[1] Urinary incontinence was only asked of respondents aged 25 and above, and emphysema and chronic obstructive pulmonary disease (COPD) were only asked of respondents aged 35 and above; hence, these two variables were not included in the calculation of the chronic condition score.

Data analyses

The data analysis strategy included descriptive, bivariate, and multivariate analysis techniques. In the first stage, descriptive statistics of the outcome and the explanatory variables were conducted using frequency and percentage for the categorical variables and mean and standard deviation for the continuous variable (chronic condition). This procedure allowed for an understanding of the general distribution of the variables to be included in the analysis. In the second stage, we examined the bivariate association between unmet health-care needs and the categorical variables using chi-square tests of association. The purpose of the bivariate analyses was to determine the proportion of respondents in each explanatory variable category that had unmet health-care needs. A one-way ANOVA was conducted to examine whether average chronic condition scores were significantly different for respondents with unmet health-care needs versus their counterparts with no unmet health-care needs.

Finally, binary logistic regression analyses were performed to examine the relative contribution of the explanatory variables in explaining unmet health-care needs. Binary logistic regression was chosen because the outcome variable in this study (unmet health-care needs) was measured as a binary variable. Explanatory variables were entered into the logistic regression model based on the behavioral model of access to health care. Four multivariate logistic regression models were built. For all models, explanatory variables were entered using the enter method. Predisposing factors were entered in the first model given that they cannot be easily altered. The second model includes the predisposing factors+the enabling factors. The third model includes the predisposing factors+the enabling factors+the need factors. A final model was fitted to assess whether sense of community belonging is associated with unmet health-care needs, controlling for predisposing, enabling, and need factors. Model fitness was assessed using the Nagelkerke pseudo R square, the omnibus chi-square test, the percentage of respondents correctly classified as having unmet health-care needs versus no unmet health-care need, as well as the sensitivity and specificity for each model. The classification cutoff was readjusted to 10 % to equal the proportion of respondents with unmet health care-needs. Adjusted odds ratios are reported together with their corresponding 95 % confidence intervals (95 % CI). To produce a sample equal to the original sample size and representative of the population of Ontario, the population weight was adjusted by dividing each master weight score by the average weight. The adjusted weight was used in all analyses. Missing data

were handled using listwise deletion. Variables were considered significant at a level of $p<0.05$. All analyses were performed using SPSS version 21 for Windows (SPSS Inc., Chicago, IL, USA).

Results

Sample characteristics

Table 1 presents the sample characteristics for the CCHS-2012 respondents included in the analysis. Of the 21,257 respondents examined, 2,147, representing 10 %, reported having unmet health-care needs within the last 12 months. The sample was almost evenly distributed by gender with females comprising 51 % of the sample. Over half (60 %) of the respondents were between ages 12 to 49 years, 30 % were between 50 to 69 years, and 10 % were 70 years and above. Just over one in four respondents (28 %) identified themselves as visible minorities. Slightly over one in two respondents (51 %) were married, 7 % were in common-law relationships, 12 % were widowed/separated or divorced, and 30 % were single/never married. The majority of the respondents (56 %) were post-secondary graduates. With respect to annual personal income, about 23 % of respondents made no income/less than $20,000, 20 % made $20,000 to $39,999, 14 % made $40,000 to 59,999, 8 % made $60,000 to $79,999, and 11 % made $80,000 and above. About 23 % of the respondents had missing data on income. The distributions of the other variables were as follows: 9 % reported not having a regular doctor, 11 % perceived their physical health to be poor, 7 % perceived their mental health to be poor, and 11 % had difficulties in carrying out IADL. Approximately one in three respondents (32 %) reported a weak or somewhat weak sense of belonging to their community. Chronic condition scores were positively skewed. Respondents had on average 1.08 chronic conditions (SD=1.37, range 0–12).

