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Build it and they will come: Volunteer Opportunities and Volunteering[*]

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Abstract

Formal volunteering takes place on behalf of charitable or non-profit organizations. While the physical presence of these organizations is usually required for citizens who want to volunteer, the physical presence of charitable organizations varies from neighbourhood to neighbourhood. Until now, no one has examined the role of charity proximity on volunteer decisions. In this paper we use information on the location of registered charities in Canada merged with survey information on the location of individuals and their volunteering decisions to examine how the physical proximity of charities ('Access') affects volunteer behaviour. Careful attention is paid to the possibility that the measure of access might be endogenous: organizations and volunteers may respond to the same unobservable factors when deciding where to locate. Our results imply that access does matter for the decision to volunteer as well as for the amount of time devoted to volunteering: increasing the number of charitable organizations within a one-kilometre buffer around an individual's place of residence by 1% increases the predicted probability of volunteering by 0.9%. We find that the impact of an additional charity on the likelihood of volunteering decreases with distance to the individual's residence, suggesting that the location of charities, indeed, matters when it comes to influencing volunteering behaviour.

Key words: Volunteer, Geo-coding, Endogeneity, Proximity to charities, Charitable organizations.

JEL Classification: R12; H49.

1. Introduction

Approximately 40% of the Canadian population volunteers time in the non-profit sector. Many factors influence volunteering, including education, income, religiosity and health (e.g., Brown and Lankford, 1992; Sundeen and Raskoff, 1994; Day and Devlin, 1998; Pilivan and Seigel, 2007; Guo et al., 2013). It is also affected by the physical characteristics of a neighbourhood (Baum and Palmer, 2002). Individuals who perceive their neighbourhoods to be friendly for walking, with easy access to the likes of libraries, cultural and recreational facilities are more apt to participate in social and volunteer activities (Richard et al., 2009; Ziersch et al., 2011; Dury et al., 2014).

A related but hitherto unexplored factor influencing volunteer behaviour is physical access to volunteer opportunities. Proximity to volunteer opportunities can affect volunteer behaviour in at least two ways: by increasing awareness of volunteer opportunities and, by decreasing the time-costs of participation. This paper is the first to link information on the location of charitable organizations to information on the location of individuals to see if proximity influences the decision to volunteer and the amount of time volunteered.

We obtain information on the location of charities from the annual T3010 form submitted to the Canada Revenue Agency (CRA) by all registered charities as a condition of maintaining their charitable status. Information about individuals is taken from Statistics Canada's General Social Surveys (2003, 2005, 2008 and 2010). Examining the link between proximity to charities and volunteering is complicated by the fact that neither individuals nor charitable organizations randomly select their locations. We deal with this endogeneity problem using a control function approach – an approach similar to instrumental variables but better suited to situations where the dependent variable is dichotomous – and then we ensure that our results are consistent with

causality by examining their sensitivity to different measures of proximity. In theory there should be less information regarding volunteer opportunities and higher time costs for volunteering for charities located further away. We thus estimate if the effect of proximity decreases as the radius for measuring access around a person's abode grows. In addition, sample restrictions allow us to examine the sensitivity of the access effect for individuals whose location decisions were made more than 10 years ago and which might then be considered 'less endogenous'.

Proximity to charitable organizations does indeed influence both the decision to volunteer and the intensity (hours) of volunteering. For example, increasing by 1% the number of charitable organization within a one kilometre radius of an individual's home increases the predicted probability of volunteering by about 0.9%. The larger the radius, the smaller is the effect of increasing the number of organizations on the decision to volunteer, consistent with the interpretation that it is the proximity to charities that leads individuals to volunteer more. We also conclude proximity is more important for individuals with full time jobs, and for those with higher income, relative to poorer, unemployed individuals pointing to the significance of the time costs for volunteering on this activity.

2. The Importance of Environment

While no one has hitherto looked at whether proximity to charitable organizations influences volunteering, the impact of other aspects of physical environment on volunteering has been studied. Curtis et al. (1992) find that people who live in smaller communities (rural areas and small towns) are more likely to participate in volunteer activities than those from bigger cities. A similar link was found between community size and volunteering in the teenage population (Sundeen et al., 1994). By contrast, Hooghe and Botterman (2012) find no evidence of an urban-rural divide on the scope or intensity of participation in volunteer associations in

general, but when they distinguish between different types of volunteer organizations, they find that urbanization has a negative effect on participation in traditional associations like senior citizens' or family groups as opposed to more modern forms of associations such as youth and women's associations. Choi et al. (2003) use the American Asset and Health Dynamics Among the Oldest Old (AHEAD) (1993) survey of 6,465 persons aged 70 or more and conclude that those living in the US South are less likely to take part in volunteer activities relative to those living in the West. Broadening the question to include civic participation, Oliver et al. (2000) find that individuals living in smaller communities are much more likely to participate in a variety of local civic activities than those living in larger cities. One American paper finds a positive and significant relationship between the density of non-profit organizations per 1,000 persons at the state level and the volunteering rate (Rotolo and Wilson, 2011).

Macro-level indicators may mask a variety of local effects. Dury et al. (2014) investigate the associations between neighbourhood characteristics and taking part in volunteer activities by older people in Belgium. They use the perception of physical-social dimensions of the neighbourhood and municipal features to control for environmental factors, and find that connectedness, satisfaction and the presence of services in a neighbourhood have a positive effect on the volunteer activities of older individuals. Some studies look at neighbourhood characteristics and participating in a broader range of community activities; for instance, Baum et al. (2002) use data from Australia and find that participation in social and civic activities is encouraged with access to recreational facilities, open spaces and gathering spaces, and discouraged when such opportunities are lacking. In another Australian study, Ziersch et al. (2011) find that perceived social cohesion and higher ratings for local shops and recreational facilities have a positive effect on local community group participation. A positive perception of

neighbourhood was found to influence the social activities of older people in Britain (Bowling et al., 2007), in Belgium (Buffel et al., 2013; Dury et al., 2014),) and in Quebec, Canada (Richard et al., 2009 and 2013).

The importance of proximity has been explored in contexts other than volunteering. Saberton et al. (2009) employ geo-coded data on the location of blood donor clinics and the location of donors in 40 urban communities in Canada and find a significant positive relationship between access to clinics and blood donations – a finding subsequently corroborated by Esita (2012) for the City of Hamilton; Cimaroli et al. (2012) use similar data for the Toronto metropolitan area, and show that individuals with higher levels of accessibility to the clinics are more likely to return back to donate blood. Chen et al. (2009) examine the relationship between access to fast food restaurants and grocery stores on obesity in the US city of Indianapolis. They count the number of fast food restaurants and grocery stores within a 0.5 mile radius/buffer of an individual's home address, concluding that proximity to these outlets has a small, but significant effect on an individual's body mass index. Spence et al. (2009) find a positive relationship between the numbers of fast-food restaurants, convenience grocery stores and produce vendors near an individual's house and the risk of becoming obese, a finding that is corroborated by Hollands et al. (2014) using Canadian data. Proximity to employment opportunities affects employment and earnings according to Aslund et al. (2010) in a study of refugees arriving in Sweden in 1990-1991.

3. Data

Under the *Income Tax Act* registered charities in Canada must file a T3010 form every year in order to maintain their charitable status. We use "research ready" T3010 data for 2003 to 2009 (incomplete data was available to 2012) available through the Public Economics Data

Analysis Laboratory (PEDAL) of McMaster University. Among other things, we know the name, location, and business number of all charitable organizations in Canada. Herein 'charity' refers to all of these registered charities of which about 90% are charitable organizations and 10% are charitable foundations.[1] There were 78,205 charities in 2003 and 83,668 in 2009. Over 80% of these organizations are located in four provinces: Ontario (35%), Quebec (20%), British Columbia (14%) and Alberta (11%). Religious organizations are the most common and comprise some 39% of the sample, followed by social welfare (21%), education (11%), and culture and arts (9%).

The literature on urban planning suggests several ways to create a measure of the number of charitable organizations in an individual's neighbourhood. The simplest method is the container approach which adds up the total number of, in our case, charitable organizations within a defined geographic unit (e.g., six-digit postal code, three-digit postal code (known as the Forward Sortation Area or FSA), or census tract). But, this approach may inaccurately report "weak access" for an individual who lives close to charitable organizations located in a different geographic boundary, or "high access" for an individual who lives far from organizations in the same geographic boundary.

