

Doing Good, Feeling Good: Causal Evidence from Canadian Volunteers

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Prepared for presentation to the Canadian Centre for Health Economics, University
of Toronto, November 10, 2017

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Acknowledgments: This paper is derived from Ch. 3 of Forough Seifi's PhD thesis. The analysis presented in this paper was conducted at the COOL RDC which is part of the Canadian Research Data Centre Network (CRDCN). The services and activities provided by the COOL RDC are made possible by the financial or in-kind support of the SSHRC- Social Sciences and Humanities, Research Council of Canada, the CIHR- Canadian Institutes of Health Research, the CFI- Canada Foundation for Innovation, Statistics Canada, Carleton University, the University of Ottawa and the Université du Québec en Outaouais. The views expressed in this paper do not necessarily represent the CRDCN's or that of its partners. We are grateful to conference participants from the 2017 Canadian Economic Association meetings especially Ida Ferrara, we thank Pierre Brochu, Calum Carmichael, Louis-Philippe Morin, and Casey Warman for their careful comments. R.A. Devlin acknowledges with gratitude funding from SSHRC grant: 435-2-12-0489.

Abstract

A literature suggests that volunteers are healthier and happier than their non-volunteering counterparts. But this ‘observation’ is fraught with problems of endogeneity. Some papers have addressed the endogeneity problem with an instrumental variable technique; mostly relying on measures of ‘religiosity’ as instruments. No studies of such nature have been conducted in Canada. We rely on a novel instrument and use data from Canadian General Social Surveys to fill this gap. We instrument volunteers by a measure of physical access to charitable organizations around an individual’s place of residence. Employing a conditional mixed process (CMP) model, we find that volunteering is a robustly significant predictor of health, and it positively affects life satisfaction for female and middle-aged individuals.

1. Introduction

Researchers seek to understand better the factors affecting individuals' health. One intriguing possibility is that volunteering itself may 'lead to' better health – perhaps because it strengthens social networks which decreases stress and the risk of certain diseases; perhaps because volunteering leads to higher incomes through, for instance, the acquisition of human capital (e.g., Cozzi et al., 2013); finally, volunteering may lead to increased 'warm glow' and feeling good about oneself (Fiorillo and Nappo, 2016). Several studies document a correlation between volunteering and objective (e.g., mortality) or subjective (e.g., self-rated health) measures of health outcomes. For example, Musick et al. (1999) use data from the Americans' Changing Lives survey to examine the association between volunteering and mortality among older adults, finding that donating time is associated with a lower risk of mortality. Morrow-Howell et al. (2003) use the same data set to examine the effect of volunteering on self-reported health, and find that both participation and the amount of time devoted to volunteering are positively related to individuals' health.

Not only has volunteering been linked to better health, but it has also been linked to better well-being. Thoits and Hewitt (2001) use two sets of data from the Americans' Changing Lives study (1986 and 1989) to examine the effect of volunteering on happiness, life satisfaction, self-esteem, sense of control over life, physical health and depression. They conclude that volunteering is positively related to well-being and that individuals with better well-being are more likely to volunteer.

Identifying a causal link from volunteering to health or well-being is complicated because of unobserved heterogeneity and reverse causality. Unobservable factors can jointly affect volunteering and health outcomes. For example, a daily walker may be both more likely to report

good health and more likely to be aware of her local community's activities and needs. Moreover, reverse causality may arise if, for example, individuals in poor health do not have the capacity to participate in volunteer activities, whereas healthy individuals do. Only a handful of studies try to determine the causal relationship between volunteering, health and well-being.

Five studies take into account endogeneity using data from the United States and United Kingdom, of which three employ an IV approach and rely on measures of 'religiosity' as instruments. Borgonovi, (2008) using the US Social Capital Community Benchmark Survey (2000) of 23,143 persons investigates the causal relationship between religious volunteering and health and happiness. She employs a measure of religious fragmentation as an instrument for religious volunteering, and finds that volunteering for a religious organization does not affect health but it does have a strong, positive impact on happiness. Schultz et al. (2008) use the same survey focusing on two cities, Duluth, Minnesota, and Superior, Wisconsin, to investigate the causal relationship between social capital (attitudes on trust, formal group involvement, informal socializing, organized group interaction, social support and volunteer activity) and health. Using religious attendance and the length of time an individual has lived in his community as instruments, they find that an additional episode of volunteering each year increases the probability of being healthy by 11%. Fiorillo and Nappo (2017) use the British Income and Living Conditions Survey (2006) to investigate the causal relationship between volunteering and self-perceived health with religious participation (at least once a year) as their instrument. They find that being a volunteer has a large, positive premium on self-reported health of 28%.