Table 1 Sample characteristics (N=21,257)

Variables	Frequency (%)	Mean (SD)
Outcome variable		
Unmet health-care needs		
No	19,072 (89.9)	
Yes	2,147 (10.1)	
Explanatory variables		
Age		
12 to 19 years	2,401 (11.3)	
20 to 29 years	3,457 (16.3)	
30 to 39 years	3,070 (14.4)	
40 to 49 years	3,648 (17.2)	
50 to 59 years	3,619 (17.0)	
60 to 69 years	2,778 (13.1)	
70 years and above	2,284 (10.7)	
Gender		
Male	10,417 (49.0)	
Female	10,840 (51.0)	
Cultural or racial origin		
White	14,735 (72.1)	
Visible minority	5,693 (27.9)	
Marital status		
Married	10,730 (50.6)	
Common-law	1,485 (7.0)	
Widowed/separated/ divorced	2,577 (12.1)	
Single/never married	6,426 (30.3)	
Level of education		
Less than secondary school graduate	4,014 (19.6)	
Secondary school graduate	3,797 (18.6)	
Some post-secondary graduate	1,160 (5.7)	
Post-secondary graduate	11,481 (56.1)	
Annual personal income		
No or less than $20,000	4,821 (22.7)	
$20,000 to $39,999	4,331 (20.4)	
$40,000 to $59,999	3,016 (14.2)	
$60,000 to $79,999	1,837 (8.6)	
$80,000 and above	2,293 (10.8)	
Missing data	4,959 (23.3)	
Has a regular medical doctor		
Yes	19,383 (91.2)	
No	1,859 (8.8)	
Self-perceived physical health		
Good	18,922 (89.3)	
Poor	2,272 (10.7)	
Self-perceived mental health		
Good	19,429 (93.6)	
Poor	1,332 (6.4)	
Difficulties in carrying out IADL		
No	19,076 (89.9)	
Yes	2,141 (10.1)	
Sense of community belonging		
Strong	13,990 (68.2)	
Weak	6,538 (31.8)	
Chronic condition index		M=1.08, SD=1.37, Range=0–12

Bivariate associations between unmet health-care needs and the explanatory variables

Significant bivariate associations were observed between unmet health-care needs and all the explanatory variables. Age was associated with unmet health-care needs, with younger respondents being more likely to report having unmet health-care needs (χ^2=88.12, p<0.001). About 12 % of females compared to 8 % of males reported having unmet health-care needs (χ^2=64.01, p<0.001). Close to 11 % of Whites compared to 9 % of visible minorities reported having unmet health-care needs (χ^2=8.73, p<0.01). About 9 % of respondents who were married compared to 13 % of respondents living in common-law relationships, 11 % of respondents who were widowed/separated/divorced, and 10 % of respondents who were single/never married reported having unmet health-care needs (χ^2=23.07, p<0.001). With respect to level of education, 8 % of respondents with less than secondary school education, 10 % of respondents with secondary school education, 14 % of respondents with some post-secondary school education, and 11 % of respondents with post-secondary education reported having unmet health-care needs (χ^2= 43.52, p<0.001). Annual personal income was inversely associated with unmet health-care needs (χ^2=108.15, p<0.001).

Also, one in ten respondents (10 %) with a regular medical doctor compared to about one in six (17 %) respondents without a regular medical doctor reported having unmet health-care needs (χ^2=93.17, p<0.001). A little over one in five respondents (22 %) who perceived their physical health to be poor compared to 9 % of respondents who perceived their physical health to be good reported having unmet health-care needs (χ^2=407.41, p<0.001). Similarly, 27 % of respondents with poor mental health compared to 9 % of respondents with good mental health reported having unmet health-care needs (χ^2=469.59, p<0.001). The study also found that the proportion of respondents who had difficulties in carrying out IADL and reported having unmet health-care needs (24 %) was significantly greater than the proportion of respondents who had no difficulties in carrying out IADL and reported having unmet health-care needs (9 %) (χ^2=490.24, p<0.001). With respect to sense of community belonging, the study found that the proportion of respondents who had a weak sense of community belonging and reported having unmet health-care needs (14 %) was significantly greater than the proportion of respondents who had a strong sense of community belonging and had unmet health-care needs (8 %) (χ^2=125.98, p<0.001) ~~Table. 2~~

Results from the one-way ANOVA comparing chronic condition scores between respondents with unmet health-care needs and those with no unmet health-care needs indicate that those with unmet health-care needs had, on average, 2.11 chronic conditions (SD=1.90) compared to those who reported no unmet health-care needs, who had, on average, 1.29 chronic conditions (SD=1.45): F(1, 19929)=564.45, p<0.001).