The "coverage" approach (e.g. Talen and Anselin, 1998) addresses this problem by counting the number of organizations physically located within a given distance from the individual's place of residence as indicated by their postal code (the smallest geographic location indicator available in Canada). We use Canada Post's Postal Code Conversion File (PCCF) to

[1] The CRA designates a registered charity as a charitable organization, a public foundation or a private foundation. The primary mission of charitable organizations is to deliver goods and services while foundations are aimed to raise funds and distribute these funds among charitable organizations. Both foundations and charitable organizations can provide volunteer opportunities. According to information provided in the T3010 forms, more than 80% of foundations rely only on unpaid staff to run their organizations.

obtain the longitude and latitude (x,y) coordinates of each charitable organization based on the reported postal code from their T3010 form, and for each individual respondent of the Statistics Canada General Social Surveys (GSS) (2003, 2005, 2008 and 2010) based on the reported postal code of their residence. The process of assigning x, y coordinates is called *geocoding* and allows distances between individuals and charities to be calculated. For each province, we calculate the number of organizations that fall within five different radii (from one to five kilometres) around the survey respondent's home and use this number to capture access to charitable organizations. We include both this measure of Access as well as its square to capture potential nonlinearity in the relationship between access and volunteer decisions.

The Statistics Canada General Social Survey (GSS) is a nationally representative cross-sectional telephone survey that covers one topic annually. The GSS cycles on time use (2005 and 2010) and social engagement (2003 and 2008) are used in this study as they ask respondents if they engaged in formal volunteering (unpaid volunteer work for an organization) in the past 12 months; these surveys provide the much-needed information on the postal codes of respondents. Comparing the location of individuals with that of the registered charities, we find substantial variation in access to charitable organizations across individuals in the sample. Approximately 23% percent of individuals in our sample have zero charitable organizations within a one kilometre radius of their home; increasing the size of the threshold to five kilometres drops the number of individuals with zero charities to 1%. Over 60% of our sample of respondents has between 1-20 charities within one kilometre, and more than 80 charities within five kilometres of their home. The distribution of charities varies dramatically between individuals living in urban and rural areas. In urban areas about 11% percent of individuals have zero charities within one kilometre of their residential location while in rural areas this number is 60%.

Not surprisingly, the highest number of charitable organizations is found for postal codes located in the primary central business district (CBD) areas in Canada's largest cities: Toronto, Vancouver and Montreal. For example, an individual living in downtown Toronto is surrounded, on average, by 695 charitable organizations within one kilometre of his or her home. Of these charities, 306 have unique addresses, 264 share addresses with at least one other charity but have unique suite numbers, and 125 charities share a suite with at least one other charity. Although each charitable organization has a unique business number, their extensive concentration in one place may result in them sharing volunteers to perform joint tasks.

In addition to asking respondents if they volunteered in the past 12 months, the GSS cycles employed here report the average number of hours volunteered per month in a categorical variable format. Following Turcotte and Gaudet (2013), we consider people who volunteered an average of five or more hours per month as regular volunteers, people with fewer than five hours as irregular volunteers and others as non-volunteers. Beginning with a total of 80,339 observations over the four GSS cycles (2003, 2005, 2008 and 2010), we restrict the sample to respondents aged 19 years and over to avoid confounding our estimates with "mandatory" high school community service policies in Ontario, British Columbia and Newfoundland; we exclude the 0.7% of the sample who do not report on their volunteer activities; 11% of the sample did not report or reported incorrectly their residential six digit postal code. Our usable sample contains 68,023 observations.

Table 1 defines the variables used in this study. Our regressions include controls for sex, age, marital status, education, employment status, household income, the age of the youngest child in the household, a measure of religiosity, perceived health status, the length of time living in current neighbourhood, and, for immigrants, length of time lived in Canada. We control for

whether the respondent lives in an urban or rural area, the province of residence, and the individual's perception of the friendliness of their neighbourhood and the population density.. Population density may independently affect volunteer outcomes. Living in close geographical proximity to others may create bridges between people to share concerns about common problems and promote civic engagement (e.g., Stein and Dillingham, 2004), but may spoil social networks and connectedness between citizens (e.g., Oliver, 2000). We include estimates of population size at the one to five kilometre buffer sizes.[2] Year dummy variables capture time variant effects.

Table 2 presents some descriptive statistics for the usable sample, also grouped by whether or not the respondent volunteered. About 37% of GSS respondents were involved in formal volunteer activities over the past 12 months, and most (22%) volunteered at least five hours per month. The mean age in both the volunteer and non-volunteer subsamples is 46 years. Women participate more in volunteer activities than men; 70% of the sample has more than high school education and volunteers have a higher level of education than non-volunteers. Approximately 21% of individuals live in households that earn an annual income of less than $40,000 and volunteering is more common among individuals with higher household income. Employed people, either in full-time or part-time work have a higher volunteer rate than those who are unemployed. More than half of the respondents report that they are in excellent or very good health. Rural residents comprise nearly 20% of the full sample but 22% of all volunteers indicating a higher volunteer participation rate for this group.[3]

[2] As data on population size at the postal code level is not available, we estimate population density by using population data from the 2006 and 2011 censuses at the dissemination block (DB) level, the smallest geographic level available for population estimates. We assign each postal code to the appropriate DB using the PCCF file and divide the population size at the DB by the number of postal codes in the DB, under the assumption that that the population is equally distributed across postal codes. Finally we sum the population for each postal code that falls within the one to five kilometre distance bands.

[3] In fact the volunteer participation rate is 42% for rural residents as compared to 36% for urban residents.

The average number of charitable organizations within one to five kilometres of the individual's place of living is 18, 59, 115,184 and 264 respectively and is similar for the volunteer and non-volunteer subgroups. But averages mask significant heterogeneity in access to charitable organizations across regions, table 3 presents the number of charities in each buffer size (1-5kms) by population quantile for volunteers and non-volunteers. Once differences in population size accounted for, we see that the number of charities around individuals' homes is consistently higher for volunteers than non-volunteers with larger differences for respondents living in more densely populated neighbourhoods.

4. Methodology

Because the outcome variable is either dichotomous (do you volunteer: yes or no) or categorical (regular, irregular and non-volunteer), a probit or ordered probit approach makes sense. Measures of access may be correlated with unobserved factors associated with individuals' and/or charitable organizations' location decisions and with individuals' unobserved propensity to volunteer. For example, individuals predisposed to volunteering may choose to locate in neighbourhoods that support their preferences and have a greater number of volunteer opportunities. Charitable organizations may choose to locate where there is a greater availability of workers and volunteers with specific skills. The standard instrumental variables method is not appropriate when employing probit or ordered probit models with endogenous explanatory variables as estimates are found to be biased and inconsistent. Maximum likelihood and control function approaches have been proposed to deal with this problem (Papke and Wooldridge, 2008; Lewbel et al., 2010). Here we use the control function (CF) approach, following others in different contexts (e.g., Petrin and Train, 2010; Liu et al., 2010, and Adepoju and Oni, 2012).

Like any instrumental variables approach, the CF approach requires an identifying instrument that is highly correlated with the accessibility measure, affects volunteer outcomes only through its effect on charitable organization locations and is unrelated to the unobserved individual characteristics affecting volunteering. We define proximity to charities within a 35 kilometre radius around a respondent's home address as an instrument for access measured at the one to five kilometre radii distances. The logic behind using this 'spatial' lag is that an individual's decision to live in a larger geographic area (say, Ottawa) is determined by a range of factors not associated with neighbourhood characteristics per se (like, job availability or family), but the corresponding decision to locate in a specific neighbourhood (say, Centertown in Ottawa) is a choice influenced by such characteristics. The 35 kilometre radius was chosen as it is the average land area of Census Metropolitan Areas (CMAs) in Canada. By assuming that individuals conduct their daily activities within their own cities, including inner and outer suburbs, this 35 kilometre band is large enough to take account of the geographic area around urban centres but it does not affect an individual's decision for selecting a neighbourhood of residence. This type of instrument has been employed in other contexts (e.g., Deri, 2005 and Hakansson et al., 2013).