Using the Well-Being Module of the American Time Use Survey 2010, Gimenez-Nadal and Molina (2015a) exploit variation in the cross-state treatment of deductions for charitable contributions and the number of non-profit organizations per 10,000 inhabitants at the state level

as instruments in two specifications of their IV model investigating the causal relationship between volunteering and happiness, and find no statistical effect.¹ The last paper dealing with endogeneity by Binder and Freytag (2013) moves away from the IV method and employs a propensity score matching technique to examine the impact of volunteering on self-reported health and happiness. In addition to the usual influences on well-being, they also control for personality traits which are likely to affect both volunteering and subjective well-being. They find volunteering increases well-being with evidence that this effect grows over time.

We are the first to investigate the causal link between volunteering and health and volunteering and life satisfaction in Canada, although Theurer and Wister (2010) do use Canadian data to explore correlations between voluntary activities and health outcomes for the elderly. Like others, we too employ an instrumental variables technique, but we rely mainly on a novel instrument to identify volunteers, namely: physical access to charitable organizations. Access is measured as the number of registered charities within a three-kilometer radius of an individual's residence (as indicated by their six-digit postal code). To render our work closer to the few other studies in the literature, we also estimate the models using two other instruments that are closer to those already employed: a measure of religiosity and length of time living in a city or community.

Using data from the General Social Surveys (2003, 2005, 2008, 2010 and 2013), we find that volunteering has a positive causal effect on health. Volunteering increases the probability of a respondent reporting excellent/very good health status by about 24 percentage points and decreases the probability of a respondent reporting good or fair/poor health status by 10 percentage and 14 percentage points respectively. But, these volunteer effects are heterogeneous across age groups:

¹ In the published version of this paper (Gimenez-Nadal and Molina, 2015b) they have removed the discussion of the IV model, and focus on associations.

its impact on health is important only for younger and middle aged individuals. Being a volunteer is found to have a positive impact on self-reported life satisfaction for women and middle-aged individuals.

2. Data

The General Social Surveys (GSS) are national cross-sectional social surveys enacted by Statistics Canada since 1985. They cover in detail one topic annually while capturing a host of socio-economic and family characteristics of individuals. We focus on five surveys: the GSS on social engagement (2003 and 2008), on time use (2005 and 2010) and the 2013 survey on social identity and volunteering, giving and participation all collect data on volunteering, self-perceived health and life satisfaction of respondents. Self-perceived health is based on the question “in general, would you say your health is: excellent; very good; good; fair and poor.” We recode self-rated health into three groups: one indicating fair or poor (1-2) health, two indicating good (3) health and three indicating very good or excellent (4-5) health. Life satisfaction is based on the question “how do you feel about your life as whole right now?”, and takes values from 1-10 where 1 indicates being very dissatisfied and 10 indicates being very satisfied. In order to render the 2013 survey comparable to the earlier ones, life satisfaction is recoded into three categories (8-10); (4-7) and (1-3): very satisfied, somewhat satisfied and very dissatisfied respectively.

The original sample pooled from these five cycles (2003, 2005, 2008, 2010 and 2013) contains 122,748 observations. After excluding those who do not report their health (1%) and life satisfaction (1%), those who do not answer the question about formal volunteering (0.25%) and those who do not provide their residential six-digit postal code correctly (11%), we are left with 110,624 observations. To keep as many observations as possible, we do not exclude observations

with missing values for other variables, but include controls in the regression for missing values for each variable.

To measure an individual's participation in formal volunteer work the GSS (2003, 2005 2008, 2010 and 2013) ask two different types of questions: "In the past 12 months, did you do unpaid volunteer work for any organization?" coded as a binary yes/no response and "On average, about how many hours per month did you volunteer?" coded into four categories: over 15 hours per month, between 5 to 15 hours per month, between 1 to 5 hours per month and less than 1 hour per month. We focus on the participation decision from the first question.

A wide variety of other variables are included in the regressions: sex, age, marital status, education, employment status household income, age of the youngest child in the household and immigration status. Variables reflecting the characteristics of the community in which the individual resides include an urban-rural indicator, provincial dummies and the population density measured at a three kilometer buffer around each respondent's postal code. Year fixed effects are added to capture time trends in self-rated health and life satisfaction.

Table 1 presents some descriptive statistics for the full sample, by categories of self-reported health and by life satisfaction. In general, 39% of the respondents were involved in formal volunteer activities within the past 12 months; their mean age was 45 years. There are slightly more women than men in the sample. Most of the respondents are either married or living common law (62%), have more than high school education (53%), have no children at home (58%), are born in Canada (79%) and live in urban areas (82%). On average about 37% of individuals work full-time. Approximately 50% of individuals live in households that earn an annual income of greater than \$60,000. The average population within 3km radii of the individual's place of residence is 41,756.