Multivariate results

Table 3 presents the adjusted odds ratio from the four multivariate logistic regression models predicting the likelihood of having unmet health-care needs. All the predisposing factors entered in model 1 (age, gender, cultural or racial origin, and marital status) emerged as significant. Respondents who are younger were more likely to have unmet health-care needs when compared to respondents who are older. The strength and direction of this effect remained consistent after controlling for the enabling and need factors in models 2 and 3, respectively, and sense of community belonging in model 4. In the final model, females were 1.34 times more likely to have unmet health-care needs when compared to their male counterparts (AOR=1.34, p<0.001, 95 % CI=1.20–1.49). Controlling for the effect of all the other factors, visible minorities were 13 % less likely to have unmet health-care needs when compared to their White counterparts (AOR= 0.87, p<0.05, 95 % CI=0.78–0.98). Marital status lost its significant effect once we controlled for enabling need factors and sense of community belonging.

All the three enabling variables (education, annual personal income, and having a regular medical doctor) entered in model 2 had a significant effect on unmet health-care needs. In the final model, respondents with some post-secondary school education were 1.49 times more likely to report having unmet health-care needs (AOR=1.49 p<0.001, 95 % CI= 1.18–1.89), and respondents with post-secondary education were 1.33 times more likely to report having unmet health-care needs (AOR=1.33 p<0.001, 95 % CI=1.12–1.58), both when compared to respondents with less than secondary school education. Respondents with secondary school education were not significantly different from their counterparts with less than secondary school education. Although annual personal income was inversely associated with the odds of having unmet health-care needs in model 2, its effect disappeared once we adjusted for the need factors and sense of community belonging. However, compared to a respondent who had a regular medical doctor, odds were about doubled for a respondent who does not have a regular medical doctor to report having unmet health-care needs (AOR=1.99, p<0.001, 95 % CI=1.71–2.32).

All the need factors entered in model 3 had a significant effect on unmet health needs and remained robust even after taking into account sense of community belonging. In the final model, respondents were more likely to report having unmet health-care needs if they perceived their physical health to be poor (AOR=1.29, p<0.001, 95 % CI=1.10–1.52), perceived their mental health to be poor (AOR=1.67, p<0.001, 95 % CI=1.41–1.98), or had difficulties in carrying out IADL

t2.1 **Table 2** Bivariate association between unmet health-care needs and explanatory variables

t2.2 Variables	No unmet need n (%)	Unmet need n (%)	Chi-square
t2.3 Age			88.12***
t2.4 12 to 29 years	2,250 (93.8)	148 (6.2)	
t2.5 20 to 29 years	3,028 (87.8)	422 (12.2)	
t2.6 30 to 39 years	2,711 (88.4)	355 (11.6)	
t2.7 40 to 49 years	3,246 (89.0)	401 (11.0)	
t2.8 50 to 59 years	3,212 (89.0)	397 (11.0)	
t2.9 60 to 69 years	2,529 (91.3)	242 (8.7)	
t2.10 70 years and above	2,096 (92.0)	183 (8.0)	
t2.11 Gender			64.01***
t2.12 Male	9,518 (91.6)	876 (8.4)	
t2.13 Female	9,554 (88.3)	1,271 (11.7)	
t2.14 Cultural or racial origin			8.73**
t2.15 White	13,175 (89.5)	1,543 (10.5)	
t2.16 Visible minority	5,168 (90.9)	517 (9.1)	
t2.17 Marital status			23.07***
t2.18 Married	9,718 (90.7)	997 (9.3)	
t2.19 Common law	1,296 (87.3)	189 (12.7)	
t2.20 Widowed/separated/divorced	2,281 (88.7)	290 (11.3)	
t2.21 Single/never married	5,749 (89.7)	662 (10.3)	
t2.22 Level of education			43.52***
t2.23 Less than secondary school graduate	3,692 (92.2)	311 (7.8)	
t2.24 Secondary school graduate	3,416 (90.1)	376 (9.9)	
t2.25 Some post-secondary graduate	1,000 (86.3)	159 (13.7)	
t2.26 Post-secondary graduate	10,262 (89.4)	1,211 (10.6)	
t2.27 Annual personal income			108.15***
t2.28 No income/less than $20,000	4,181 (86.9)	633 (13.1)	
t2.29 $20,000 to $39,999	3,825 (88.3)	505 (11.7)	
t2.30 $40,000 to $59,999	2,754 (91.4)	260 (8.6)	
t2.31 $60,000 to $79,999	1,659 (90.5)	175 (9.5)	
t2.32 $80,000 and above	2,092 (91.2)	201 (8.8)	
t2.33 Missing data	4,561 (92.4)	373 (7.6)	
t2.34 Has a regular medical doctor			93.17***
t2.35 Yes	17,515 (90.5)	1,838 (9.5)	
t2.36 No	1,545 (83.4)	307 (16.6)	
t2.37 Self-perceived physical health			407.41***
t2.38 Good	17,254 (91.3)	1,641 (8.7)	
t2.39 Poor	1,759 (77.8)	503 (22.2)	
t2.40 Self-perceived mental health			469.59***
t2.41 Good	17,681 (91.1)	1,717 (8.9)	
t2.42 Poor	966 (72.7)	363 (27.3)	
t2.43 Difficulties in carrying out IADL			490.24***
t2.44 No	17,419 (91.4)	1,637 (8.6)	
t2.45 Yes	1,622 (76.2)	508 (23.8)	
t2.46 Sense of community belonging			125.98***
t2.47 Strong	12,791 (91.6)	1,176 (8.4)	
t2.48 Weak	5,651 (86.5)	880 (13.5)	