The control function approach entails estimating equation (1) with the endogenous regressor ("Access" measured as one of one to five kilometre bands around the individual's postal code and its square) as a function of the instruments (35 kilometre access and its square) and then using the residuals from this model as an additional regressor in the main probit and ordered probit models (equation (2):

$$A_i = X_i\beta_1 + Z_i\beta_2 + Z_i^2\beta_3 + u_i \quad (1)$$

$$O_i = X_i\alpha_1 + A_i\alpha_2 + A_i^2\alpha_3 + \hat{u}_i\alpha_5 + \varepsilon_i \quad (2)$$

A_i is the endogenous access variable, A_i^2 is its square included to capture potential nonlinearity, X_i is the vector of explanatory variables previously described, Z is a vector of exogenous instruments (access measured at 35 kilometre radius and its square), $\hat{u}_i$ is the fitted value of residuals which are used in the second step, O_i is the outcome for an individual i. Technically, in the probit models the 'true' outcome indicator is actually a latent variable (often denoted with an asterisk, such as O_i^*) which is observed only if it takes a positive value. We use two outcome variables: the first takes the value one if the individual did any unpaid volunteer activities during the past 12 months and zero otherwise; the second measures the intensity of volunteering in three ordered categories: regular volunteering (5 or more hours per month), irregular volunteering (fewer than 5 hours per month) and non-volunteering. Note that as opposed to a regular IV regression where two first stage regressions are required when there are two endogenous regressors (A_i *and* A_i^2), following Wooldridge (2011) the independence of error terms and (X_i, Z_i, Z_i^2) is sufficient to have only one first stage regression in the control function approach.

5. Results

Table 4 presents the main results of the paper. Although we control for a large number of personal, household and neighbourhood characteristics, for space considerations we report only the estimated effects of access to charitable organizations on the probability of participation, and the intensity of volunteering. Full regression coefficient estimates for selected specifications are provided in the Appendix. Five different access variables are created, for each of one to five kilometres around each individual's place of residence. The first four columns present the results ignoring endogeneity, the latter four columns account for endogeneity. Note that Z-values are given in parentheses, GSS data are weighted by the probability weights provided by Statistics

Canada, and robust standard errors are estimated and bootstrapped with 150 iterations in the control function regressions.

Two diagnostic test statistics for the CF approach are reported at the bottom of table 4; they support the conclusion that the lagged spatial variable is a good instrument choice. The Durbin-Wu-Hausman Chi-squared test for the endogeneity of access to charitable organizations and volunteer outcomes rejects the null hypothesis of exogeneity for at all buffer sizes, implying that our measure of access should be considered endogenous. The first stage Cragg-Donald Wald F statistics which measure the correlation between the instrument and the number of charitable organizations at one to five kilometres are well above the minimally accepted benchmark ($F \geq 10$) indicating that the instruments are sufficiently correlated with the (endogenous) access variable.

The magnitudes of the CF coefficient estimates are larger than those reported for the probit and ordered probit models which are not what one would expect if omitted variables were the underlying cause of the endogeneity. Similarly higher estimated coefficients after controlling for endogeneity have been found in other contexts: Hakansson et al. (2013) and Aslund etal. (2010) find that, after controlling for residential sorting, access to jobs has a larger impact on employment when compared to the OLS specification. A larger point estimate using the CF approach is consistent with measurement error in the access variable which would bias downward the estimated probit and ordered probit models coefficients. There are at least two reasons to suspect measurement error. First, charitable organizations are not the only places where individuals can formally volunteer their time; they may also do so in other non-profit organizations. But we have limited information on these other types of non-profit organizations. Second, our approach to measuring 'access' based on postal codes will be more accurate for

urban than for rural areas. We explore these possible issues in a robustness exercise discussed below.

When looking at the dichotomous decision to volunteer, presented in columns (1) and (5), the estimated coefficients for Access are positive and highly statistically significant and for Access-squared they are negative but very small in magnitude. Together, these mean that volunteering increases with access to charitable organizations but at a slowly decreasing rate. For the ordered dependent variable (reported in columns (2) - (4), and columns (6) – (8) of table 4) we find that volunteering – both regular and irregular – increases with Access, and the probability of being a non-volunteer decreases with Access. These results suggest that looking at the volunteer-non-volunteer dichotomy makes sense, and that we do not gain much additional insight by considering the irregular-volunteer category.

Table 4 also presents the estimated marginal effect of Access (and its square) on the probability of volunteering (or of being an irregular volunteer), for each buffer size. This marginal effect gives the impact on the likelihood of volunteering associated with increasing the number of charities in the given buffer by one. The marginal effect is then the difference between average adjusted prediction of volunteering (AAP) evaluated at the mean of Access and Access squared holding other variables at their observed values and the AAP evaluated at the mean plus one. These marginal effects should be interpreted relative to the predicted probability that the reference individual volunteers, which is indicated (for the one kilometre specification) at the bottom of the table.[4]

[4] The reference individual is female, married/common law, with post-secondary diploma or certificate, works full-time, lives in a household with at least $100,000 income, has no children in household, has non-frequent religious attendance, has lived in her neighbourhood for more than 10 years, was born in Canada, is in excellent /very good health, lives in rural Ontario, thinks that people help each other in their neighbourhood, and is in the year 2010.

The marginal effect decreases with the size of the buffer: 0.0034, 0.0010, 0.0005, 0.0003, and 0.0002 for buffers of one to five kilometres around the individuals' postal code, representing an increase in the likelihood of volunteering of 0.89%, 0.26%, 0.13% , 0.08%; 0.05% for a 1% increase in the number of charities in the buffer.[5] Decreasing marginal effects with buffer size are consistent with causality between proximity to charities and volunteering: the impact of one more charity is greater the closer that charity is to the person's residence. While these magnitudes might seem small, they represent the estimated effect associated with only one additional charity. Over the period of our analysis (2003-2009), however, the number of charities in Canada grew by some 6%, and even more so (8%) in urban centres. If the number of charities in a one kilometre buffer around an individual's home increased by 6%, our estimates suggest this would increase the likelihood of volunteering by 5.3 %.

To speak to the economic significance of these results, we can compare them to the estimated effects of other, well established, influences on volunteering. For instance, it is well-known that higher education leads to more volunteering. Our results indicate that an increase of one standard deviation (0.44) in the proportion of respondents with a university degree (as compared to those with less than high school) would increase the probability of volunteering by about 5.7%, ceteris paribus – about the same amount as would a 6% increase in charities. Moreover, if the number of individuals who attend a place of worship regularly would increase by one standard deviation, it would raise the probability of volunteering by 9.9% – not even double the impact of proximity. Physical proximity to charitable organizations has a meaningful impact on volunteering.

[5] The percentage increases are calculated by dividing the marginal effects by the predicted probabilities.

While our main strategy to identify the causal effect of access on volunteering is the use of the CF approach, we consider two alternative strategies. First, we have argued that the decreasing effect of access as buffer size increases is consistent with a causal effect. We are assuming that the farther away the charity is from home, the less likely the individual will know about volunteer opportunities in that charity and the more costly it would be time-wise to work in that charity. However, our calculation of buffers as concentric circles of increasing size around an individual's postal code is a potentially misleading way of ascertaining the importance of distance because we are including all of the charities in the one kilometre buffer when we look at the two kilometre buffer effect, all of the charities in one and two kilometre buffers when looking at the three kilometre buffer effect, and so on. With this specification, observing a decreasing effect with buffer size may reflect the fact that increasing the number of charitable organization by one unit should be larger in a smaller area (one kilometre buffer with relatively smaller number of charities) as compared to a larger area (five kilometre buffer with many more charities). We take account of this possibility by considering an alternative construction of buffers. We begin with the number of charitable organizations at the one kilometre buffer, and then we calculate the number of charitable organizations in a two kilometre "doughnut" consisting of the difference between the two kilometre buffer and the one kilometre buffer; the third kilometre buffer subtracts off the two and one kilometre buffers, and so on. The result is a series of 'doughnuts' with ever expanding holes centred on the individual's residence. The results from measuring Access as the number of charitable organizations in the doughnut ring (as opposed to the hole), are presented in table 5. This alternative buffer definition still finds that increasing the physical distance from an individual's place of residence to charitable organizations decreases the probability of taking part in volunteer activities: the marginal effect

decreases from 0.0012 in the one kilometre buffer to 0.0001 in the five kilometre doughnut ring. This result is consistent with our causal interpretation: an additional charitable organization leads people to be more likely to volunteer, but this effect diminishes with distance.

To try to ensure that we are indeed picking up a causal link from proximity to charities and volunteering, we consider an exercise where we attempt to identify a group of individuals whose residential location decision can be considered exogenous with respect to their volunteer behaviour. Individuals who have lived in their current homes for longer periods of time are less likely to have made their location decision based on the same unobservable factors influencing the location of charities currently in their neighbourhood. Following Matas et al. (2010) and Di Paola et al. (2014), we restrict the sample to individuals who have lived in their homes for more than 10 years and find that the marginal effect of access to charitable organizations on the probability of taking part in volunteer activities (reported in table 6) is similar to the baseline model of table 4, and continues to fall with buffer size. This result suggests that residential sorting cannot explain our findings regarding accessibility to volunteer opportunities on volunteering probability.

Table 7 presents the estimated impact of Access using the CF approach when we split the sample by gender, employment status, and income level. We find that Access has a similar effect on women and men, contrary to results from other studies which find that men and women behave differently with regards to philanthropic activities (e.g., Brown et al., 1992).

Since volunteering is a time intensive activity, Access should matter more for individuals who are more time constrained. To this end, we split the sample into part time/ not employed workers and full time workers. The results, reported in columns (3) and (4) of table7 suggest that proximity to charitable organizations has, indeed, larger effects on the probability of

participation and intensity of volunteering for individuals who have full time jobs. For example at the one kilometre buffer, increasing the number of charitable organizations by 1% increases the probability of taking part in volunteer activities by 1.13% percent for individuals with full time jobs and 0.74% for individuals with part time jobs or who are not employed.

Proximity to volunteer opportunities can be particularly important for individuals who reply on public transportation. To the extent that proximity decreases travel costs, we would expect that Access matters more for the volunteer behaviour of low income individuals (who are more likely to rely on public transit and for whom physical proximity to charitable organizations may be real barriers to volunteering). We split the sample into households with annual income less than $40,000 (low income) and greater than $80,000 (high income). Contrary to expectations however, it is the high-income group for whom Access is more important. One possible explanation is that, Access reflects the opportunity cost of volunteering, and individuals with higher income may have higher opportunity costs.

As a final robustness exercise we run two control function specifications to address two possible sources of measurement error in our Access variable. First we include a specification restricting the sample to urban residents to deal with the potential problem with geographically large rural postal codes. Second, we try to take account of the fact that volunteering may take place in a non-profit organization that is not a registered charity. Complete data on the location of all non-profits is not available. However, we were able to add the location of approximately 12,000 primary schools, secondary schools and libraries to our data set using information available in the Enhanced Point of Interest (EPOI) file from Digital Mapping Technologies Inc. (DMTI). The results for these two specifications are presented in Table 8. These estimated marginal effects are larger than those presented in table 4. For example for the urban sample, a

1% increase in the number of charities within a 1km buffer is estimated to increase volunteering by 2.3% and using the extended database the same increase in charities would increase volunteering by 2.0%. These results thus suggest that using the set of registered charities as a proxy for all formal volunteer opportunities may not be a restrictive assumption and more generally that our main estimates can be considered conservative.

6. Conclusion

Volunteering has been associated with a wide range of economic (improved job opportunities and earnings) (e.g., Menchik and Weisbrod, 1987; Day and Devlin, 1998; Jorgensen, 2013) and non-economic (increased civic engagement, health and happiness) (e.g., Borgonovi, 2008; Schultz et al., 2008) returns. Three provinces (Ontario, British Columbia and Newfoundland) have introduced mandatory community service hours as high school graduation requirements with these important returns in mind. Many Fortune 500 companies provide paid time off work for employees to volunteer their time and skills to their communities.[6] Initiatives abound to encourage volunteering among various groups – like the *Canadian Volunteerism Initiative* [7] geared to all potential volunteers, *Millennium Volunteers*[8] that targets youth and *Work Together*[9] which encourages the unemployed to volunteer as a way to improve their employment prospects.

The benefits to charities and to the larger community from volunteer effort are significant and well-documented. In the health sector for example, it has been estimated that the combined

[6] http://fortune.com/2015/03/21/companies-offer-incentives-for-volunteering/, accessed September 27th, 2016.
[7] http://www.vsi-isbc.org/, accessed October 4th, 2016.
[8] http://youngcitizens.volunteernow.co.uk/millennium-volunteers, accessed September 27th, 2016.
[9] http://webarchive.nationalarchives.gov.uk/20130128102031/http://www.dwp.gov.uk/docs/work-together-lft.pdf, accessed September 27th, 2016.

value of formal and informal caregiving in Canada is between $20 and $30 billion annually (Health Charities Council of Canada, 2002).

Understanding better the determinants of volunteering can potentially reveal mechanisms by which this behaviour can be promoted or encouraged. This paper is the first to investigate the effect of access to charitable organizations on volunteer behaviour. Using an extensive administrative database of all charitable organizations in Canada linked to nationally representative survey data on volunteer participation, and paying careful attention to the problem of endogeneity, our analysis shows that proximity to charitable organizations increases the likelihood of volunteering. If the number of charitable organizations within one kilometre of an individual's residence were to increase by 6%, the probability that this individual would volunteer increases by over 5% -- an effect comparable to that which would arise if the number of individuals with a university degree were to increase by one standard deviation (0.44). In addition we find that proximity to charitable organizations is more important for individuals with full time jobs, and for those with higher income, relative to poorer, unemployed individuals, underscoring the importance of time costs for volunteering.

Even though we paid very careful attention to methodology and data, this study has weaknesses. Data are rarely perfect. The T3010 data set upon which our Access variable is based, represents a very complete set of charities, and is the state of the art when it comes to information on the supply of charities, but it is not without limitations. Multiple locations/branches of a charity may not be captured in the database if only one T3010 tax form is submitted. This data set does not capture non-profit organizations that are not registered charities; however, we were able to include several of these organizations thought to be important venues for volunteering (schools and libraries), and found our results to be robust.

Another limitation is that our measure of access using buffers around postal codes may be less accurate for individuals living in rural areas where postal codes cover large distances as compared to urban areas where postal codes cover much smaller areas. And, indeed, the impact of proximity in urban areas is stronger. Finally since our buffers are constructed for each province separately, our measure of access will miss charities in the neighbouring province for individuals living within five kilometres of a border. As only 0.2%, 0.9%, 1.4%, 1.9%, and 2.2% of our sample live within one to five kilometres from a neighbouring province, we would argue that this limitation has a minimal effect.

Our work suggests yet another mechanism through which the built environment influences individuals' behaviour, and potentially individual's economic and non-economic outcomes. The results also suggest that careful urban planning, through proper incentivizing of the location choices of charitable organizations would influence the philanthropic activities of individuals in the community. Of course not all volunteer opportunities are expected to provide the same returns or benefits. Future work might consider how accessibility to the various types of charitable organizations (for example religious based charities versus sports or community based charities) influence the type of volunteer work conducted. The bottom line, however, is that our results once again confirm the old adage: location matters.