**$p<0.01$; ***$p<0.001$

(AOR=1.99, $p<0.001$, 95 % CI=1.69–2.33). Lastly, an increase in chronic condition score by one increases the odds of having unmet health-care needs by a factor of 42 % (AOR=1.42, $p<0.001$, 95 % CI=1.36–1.47).

Table 3 Multivariate logistic regression predicting the likelihood of having unmet health-care needs (adjusted model)

Variables	Model 1		Model 2		Model 3		Model 4	
	AOR	95 % CI	AOR	95 % CI	AOR	95 % CI	AOR	95 % CI
Predisposing factors								
Age (70 years and above)								
12 to 19 years	0.90 ns	0.66–1.23	0.91 ns	0.67–1.25	3.05***	2.18–4.28	3.04***	2.17–4.26
20 to 29 years	1.71***	1.34–2.17	1.57***	1.23–2.00	3.76***	2.89–4.90	3.65***	2.80–4.75
30 to 39 years	1.84***	1.47–2.29	1.89***	1.50–2.38	3.39***	2.65–4.32	3.30***	2.59–4.22
40 to 49 years	1.61***	1.30–2.00	1.69***	1.35–2.11	2.59***	2.04–3.28	2.54***	2.00–3.22
50 to 59 years	1.78***	1.44–2.20	1.89***	1.52–2.35	2.54***	2.02–3.20	2.51***	2.00–3.16
60 to 69 years	1.29*	1.03–1.62	1.31*	1.04–1.65	1.55***	1.22–1.98	1.54***	1.21–1.96
Gender (male)								
Female	1.51***	1.34–1.66	1.46***	1.32–1.61	1.33***	1.20–1.48	1.34***	1.20–1.49
Cultural or racial origin (White)								
Visible minority	0.82***	0.73–0.92	0.76***	0.68–0.85	0.88*	0.78–0.99	0.87*	0.78–0.98
Marital status (married)								
Common-law	1.24*	1.04–1.49	1.18 ns	0.99–1.42	1.09 ns	0.90–1.31	1.06 ns	0.88–1.28
Widowed/separated/divorced	1.19*	1.02–1.39	1.13 ns	0.96–1.32	0.91 ns	0.77–1.08	0.90 ns	0.76–1.07
Single/never married	1.31***	1.13–1.52	1.20*	1.03–1.39	1.00 ns	0.86–1.17	0.99 ns	0.84–1.16
Enabling factors								
Level of education (less than secondary school graduate)								
Secondary school graduate			0.90 ns	0.76–1.09	1.14 ns	0.94–1.38	1.12 ns	0.92–1.36
Some post-secondary graduate			1.26*	1.01–1.59	1.53***	1.21–1.94	1.49***	1.18–1.89
Post-secondary graduate			1.03 ns	0.87–1.21	1.35***	1.14–1.61	1.33***	1.12–1.58
Annual personal income (no income/less than $ 20,000)								
$20,000 to $39,999			0.83**	0.72–0.95	1.04 ns	0.90–1.20	1.03 ns	0.90–1.20
$40,000 to $59,999			0.59***	0.50–0.69	0.91 ns	0.76–1.08	0.90 ns	0.76–1.08
$60,000 to $79,999			0.67***	0.55–0.82	1.05 ns	0.86–1.29	1.05 ns	0.86–1.29
$80,000 and above			0.63***	0.52–0.77	1.09 ns	0.89–1.33	1.09 ns	0.89–1.33
Missing data			0.62***	0.53–0.73	0.79**	0.67–0.93	0.79**	0.67–0.93
Has a regular medical doctor (yes)								
No			1.68***	1.45–1.95	2.03***	1.74–2.36	1.99***	1.71–2.32
Need factors								
Self-perceived physical health (good)								
Poor					1.34***	1.14–1.57	1.29***	1.10–1.52
Self-perceived mental health (good)								
Poor					1.73***	1.46–2.05	1.67***	1.41–1.98
Difficulties in carrying out ADL (no)								
Yes					1.98***	1.69–2.32	1.99***	1.69–2.33
Chronic condition score					1.42***	1.36–1.48	1.42***	1.36–1.47
Sense of community belonging								
Sense of community belonging (strong)								
Weak							1.27***	1.15–1.41
Model chi-square (sig)	169.62 (0.001)		294.62 (0.001)		1,156.89 (0.001)		1,177.28 (0.001)	
Sensitivity %	55.6		56.7		71.8		72.0	
Specificity %	58.4		60.2		57.8		57.9	
Overall percentage correctly classified	55.9		57.0		70.4		70.6	

*$p<0.05$; **$p<0.01$; ***$p<0.001$; ns=not significant

Sense of community belonging had a significant independent effect on unmet health-care needs. Controlling for predisposing, enabling, and need factors, respondents with a weak sense of community belonging were 1.27 times more likely to report having unmet health-care needs when compared to respondents with a strong sense of community belonging (AOR=1.27, $p<0.001$, 95 % CI=1.15–1.41).

Examination of the model fitness statistics indicates that the multivariate model was fit. Sense of community belonging and all the other explanatory variables made significant contributions to the model. Based on the Nagelkerke pseudo R square, all the variables explained about 12.8 % of the variation in unmet health-care needs, of which 1.56 % is attributable to sense of community belonging. However, it should be noted that logistic regression does not have the equivalent of an R square as found in ordinary least squares (OLS) regression. We suggest interpreting the Nagelkerke pseudo R square with some degree of caution even though it is still informative. The omnibus model chi-square test result was significant (χ^2=2,380.58, $p<0.001$) for each model and in the final model; 70.6 % of the respondents were correctly classified as having unmet health needs versus not having unmet health-care needs.

Discussion

This cross-sectional study examined the prevalence and associated factors of unmet health-care needs in adults in the province of Ontario, Canada. The purpose of this study was to determine the specific impact of an individual's sense of community belonging on unmet health-care needs, adjusting for predisposing, enabling, and need factors. Many of the current findings converge with previous research and are fairly consistent with the behavioral model of access to health services.

The study found that one in ten respondents reported having unmet health-care needs. This proportion is comparable to findings in other recent Canadian studies, reporting that about 12 % of the population have unmet health-care needs (Sanmartin et al. 2002; Sibley and Glazier 2009). In the final multivariate logistic regression model containing all the explanatory variables, respondents who were younger, female, more educated, and of visible minority status were more likely to report having unmet health-care needs. In addition, respondents without a regular medical doctor, as well as those who perceived their physical and mental health to be fair or poor, had difficulties in carrying out IADL or had more chronic conditions reported an increased likelihood of having unmet health-care needs.

As hypothesized, having a weak sense of community belonging was also significantly associated with having unmet health-care needs. It is likely that individuals with a weak sense of community belonging have fewer social support networks in their respective communities to turn to for help or advice in times of need. Thus, these individuals may not be aware of where or how to access adequate or appropriate health care (Bryant et al. 2009; Ellen et al. 2001). The finding that having a weak sense of community belonging is related to unmet health-care needs also underscores the role of the community in meeting the health-care needs of individuals in addition to individual-level and health-related factors, which has been a more common focus of research attention. This reinforces the findings of various studies that have argued and demonstrated the importance of community-related factors in understanding access to health services (Arku et al. 2011; Baiden et al. 2011; Ellen et al. 2001; Macintyre et al. 2002; Schempf and Kaufman 2012). The current findings suggest that in order to ensure that individuals receive adequate health care, there is a need for interventions that create favorable conditions for individuals to take an active part in community activities. This would help strengthen community networks as part of a wider strategy for enhancing access to health-care services. Although the finding of this study suggests that sense of community belonging may be an important factor explaining unmet health-care needs, it is important to note that it may also be the result of a common attitudinal characteristic. For instance, individuals who are not happy about their community are also likely to be critical of the health-care system, even though, objectively, they receive adequate care. Thus, it is possible that the finding regarding sense of community belonging demonstrates an individual psychological characteristic and not necessarily the effect of the neighborhood on unmet health-care needs.