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Table 1: Variable Definitions

Dependent Variables	
Volunteer	Dummy variable 1, if the respondent took part in any formal volunteer activity during the past 12 months, 0 otherwise
Volunteer intensity	Ordered variable, 3 if the respondent volunteered on average more than five hours per month (regular volunteer); 2 if the respondent volunteered on average between zero and five hours per month (irregular volunteer); 1 the respondent did not volunteer at all (non-volunteer)
Independent Variables	
Age	Continuous variable representing the age of the respondent
Sex	Dummy variable 1, if the respondent is female, 0 otherwise
Marital Status	Set of dummy variables Married/Common Law **(reference)**, Single/Never Married, Separated/Divorced, Widow/Widower
Education	Set of dummy variables representing respondent's highest level of education: Less than High School **(reference)**, High School, Some Post-Secondary, Post-Secondary Diploma or Certificate, University Degree
Employment Status	Set of dummy variables representing respondent`s employment status: Employed Full Time **(reference),** Employed Part Time, Not Employed
Annual Income	Set of dummy variables representing the respondent's annual household income: Less than $20,000, $20,000-$39,999, $40,000-$59,999, $60,000-$79,999, $80,000-$99,999, Over $100,000 **(reference)**
Age of Youngest Child in the Household	Set of dummy variables representing the age of the youngest child in the household: No children **(reference)**, youngest is between 0-4 years old, youngest is between 5-14 years old, youngest child is at least 14 years old
Regular Participation in Religious Activities	Dummy variable 1, if respondent took part in religious activities at least once a month, 0 otherwise
Time in Neighbourhood	Set of dummy variables representing the length of time the respondent has lived in their current neighbourhood: Less than Five Years, Five to Ten Years, Greater than Ten Years **(reference)**
Immigration Status	Set of dummy variables representing the respondent's immigration status: Canadian Born (**reference)**, immigrant having lived in Canada less than 15 Years, immigrant having lived in Canada greater than 15 Years
Self-Reported Health Status	Set of dummy variables representing the respondent's self-reported health status: Excellent/Very Good **(reference)**, Good, Fair/Poor
Province	Set of dummy variables for the 10 Canadian Provinces: Ontario **(reference)**
Rurality	Dummy variable 1, if respondent lives in a rural area or small town (non-census metropolitan area/non-census agglomeration), 0 otherwise
Sense of Help in Neighbourhood	Dummy variable 1, if respondent reports that people in his/her neighbourhood help each other, 0 otherwise
Year	Set of dummy variables for survey year: 2003, 2005, 2008, 2010 **(reference)**

Population Density (1-5km)	Continuous variable representing the population estimate within the specified radius (1km-5km) around the respondent`s place of residence
Access (1-5km)	Continuous variable representing the number of charitable organizations located within the specified radius (1km to 5km) around the respondent`s place of residence

Table 2: Summary statistics for the full analytic sample and for the volunteer and non-volunteer subsamples

Variable	Full Sample	Volunteer	Non-Volunteer
Dependent Variables			
Volunteer	0.37	-	-
Regular volunteer	0.22	-	-
Irregular volunteer	0.15	-	-
Non-volunteer	0.63	-	-
Independent Variables			
Age (years)	46	46	46
Male	0.49	0.46	0.51
Female	0.51	0.54	0.49
Married/common law	0.67	0.70	0.65
Single/never married	0.21	0.19	0.22
Separated/divorced	0.07	0.07	0.08
Widow/widower	0.05	0.04	0.06
Less than high school	0.15	0.09	0.19
High school	0.14	0.12	0.16
Some post-secondary	0.16	0.17	0.16
Post-secondary diploma or certificate	0.28	0.28	0.28
University degree	0.26	0.34	0.21
Employed full time	0.43	0.42	0.43
Employed part-time	0.25	0.27	0.23
Not employed	0.33	0.31	0.33
Household Income < $20K	0.07	0.05	0.08
Household Income $20K-$40K	0.14	0.12	0.15
Household Income $40K-$60K	0.16	0.15	0.17
Household Income $60K -$80K	0.13	0.14	0.13
Household Income $80K -$100K	0.10	0.11	0.10
Household Income > $100K	0.21	0.27	0.18
No children in household	0.57	0.54	0.59
Youngest child is preschool aged	0.12	0.11	0.13
Youngest child is school aged	0.16	0.21	0.14
Youngest child is over 14 years	0.14	0.15	0.14
Religious	0.29	0.40	0.23
Not religious	0.71	0.59	0.76
Live in current dwelling < 5 years	0.40	0.36	0.41
Live in current dwelling 5-10 years	0.18	0.19	0.18
Live in in current dwelling 10+ years	0.42	0.45	0.41
Born in Canada	0.79	0.82	0.78
Immigrant, having lived in Canada less than 15 years	0.06	0.05	0.07
Immigrant, having in Canada over 15 years	0.15	0.13	0.15

Excellent/Very Good health	0.54	0.59	0.51
Good health	0.31	0.30	0.32
Poor/Fair Health	0.14	0.11	0.16
Urban	0.81	0.78	0.82
Rural	0.19	0.22	0.18
Sense that people in the neighbourhood help each other	0.78	0.82	0.76
Sense that people in the neighbourhood do not help each other	0.17	0.14	0.19
Population size-1 km (#)	6,603	6,028	6,941
Population size-2 km (#)	21,421	19,613	22,479
Population size-3 km (#)	42,027	38,387	44,156
Population size-4 km (#)	68,130	62,221	71,585
Population size-5km (#)	97,894	89,156	103,002
Access-1 km (#)	18	17	18
Access-2 km (#)	59	57	60
Access-3 km (#)	115	111	118
Access-4km (#)	184	176	189
Access-5km (#)	264	251	272
N	68,023	25,169	42,854

Notes: The sample is restricted to respondents aged 19 years and older who report their six digit postal code correctly and answer the questions relating to volunteer activities. Summary statistics are weighted using the provided frequency weights.

Table 3: Average number of charities in the 1-5km buffers for the volunteer and non-volunteer sub-samples by population quantile

	Volunteer					Non-Volunteer				
	1st pop'n quintile	**2nd pop'n quintile**	**3rd pop'n quintile**	**4th pop'n quintile**	**5th pop'n quintile**	**1st pop'n quintile**	**2nd pop'n quintile**	**3rd pop'n quintile**	**4th pop'n quintile**	**5th pop'n quintile**
Access 1 km	2	4	11	16	52	2	4	10	16	47
Access 2 km	7	12	30	54	176	7	11	28	50	161
Access 3 km	7	21	54	102	359	6	19	51	94	332
Access 4 km	6	26	82	154	583	5	24	78	143	544
Access 5 km	7	33	112	213	844	6	31	103	203	791

Notes: The sample is restricted to respondents aged 19 years and older who report their six digit postal code correctly and answer the questions relating to volunteer activities. Summary statistics are weighted using the provided frequency weights.

Table 4: Main Results. The Estimated effect of access to charitable organizations on volunteer outcomes

	Without Controlling for Endogeneity				**Controlling for Endogeneity**			
	Probit	**Ordered Probit**			**CF Probit**	**CF Ordered Probit**		
	Volunteer	Regular Volunteer	Irregular Volunteer	Non Volunteer	Volunteer	Regular Volunteer	Irregular Volunteer	Non Volunteer
Access 1km	0.13*	0.09*	0.03*	-013*	0.34*	0.25*	0.08*	-0.33*
	(8.14)	(8.28)	(8.19)	(-8.27)	(7.45)	(6.77)	(6.63)	(-6.74)
$(\text{Access 1km})^2$	-2.13e-04*	-1.56e-04*	-5.35e-05*	2.10e-04*	-1.73e-04*	-1.42e-04*	-4.89e-05*	1.91e-04*
	(-5.67)	(-6.04)	(-6.01)	(6.04)	(-5.06)	(-5.49)	(-5.47)	(5.49)
Marginal effect 1km	**0.0012**	**0.0009**	**0.0003**	**-0.0012**	**0.0034**	**0.0024**	**0.0006**	**-0.0030**
Access 2km	0.05*	0.03*	0.01*	-0.04*	0.10*	0.07*	0.02*	-0.10*
	(6.93)	(6.90)	(6.83)	(-6.89)	(7.55)	(7.04)	(6.98)	(-7.4)
$(\text{Access 2km})^2$	-2.51e-05*	-1.71e-05*	-5.86e-06*	2.30e-05*	-1.83-05*	-1.44e-05**	-4.95e-06**	1.94e-05**
	(-3.99)	(-3.89)	(-3.87)	(3.88)	(-3.50)	(-3.10)	(-3.09)	(3.10)
Marginal effect 2km	**0.0004**	**0.0003**	**0.0001**	**-0.0004**	**0.0010**	**0.0007**	**0.0002**	**-0.0009**
Access 3km	0.03*	0.02*	0.01*	-0.02*	0.05*	0.04*	0.01*	-0.05*
	(5.87)	(5.74)	(5.70)	(-5.74)	(6.86)	(6.25)	(6.38)	(-6.29)
$(\text{Access 3km})^2$	-6.75e-06**	-4.44e-06***	-1.52e-06***	5.96e-06***	-4.11e-06	-3.23e-06	-1.11e-06	4.34e-06
	(-2.58)	(-2.42)	(-2.41)	(2.42)	(-1.91)	(-1.58)	(-1.58)	(1.58)
Marginal effect 3km	**0.0002**	**0.0002**	**0.0000**	**-0.0002**	**0.0005**	**0.0004**	**0.0001**	**-0.0004**
Access 4km	0.02*	0.01*	0.00*	-0.02*	0.03*	0.02*	0.01*	-0.03*
	(4.92)	(4.78)	(4.75)	(-4.78)	(6.05)	(6.12)	(6.07)	(-6.12)
$(\text{Access 4km})^2$	-1.65e-06	-9.50e-06	-3.26e-07	1.28e-06	-5.49e-09	-4.11e-07	-1.41e-07	5.52e-07
	(-1.12)	(-0.93)	(-0.93)	(0.93)	(-0.39)	(-0.40)	(-0.40)	(0.40)