The finding that younger individuals are more likely to have unmet health-care needs is consistent with previous research (Cavalieri 2013) and highlights the fact that expectations about the health-care system may vary across an individual's lifespan. Younger individuals tend to have higher expectations than the elderly; thus, they are more likely to be dissatisfied with the care received (Cavalieri 2013; Moret et al. 2007; Peck et al. 2004). These individuals are also more likely to have demanding jobs that make it more difficult to receive health services. Because of the many health problems associated with old age, individuals who are older are more likely to have access to a regular medical doctor whom they can consult in times of need. Job demands and greater expectations from the health-care system by individuals with higher education may also contribute to their increased unmet health-care needs (Bryant et al. 2009).

The findings that females are more likely to have unmet health-care needs both corroborate (see, e.g., Argintaru et al. 2013; Bryant et al. 2009; Cavalieri 2013; Raphael et al. 2010; Singh et al. 2013) and contradict past studies (Momtaz et al. 2012). Bryant et al. (2009), for instance, noted that job

conditions at work and caregiving duties at home for dependent children and elderly family members may explain the presence of increased unmet health-care needs in women. These multiple roles leave women with less time to seek care for themselves (Cavalieri 2013; Gogoi et al. 2014; Raphael et al. 2010). Others have argued that while more frequent contact with the health-care system, either through child birth or annual physical checkups, presents women with more opportunities to access health, it also predisposes them to a higher likelihood of experiencing difficulties with the health-care system. As a result, women's overall impressions about their health needs are likely to reflect the balance between these two dynamics at a given point in time (Cavalieri 2013; Singh et al. 2013).

The findings that respondents without access to a regular doctor are more likely to have unmet health-care needs highlights the role of the primary care provider as a gateway to accessing health-care services (Argintaru et al. 2013; Singh et al. 2013). As expected, the findings suggest that ensuring an adequate number of family physicians to serve the members of a community is extremely important in preventing unmet health needs. Poor physical and mental health (Argintaru et al. 2013; Sunderland and Findlay 2013), difficulties in carrying out IADL (Allen and Mor 1997; Gaugler et al. 2005; Park 2003), and the presence of chronic conditions are major drivers of health-care service use (Argintaru et al. 2013; Cavalieri 2013; Momtaz et al. 2012). Individuals with these conditions require greater care and are therefore more likely to have unmet needs.

The presence of needs factors, such as chronicity of illness, physical health, and mental health status, are critical in accessing health care, but enabling factors are also important, particularly sense of community belonging. Social factors influence individuals' health outcomes through various ways including cognitive, attachment, and behavioral pathways (Holt-Lunstad and Smith 2012). In addition, the absence of a family physician can aggravate the problem of mental illness and poor physical health in poor neighborhoods (Kitchen et al. 2012). Reaching out to individuals through community avenues, such as community centers, libraries, and grocery stores, regarding access to health care may be important platforms for raising awareness among individuals who may otherwise not be aware of the kinds of health services available to them within their community.

Regularly asking individuals with health problems whether their health needs are being met, regardless of the community setting (e.g., walk-in clinic, hospital, recreational facility, community center, mental health center, etc.), may also be a helpful method for identifying individuals at risk for unmet health-care needs. Recommendations can then be made to help prevent additional unmet health-care needs in the future. Research consistently reports that individuals with unmet health needs are more likely to have chronic health and mental health needs (Shippee et al. 2012; Sibley and Glazier 2009). Thus, when individuals receive treatment for physical or mental health problems, it may be beneficial for health-care professionals to also enquire about their patients' various health needs and whether they are being met, as well as whether they have easy access to health services (e.g., a regular medical doctor). The current study findings indicate that inquiring about an individual's sense of community belonging is important as well, particularly for individuals who have unmet health-care needs. If identified, educating these individuals on how and where to access care or advice on how to get a family medical doctor may contribute to improved health and wellbeing for Canadians.