Marginal effect 4km	**0.0001**	**0.0001**	**0.0000**	**-0.0001**	**0.0003**	**0.0002**	**0.0001**	**-0.0003**
Access 5km	0.01*	0.01*	0.00*	-0.01*	0.02*	0.01*	0.00*	-0.02*
	(3.68)	(3.30)	(3.29)	(-3.30)	(5.27)	(4.76)	(4.61)	(-4.72)
$(\text{Access 5km})^2$	5.36e-07	6.40e-07	2.20e-07	-8.60e-07	9.23e-07	8.72e-07	3.00e-07	-1.17e-06
	(0.60)	(1.03)	(1.03)	(-1.03)	(1.13)	(1.56)	(1.56)	(-1.56)
Marginal effect 5km	**0.0001**	**0.0001**	**0.0000**	**-0.0001**	**0.0002**	**0.0001**	**0.0000**	**-0.0002**
N	68,023	68,023	68,023	68,023	68,023	68,023	68,023	68,023
Predicted probability (at 1km buffer)	0.37	0.20	0.16	0.65	0.38	0.20	0.16	0.65

Statistical tests for the validity of the instruments				
	Probit		**Ordered probit**	
	Cragg-Donald Wald F statistic	Durbin-Wu-Hausman Chi^2 statistic	Cragg-Donald Wald F statistic	Durbin-Wu-Hausman Chi^2 statistic
Access 1km	12.01	29.22 (0.00)	12.01	21.14 (0.00)
Access 2km	100.75	27.47 (0.00)	100.75	19.04 (0.00)
Access 3km	221.91	23.80 (0.00)	221.91	16.16 (0.00)
Access 4km	265.35	21.53 (0.00)	265.35	13.81 (0.00)
Access 5km	392.76	19.67 (0.00)	392.76	12.53 (0.00)

Notes: The asterisks *, ** and *** indicate significance at the 1, 5 and 10 percent levels respectively. The numbers in the parentheses are Z values for the point estimates and p values for the test statistics. In the interest of readability of the tables, the estimated coefficients for Access and Access^2 are multiplied by 100. As the predicted probability for the dependent variables is relatively unchanged across specifications with varying measures of Access (1-5km buffers), only the predicted probability for the specification using the 1km buffer is reported. The regression models are weighted by the probability weight. The standard errors are bootstrapped (150 replications) when controlling for endogeneity.

Table 5: The Effect of Access around 'Doughnuts' of increasing diametres centred on individuals' residences

	Probit	**Ordered Probit**		
	Volunteer	Regular Volunteer	Irregular Volunteer	Non Volunteer
Access 1km	0.13*	0.10*	0.03*	-013*
	(8.19)	(8.40)	(8.31)	(-8.40)
(Access 1km)^2	-2.16e-04*	-1.58e-04*	-5.42e-05*	2.12e-04*
	(-5.71)	(-6.14)	(-6.11)	(6.14)
Marginal effect 1km	**0.0012**	**0.0009**	**0.0003**	**-0.0012**
Doughnut 1-2km	0.05*	0.04*	0.01*	-0.05*
	(5.92)	(6.00)	(5.95)	(-5.99)
(Doughnut 1-2km)^2	-3.62e-05**	-2.46e-05**	-8.44e-06**	3.31e-05**
	(-3.18)	(-3.12)	(-3.11)	(3.11)
Marginal effect 1-2km	**0.0005**	**0.0003**	**0.0001**	**-0.0004**
Doughnut 2-3km	0.03*	0.02*	0.01*	-0.03*
	(4.12)	(4.13)	(4.11)	(-4.13)
(Doughnut 2-3km)^2	-9.20e-06	-6.78e-06	-2.32e-06	9.10e-06
	(-0.96)	(-1.00)	(-1.00)	(1.00)
Marginal effect 2-3km	**0.0003**	**0.0002**	**0.0001**	**-0.0003**
Doughnut 3-4km	0.02***	0.01***	0.00E+00***	-0.02***
	(2.51)	(2.47)	(2.46)	(-2.47)
(Doughnut 3-4km)^2	6.32e-06	4.92e-06	1.68e-06	-6.60e-06
	(0.74)	(0.84)	(0.84)	(-0.84)
Marginal effect 3-4km	**0.0002**	**0.0001**	**0.0000**	**-0.0002**
Doughnut 4-5km	0.01	0.01	0.00E+00	-0.01
	(1.66)	(1.17)	(1.17)	(-1.17)
(Doughnut 4-5km)^2	7.65e-06	7.71e-06	2.64e-06	-1.03e-05
	(1.07)	(1.55)	(1.55)	(-1.55)
Marginal effect 4-5km	**0.0001**	**0.0001**	**0.0000**	**-0.0001**
N	68,023	68,023	68,023	68,023
Predicted probability (at 1km buffer)	0.36	0.20	0.16	0.65

Notes: The asterisks *, ** and *** indicate significance at the 1, 5 and 10 percent levels respectively. The numbers in the parentheses are Z values for the point estimates. In the interest of readability of the tables, the estimated coefficients for Access (in the doughnut) and Access (in the doughnut)^2 are multiplied by 100. As the predicted probability for the dependent variables is relatively unchanged across specifications with varying measures of Access (1-5km buffers), only the predicted probability for the specification using the 1km buffer is reported. The regression models are weighted by the probability weight.

Table 6: The effect of access to charitable organizations on the probability of volunteering by length of time living in neighbourhood

	Length of time living in a neighborhood	
	Over 10 years	**10 or fewer years**
	Volunteer	Volunteer
Access 1km	0.15*	0.11*
	(5.08)	(5.98)
(Access 1km)^2	-2.28e-04**	-1.96e-04*
	(-3.27)	(-4.39)
Marginal effect 1km	**0.0014**	**0.0011**
Access 2km	0.05*	0.04*
	(4.21)	(5.17)
(Access 2km)^2	-2.43e-05***	-2.34e-05**
	(-2.05)	(-3.27)
Marginal effect 2km	**0.0005**	**0.0004**
Access 3km	0.03*	0.02*
	(3.97)	(4.08)
(Access 3km)^2	-9.00e-06	-5.32e-06
	(-1.90)	(-1.73)
Marginal effect 3km	**0.0003**	**0.0002**
Access 4km	0.02*	0.01**
	(3.59)	(3.16)
(Access 4km)^2	-3.44e-06	-5.43e-07
	(-1.36)	(-0.31)
Marginal effect 4km	**0.0002**	**0.0001**
Access 5km	0.01***	0.01***
	(2.48)	(2.45)
(Access 5km)^2	-1.04e-07	9.51e-07
	(-0.07)	(0.88)
Marginal effect 5km	**0.0001**	**0.0001**
N	28,822	39,201
Predicted probability (at 1km buffer)	0.39	0.35

Notes: The asterisks *, ** and *** indicate significance at the 1, 5 and 10 percent levels respectively. The numbers in the parentheses are Z values for the point estimates. In the interest of readability of the tables, the estimated coefficients for Access and Access^2 are multiplied by 100. As the predicted probability for the dependent variables is relatively unchanged across specifications with varying measures of Access (1-5km buffers), only the predicted probability for the specification using the 1km buffer is reported. The regression models are weighted by the probability weight.

Table 7: The effect of access to charitable organizations on the probability of volunteering by gender, employment status and income

	Gender		**Employment status**		**Income**	
	Female (1)	**Male (2)**	**Full-time (3)**	**Part-time/not employed (4)**	**High income (5)**	**Low income (6)**
	Volunteer	Volunteer	Volunteer	Volunteer	Volunteer	Volunteer
Access 1km	0.35*	0.33*	0.44*	0.28*	0.57*	0.25*
	(5.68)	(4.44)	(6.37)	(5.12)	(5.28)	(3.54)
$(\text{Access 1km})^2$	-1.19e-04***	-2.21e-04*	-1.94e-04*	-1.64e-04**	-1.77 -04***	-2.39e-04**
	(-2.36)	(-4.07)	(-4.42)	(-3.28)	(-2.20)	(-2.81)
Marginal effect 1km	**0.0035**	**0.0032**	**0.0043**	**0.0028**	**0.0055**	**0.0025**
Access 2km	0.11*	0.10*	0.13*	0.08*	0.17*	0.07*
	(6.59)	(5.18)	(6.05)	(5.00)	(6.21)	(3.20)
$(\text{Access 2km})^2$	-1.03e-05	-2.43e-05**	-2.49e-05**	-1.21e-05	-2.93e-05***	-1.88e-06
	(-1.31)	(-2.68)	(-3.22)	(-1.52)	(-2.47)	(-1.82)
Marginal effect 2km	**0.0010**	**0.0010**	**0.0013**	**0.0008**	**0.0017**	**0.0007**
Access 3km	0.05*	0.05*	0.07*	0.04*	0.10*	0.03**
	(5.72)	(4.80)	(6.72)	(3.89)	(7.18)	(2.78)
$(\text{Access 3km})^2$	-1.82e-06	-6.10e-06	-9.92e-06**	8.34e-07	-1.30e-05**	1.80e-06
	(-0.61)	(-1.74)	(-2.92)	(0.25)	(-2.70)	(0.44)
Marginal effect 3km	**0.0005**	**0.0005**	**0.0007**	**0.0004**	**0.0009**	**0.0003**
Access 4km	0.03*	0.03*	0.05*	0.02*	0.06*	0.02***
	(4.66)	(4.29)	(5.88)	(3.48)	(6.03)	(2.12)
$(\text{Access 4km})^2$	2.21e-07	-1.51e-06	-3.48e-06	1.84e-06	-5.20e-06***	2.27e-06
	(0.12)	(-0.75)	(-1.72)	(1.03)	(-2.20)	(0.96)
Marginal effect 4km	**0.0003**	**0.0003**	**0.0005**	**0.0002**	**0.0006**	**0.0002**
Access 5km	0.02*	0.02*	0.03*	0.01**	0.04*	0.01
	(4.12)	(3.54)	(6.16)	(2.69)	(6.27)	(1.50)
$(\text{Access 5km})^2$	1.25e-06	4.50e-07	-4.71e-07	2.01e-06	-2.18e-06	2.73e-06
	(1.19)	(0.39)	(-0.39)	(1.87)	(-1.56)	(1.82)

Marginal effect 5km	**0.0002**	**0.0002**	**0.0003**	**0.0001**	**0.0004**	**0.0001**
N	38,599	29,424	27,020	41,003	16,602	19,139
Predicted probability (at 1km buffer)	0.40	0.36	0.38	0.38	0.46	0.31

Statistical tests for the validity of the instruments												
	Female		**Male**		**Full-time**		**Part-time/not employed**		**High income**		**Low income**	
	Cragg-Donald Wald F statistic	DWH Chi^2 statistic	Cragg-Donald Wald F statistic	DWH Chi^2 statistic	Cragg-Donald Wald F statistic	DWH Chi^2 statistic	Cragg-Donald Wald F statistic	DWH Chi^2 statistic	Cragg-Donald Wald F statistic	DWH Chi^2 statistic	Cragg-Donald Wald F statistic	DWH Chi^2 statistic
Access 1km	1.45	18.50 (0.00)	11.50	11.75 (0.00)	6.33	24.51 (0.00)	6.05	9.17 (0.00)	0.58	22.88 (0.00)	17.86	2.53 (0.11)
Access 2km	36.68	17.31 (0.00)	58.98	11.22 (0.00)	34.01	23.28 (0.00)	61.14	8.35 (0.00)	9.31	24.85 (0.00)	75.68	1.87 (0.17)
Access 3km	98.30	13.45 (0.00)	116.64	10.92 (0.00)	90.06	19.70 (0.00)	119.70	7.30 (0.01)	31.80	22.32 (0.00)	135.85	2.68 (0.10)
Access 4km	126.17	11.29 (0.00)	133.68	10.60 (0.01)	112.90	21.77 (0.00)	140.06	4.39 (0.04)	45.40	21.11 (0.00)	139.54	1.74 (0.19)
Access 5km	201.49	10.88 (0.00)	187.54	9.32 (0.01)	168.45	21.21 (0.00)	216.79	3.34 (0.07)	75.82	19.90 (0.00)	187.41	1.26 (0.26)

Notes: The asterisks *, ** and *** indicate significance at the 1, 5 and 10 percent levels respectively. The numbers in the parentheses are Z values for the point estimates and p values for the test statistics. In the interest of readability of the tables, the estimated coefficients for Access and $Access^2$ are multiplied by 100. As the predicted probability for the dependent variables is relatively unchanged across specifications with varying measures of Access (1-5km buffers), only the predicted probability for the specification using the 1km buffer is reported. The regression models are weighted by the probability weight. The standard errors are bootstrapped (150 replications) when controlling for endogeneity.

Table 8: Robustness Exercises. Assessing the extent of measurement error

	Urban		**Extended Data Base**	
	Volunteer		Volunteer	
Access 1km	0.31*		0.28*	
	(7.14)		(5.96)	
$(\text{Access 1km})^2$	-1.64e-04*		-1.60e-04*	
	(-5.02)		(-5.07)	
Marginal effect 1km	**0.0082**		**0.0073**	
Access 2km	0.09*		0.08*	
	(7.11)		(6.76)	
$(\text{Access 2km})^2$	-1.78e-05*		-1.67e-05*	
	(-3.01)		(-3.21)	
Marginal effect 2km	**0.0025**		**0.0021**	
Access 3km	0.05*		0.04*	
	(6.91)		(5.94)	
$(\text{Access 3km})^2$	-4.09e-06***		-3.68e-06***	
	(-1.77)		(-1.82)	
Marginal effect 3km	**0.0013**		**0.0010**	
Access 4km	0.03*		0.02*	
	(5.81)		(5.16)	
$(\text{Access 4km})^2$	-7.20e-07		-3.15e-07	
	(-0.57)		(-0.24)	
Marginal effect 4km	**0.0008**		**0.0006**	
Access 5km	0.02*		0.02*	
	(5.36)		(4.21)	
$(\text{Access 5km})^2$	6.98e-07		1.13e-08	
	(0.85)		(1.46)	
Marginal effect 5km	**0.0005**		**0.0004**	
N	51,599		68,023	
Predicted probability (at 1km buffer)	0.36		0.37	
Statistical tests for the validity of the instruments				
	Urban		**Extended Data Base**	
	Cragg-Donald Wald F statistic	Durbin-Wu-Hasuman Chi^2 statistic	Cragg-Donald Wald F statistic	Durbin-Wu-Hasuman Chi^2 statistic
Access 1km	10.18	23.10 (0.00)	30.58	21.77 (0.00)
Access 2km	21.56	21.33 (0.00)	99.08	19.12 (0.00)
Access 3km	160.34	18.19 (0.00)	137.82	15.64 (0.00)
Access 4km	184.74	16.45	74.01	14.99

		(0.00)		(0.00)
Access 5km	273.76	14.79 (0.00)	57.15	13.70 (0.00)

Notes: The asterisks *, ** and *** indicate significance at the 1, 5 and 10 percent levels respectively. The numbers in the parentheses are Z values for the point estimates and p values for the test statistics. In the interest of readability of the tables, the estimated coefficients for Access and Access^2 are multiplied by 100. As the predicted probability for the dependent variables is relatively unchanged across specifications with varying measures of Access (1-5km buffers), only the predicted probability for the specification using the 1km buffer is reported. The regression models are weighted by the probability weight. The standard errors are bootstrapped (150 replications) when controlling for endogeneity.