Limitations

There are a few limitations to this study that deserve consideration. First, health status and health-care access were self-reported and thus are subjective accounts. When reporting unmet needs for health care, individuals may not be aware of what care is available to them or may expect care that is not appropriate. Second, sense of community belonging was assessed using a single item that asked respondents "How would you describe your sense of belonging to your local community?" What constitutes "local community" is subject to individuals' interpretation. An individual may interpret local community to mean the street on which he or she lives, whereas local community for another individual may mean the town or city in which he or she lives. Also, the use of this item taps into individuals 'sense' of community belonging, which may be different from actual community belonging. However, this item has been used in many other studies and has been found to conceptually link individuals to their neighborhood context (Choenarom et al. 2005; Kitchen et al. 2012). Third, the cross-sectional nature of the study does not allow for causal inferences between unmet health-care needs and the associated factors. A longitudinal study is recommended to further clarify the relationships between unmet health-care needs and the factors identified in the current study. Lastly, the different experiences of perceived unmet health-care needs (e.g., whether health care was received but unsatisfactory or whether services were never obtained) are not distinguishable in the current study. This limits interpretation of the results, particularly in relation to policy options that might be considered to reduce the occurrence of unmet needs.

Conclusion and study implications

Despite the universal provision of health insurance in Canada, barriers continue to exist in accessing adequate health services. These barriers may be related to non-financial factors such as having competing priorities (e.g., employment) or having a weak sense of community belonging. It is important

to develop health-care policies and programs that are appropriate and meet the needs of individuals with health-related problems and who are without adequate support from their communities. It is also crucial for policies and programs to create supportive environments by enhancing community resources, including reasonable access to community-based treatment and prevention programs. It is equally important that policies reflect differences in socioeconomic and cultural characteristics of individuals. As well, when individuals have contact with the health-care system, assessments should be put in place to help identify them and address these factors as early as possible to reduce potential barriers. Efficient but comprehensive assessments identifying key predictors of unmet mental health needs, including sense of community belonging, in all health-related settings may be an effective way to identify individuals at risk of having unmet health-care needs.

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References

Aday LA, Andersen RM (1974) A framework for the study of access to medical care. Health Serv Res 9:208–220

Allen SM, Mor V (1997) The prevalence and consequences of unmet need: contrasts between older and younger adults with disability. Med Care 35(11):1132–1148

Allin S, Grignon M, Le Grand J (2010) Subjective unmet need and utilization of health care services in Canada: what are the equity implications? Soc Sci Med 70(3):465–472

Andersen RM (1995) Revisiting the behavioral model and access to medical care: does it matter? J Health Soc Behav 36(1):1–10

Andersen RM, Newman JF (2005) Societal and individual determinants of medical care utilization in the United States. Milbank Q 83(4):1–28

Argintaru N, Chambers C, Gogosis E, Farrell S, Palepu A, Klodawsky F, Hwang SW (2013) A cross-sectional observational study of unmet health needs among homeless and vulnerably housed adults in three Canadian cities. BMC Pub Health 13(1):577

Arku G, Luginaah IN, Mkandawire P, Baiden P, Asiedu AB (2011) Housing and health in three contrasting neighbourhoods in Accra, Ghana. Soc Sci Med 72(11):1864–1872

Arku G, Mkandawire P, Luginaah IN, Baiden P (2013) Healthcare access in three residential neighbourhoods in Accra, Ghana. In: Weeks JR, Hill AG, Stoler J (eds) Spatial Inequalities. Springer, The Netherlands, pp 191–204

Baiden P, Arku G, Luginaah IN, Asiedu AB (2011) An assessment of residents' housing satisfaction and coping in Accra, Ghana. Public Health 19(1):29–37

Bailey M, McLaren S (2005) Physical activity alone and with others as predictors of sense of belonging and mental health in retirees. Aging Ment Health 9(1):82–90

Bonuck KA, Arno PS, Green J, Fleishman J, Bennett CL, Fahs MC, Maffeo C (1996) Self-perceived unmet health care needs of persons enrolled in HIV care. J Commun Health 21(3):183–198

Bryant T, Leaver C, Dunn J (2009) Unmet healthcare need, gender, and health inequalities in Canada. Health Policy 91(1):24–32

Carr W, Wolfe S (1976) Unmet needs as sociomedical indicators. Int J Health Serv 6(3):417–30

Cavalieri M (2013) Geographical variation of unmet medical needs in Italy: a multivariate logistic regression analysis. Int J Health Geogr 12(1):27

Chen J, Hou C, Sanmartin C, Houle S, Tremblay S, Berthelot J (2002) Unmet health care needs. Can Soc Trends 67:18–22

Choenarom C, Williams RA, Hagerty BM (2005) The role of sense of belonging and social support on stress and depression in individuals with depression. Arch Psychiat Nurs 19(1):18–29

Ellen IG, Mijanovich T, Dillman KN (2001) Neighborhood effects on health: exploring the links and assessing the evidence. J Urban Aff 23(3–4):391–408

Gaugler JE, Kane RL, Kane RA, Newcomer R (2005) Unmet care needs and key outcomes in dementia. J A Geriatr Soc 53(12):2098–2105

Gogoi M, Unisa S, Prusty K (2014) Utilization of maternal health care services and reproductive health complications in Assam. India Public Health (epub ahead of print) DOI. doi:10.1007/s10389-014-0614-y

Herr M, Arvieu JJ, Aegerter P, Robine JM, Ankri J (2013) Unmet health care needs of older people: prevalence and predictors in a French cross-sectional survey. Eur J Pub Health. doi:10.1093/eurpub/ckt179, 1–6

Holt-Lunstad J, Smith TB (2012) Social relationships and mortality. Soc Personal Psychol Compass 6(1):41–53

Hystad P, Carpiano RM (2012) Sense of community-belonging and health-behaviour change in Canada. J Epidemiol Commun H 66(3):277–283

Katz LF, Kling JR, Liebman JB (2001) Moving to opportunity in Boston: early results of a randomized mobility experiment. Q J Econ 116(2):607–654

Kitchen P, Williams A, Chowhan J (2012) Sense of belonging and mental health in Hamilton, Ontario: an intra-urban analysis. Soc Indic Res 108(2):277–297

Lochner K, Kawachi I, Kennedy BP (1999) Social capital: a guide to its measurement. Health Place 5(4):259–270

Luginaah IN, Arku G, Baiden P (2010) Housing and health in Ghana: the psychosocial impacts of renting a home. Int J Environ Res Public Health 7(2):528–545

Macintyre S, Ellaway A, Cummins S (2002) Place effects on health: how can we conceptualise, operationalise and measure them? Soc Sci Med 55(1):125–139

Momtaz YA, Hamid TA, Ibrahim R (2012) Unmet needs among disabled elderly Malaysians. Soc Sci Med 75(5):859–863

Moret L, Nguyen JM, Pillet N, Falissard B, Lombrail P, Gasquet I (2007) Improvement of psychometric properties of a scale measuring inpatient satisfaction with care: a better response rate and a reduction of the ceiling effect. BMC Health Serv Res 7(1):197

Park JM (2003) Equity of access to long-term care among the American elderly. Public Health 11(2):121–130

Peck BM, Ubel PA, Roter DL, Goold SD, Asch DA, Mstat ASJ et al (2004) Do unmet expectations for specific tests, referrals, and new medications reduce patients' satisfaction? J Gen Intern Med 19(11):1080–1087

Putnam RD (1993) The prosperous community. American Prospect 4(13):35–42

Putnam RD (2001) Social capital: measurement and consequences. Can J Policy Res 2(1):41–51

JnlID 10389_ArtID 635_Proof# 1 - 08/07/2014

Raphael D, Bryant T, Rioux MH (eds) (2010) Staying alive: critical perspectives on health, illness, and health care. Scholars' Press, Canadian

Sanmartin C, Houle C, Tremblay S, Berthelot JM (2002) Changes in unmet health care needs. Health Reports/Statistics Canada 13(3):15

Schempf AH, Kaufman JS (2012) Accounting for context in studies of health inequalities: a review and comparison of analytic approaches. Ann Epidemiol 22:683–690

Shippee ND, Call KT, Weber W, Beebe TJ (2012) Depression, access barriers, and their combined associations with unmet health needs among publicly insured individuals in Minnesota. Soc Ment Health 2(2):85–98

Sibley LM, Glazier RH (2009) Reasons for self-reported unmet healthcare needs in Canada: a population-based provincial comparison. Health Policy 5(1):87–101

Singh PK, Singh L, Kumar C, Rai RK (2013) Correlates of maternal healthcare service utilisation among adolescent women in Mali: analysis of a national representative cross-sectional survey, 2006. Public Health 21(1):15–27

Statistics Canada (2013) Canadian Community Health Survey—Annual component, 2012), http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3226. Accessed January 10th 2014

Sunderland A, Findlay LC (2013) Perceived need for mental health care in Canada: results from the 2012 Canadian community health survey–mental health. Health Reports/Statistics Canada 24(9):3–9

Young AF, Russell A, Powers JR (2004) The sense of belonging to a neighbourhood: can it be measured and is it related to health and well being in older women? Soc Sci Med 59(12): 2627–2637

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