Appendix: Full Regression Results

	Probit			CF Probit		
	Access-1km	**Access-3km**	**Access-5km**	**Access-1km**	**Access-3km**	**Access-5km**
	Volunteer	Volunteer	Volunteer	Volunteer	Volunteer	Volunteer
Age	0.005*	0.005*	0.005*	0.005*	0.004*	0.004*
	(5.18)	(5.07)	(4.99)	(5.55)	(5.00)	(4.81)
Age^2	-6.150E-05*	-6.000E-05*	-5.930E-05*	-5.89E-05*	-5.48E-05*	-5.31E-05*
	(-6.52)	(-6.39)	(-6.30)	(-6.94)	(-6.27)	(-6.32)
Male	-0.027*	-0.027*	-0.027*	-0.025*	-0.025*	-0.025*
	(-5.19)	(-5.24)	(-5.19)	(-5.20)	(-5.16)	(-4.76)
Single/never married	-0.028*	-0.027*	-0.027*	-0.026*	-0.025*	-0.024*
	(-3.56)	(-3.46)	(-3.37)	(-3.13)	(-3.62)	(-2.93)
Separated/divorced	-0.020**	-0.019**	-0.019**	-0.018**	-0.017*	-0.017**
	(-2.43)	(-2.35)	(-2.33)	(-2.53)	(-2.59)	(-2.21)
Widow/widower	-0.027*	-0.027**	-0.026**	-0.025**	-0.023**	-0.023*
	(-2.61)	(-2.58)	(-2.57)	(-2.50)	(-2.27)	(-2.59)
Less than high school	-0.156*	-0.156*	-0.157*	-0.150*	-0.152*	-0.153*
	(-20.33)	(-20.37)	(-20.42)	(-19.68)	(-19.83)	(-19.8)
High school	-0.078*	-0.078*	-0.078*	-0.072*	-0.072*	-0.072*
	(-10.12)	(-10.10)	(-10.11)	(-9.26)	(-10.64)	(-9.90)
Some post-secondary	0.030*	0.031*	0.031*	0.028*	0.028*	0.028*
	(3.89)	(3.96)	(3.97)	(3.95)	(3.71)	(3.96)
University degree	0.134*	0.135*	0.136*	0.113*	0.115*	0.118*
	(19.50)	(19.49)	(19.68)	(16.4)	(21.34)	(18.96)
Employed part-time	0.040*	0.040*	0.041*	0.035*	0.036*	0.037*
	(6.05)	(6.02)	(6.13)	(6.13)	(6.08)	(5.43)
Not employed	0.053*	0.053*	0.054*	0.047*	0.048*	0.048*
	(7.32)	(7.33)	(7.39)	(6.91)	(8.41)	(7.00)

	Probit			CF Probit		
	Access-1km	**Access-3km**	**Access-5km**	**Access-1km**	**Access-3km**	**Access-5km**
	Volunteer	Volunteer	Volunteer	Volunteer	Volunteer	Volunteer
Income, less than $ 20,000	-0.046*	-0.046*	-0.046*	-0.052*	-0.048*	-0.046*
	(-4.41)	(-4.42)	(-4.43)	(-5.38)	(-5.25)	(-5.00)
Income, $20,000-$39,999	-0.029*	-0.029*	-0.029*	-0.029*	-0.029*	-0.028*
	(-3.65)	(-3.65)	(-3.66)	(-3.97)	(-3.95)	(-4.14)
Income, $40,000-$59,000	-0.027*	-0.027*	-0.027*	-0.024*	-0.025*	-0.025*
	(-3.57)	(-3.61)	(-3.64)	(-3.54)	(-3.75)	(-3.96)
Income, $60,000-$79,999	-0.008	-0.009	-0.009	-0.008	-0.008	-0.008
	(-1.03)	(-1.08)	(-1.07)	(-1.07)	(-1.10)	(-1.03)
Income, $80,000-$99,999	-0.015***	-0.015***	-0.015***	-0.012	-0.013	-0.013
	(-1.64)	(-1.69)	(-1.70)	(-1.32)	(-1.56)	(-1.53)
Preschool aged children	-0.058*	-0.057*	-0.058*	-0.045*	-0.047*	-0.051*
	(-6.64)	(-6.55)	(-6.63)	(-5.6)	(-5.74)	(-5.83)
School aged children	0.092*	0.092*	0.092*	0.089*	0.087*	0.084*
	(12.11)	(12.17)	(12.13)	(12.21)	(13.66)	(12.63)
Older aged children	0.013	0.014***	0.014***	0.019**	0.019**	0.017**
	(1.59)	(1.73)	(1.74)	(2.32)	(2.51)	(2.22)
Religious	0.216*	0.216*	0.217*	0.196*	0.196*	0.196*
	(38.08)	(38.21)	(38.28)	(47.06)	(38.76)	(40.91)
Live in current dwelling <5	-0.046*	-0.046*	-0.046*	-0.050*	-0.048*	-0.045*
	(-7.10)	(-7.16)	(-7.17)	(-8.79)	(-9.35)	(-7.95)
Live in current dwelling 5-10	-0.026*	-0.027*	-0.027*	-0.028*	-0.027*	-0.026*
	(-3.75)	(-3.79)	(-3.81)	(-4.44)	(-4.07)	(-3.99)
Live in Canada less than 15 years	-0.164*	-0.162*	-0.159*	-0.151*	-0.151*	-0.149*
	(-13.70)	(-13.54)	(-13.25)	(-10.76)	(-12.53)	(-11.64)
Live in Canada over 15 years	-0.080*	-0.078*	-0.076*	-0.064*	-0.064*	-0.063*

	Probit			CF Probit		
	Access-1km	**Access-3km**	**Access-5km**	**Access-1km**	**Access-3km**	**Access-5km**
	Volunteer	Volunteer	Volunteer	Volunteer	Volunteer	Volunteer
	(-10.90)	(-10.60)	(-10.23)	(-8.94)	(-9.44)	(-8.39)
Good health	-0.029*	-0.029*	-0.028*	-0.024*	-0.024*	-0.024*
	(-5.22)	(-5.15)	(-5.10)	(-4.29)	(-4.89)	(-5.10)
Poor health	-0.074*	-0.073*	-0.073*	-0.067*	-0.067*	-0.067*
	(-9.84)	(-9.80)	(-9.78)	(-8.80)	(-10.45)	(-9.45)
Urban	-0.064*	-0.064*	-0.059*	-0.032*	-0.041*	-0.040*
	(-9.48)	(-9.49)	(-8.63)	(-4.66)	(-5.89)	(-6.15)
Sense that people do not help each other in neighbourhood	-0.028*	-0.028*	-0.027*	-0.030*	-0.028*	-0.025*
	(-4.09)	(-4.09)	(-3.94)	(-5.03)	(-4.23)	(-4.08)
Population size (for given buffer)	-4.88e-06*	-9.53E-07*	-4.91E-07*	-1.30E-05*	-2.00E-06*	-8.94E-07*
	(-8.31)	(-8.42)	(-8.06)	(-7.46)	(-7.47)	(-7.01)
Access (for given buffer)	0.001*	2.578E-04*	9.920E-05*	0.003*	0.001*	2.088E-04*
	(8.14)	(5.87)	(3.68)	(7.45)	(6.86)	(5.27)
$Access^2$ (for given buffer)	-2.15e-06*	-6.75E-08**	5.36E-09	-1.73E-06*	-4.11E-08***	9.23E-09
	(-5.67)	(-2.58)	(0.60)	(-5.06)	(-1.91)	(1.13)
N	68,023	68,023	68,023	68,023	68,023	68,023

Notes: The asterisks *, ** and *** indicate significance at the 1, 5 and 10 percent levels respectively. The numbers in the parentheses are Z values. The regression models are weighted by the probability weight.