Turning to health categories, we see that over one half (58%) of the sample report that their overall health is excellent/very good. More individuals with excellent health volunteer (42%) when compared to those with fair health (29%). Proportionately more individuals in excellent health are younger, more educated, work full-time, have young children at home, live in households with higher earnings, are Canadian born and live in more populated areas relative to other health groups. The self-reported health status varies considerably across provinces: Alberta (66%) and Ontario (65%) residents are the most likely to self-report excellent/very good health, while New Brunswick residents are the least likely (53%).² A similar pattern is observed when we look at the data broken down by life satisfaction. Most individuals (66%) report that they are very satisfied with their life, and they are more likely to volunteer (42%) when compared to those who are very dissatisfied with life (29%). Again, individuals who are very satisfied with life are younger, more educated, work full-time, have young children at home, live in households with higher earnings and are Canadian born, relative to other life satisfaction groups. Life satisfaction also varies regionally: residents of Newfoundland Labrador (72%) and Quebec (69%) being most likely to have strong life satisfaction, residence of Ontario (64%) and British Columbia (65%) ranked the lowest.

In addition to the General Social Surveys, we use data from the Revenue Canada tax returns (T3010) of registered charities in Canada. We have access to detailed data on registered charities from 2003 to 2012, including their location. The postal codes from the charities are merged with the postal codes of the individuals (from the confidential GSS files) using the Postal Code Conversion File, and this allows us to create the access variable used to identify volunteers, as discussed below.

² Using information on the total number observations (97,156), the proportion of individuals with excellent/very good (very satisfied), good (somewhat satisfied) and fair/poor (very dissatisfied) health status (well-being) and the proportion of individuals in each provinces from the full and health status (life satisfaction) subsamples, it is possible to calculate the proportion of the three categories of health status (life satisfaction) across provinces.

3. Methodology

Physical access to charitable organizations (plus its square) are instruments for volunteering. Access measures the number of charitable organizations in the three kilometer buffer around a respondent's home (postal code). To be valid an instrument must satisfy two conditions: first, be correlated with the endogenous variable (volunteering) and second, be uncorrelated with the error term in the main regression (ordered probit). This measure of access is correlated with the volunteering decision. Elsewhere we find that increasing the number of charitable organizations within a 3km radius around an individual's place of residence by 6% (the growth rate of the number charities in Canada from 2003 to 2009), increases the predicted probability of volunteering by 0.78%. Proximity to charities can be linked with volunteering for at least two reasons: easier access to information about volunteer opportunities and travel time savings for volunteer work. To satisfy the exclusion restriction (second condition) the best candidate for an instrument is derived from a natural or random experiment (Angrist and Krueger, 2001). However, charitable organizations do not choose their locations randomly and their level of activity is a function of both local needs for their services and charities' abilities to access the necessary resources to provide such services to community. Non randomness in the location decision of charitable organizations may violate the exclusion restriction condition. For example, charitable organizations may locate in disadvantaged areas in order to facilitate providing services to targeted clients – like a women's center being located close to low-income housing with a preponderance of female-headed households. Controlling for other geographic characteristics such as population density (which may reflect, for instance, the location of clients), should help to mitigate this effect so that my measure of access to charitable organizations only affects an individual's health and life-satisfaction indirectly through its effect on volunteering.

The dependent variables (health and life satisfaction) are ordinal (taking on values 1-3), and the endogenous independent variable, volunteering, is binary. Dealing with endogeneity in nonlinear models with a binary endogenous regressor requires careful consideration as the standard two stage least squares (2SLS) or Control Function (CF) approaches may produce inconsistent estimates (Wooldridge, 2010). If the dependent and independent variables were binary, a bivariate probit model could be employed. But our dependent variables take on three values and we prefer to preserve this information. We thus use the fully observed recursive Conditional Mixed Process (CMP) model which assumes that the underlying model is based on a general seemingly unrelated regression (SUR) framework and allows the system to consist of binary, ordered, categorical or censored equations (Roodman, 2011). The SUR treats the dependent variables as independent from each other but with correlations across error terms. The multi equation SUR, the CMP, permits the endogenous variable in one equation to appear on the left hand side of another equation, but requires that the system be recursive (Roodman, 2011, p.174).

The CMP can be written as:

$$Y_{it}^* = Z_{it}\gamma + X_{it}'\beta + \varepsilon_{it} \quad (1)$$

$$Z_{it}^* = IV_{it}\alpha_1 + IV_{it}^2\alpha_2 + X_{it}'\beta + u_{it} \quad (2)$$

$$Y_{it} = \begin{cases} 3 & Y_{it}^* > \tau_2 \\ 2 & \tau_1 < Y_{it}^* \leq \tau_2 \\ 1 & \text{otherwise} \end{cases}$$

$$Z_{it} = \begin{cases} 1 & Z_{it}^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

where Y_{it}^* is the unobserved latent variable for the outcome variables. The two outcome variables used are: (i) self-reported health with three ordered categories: excellent/very good (3), good (2) and fair or poor (1) and (ii) self-rated life satisfaction with three ordered categories: very satisfied (3), somewhat satisfied (2), very dissatisfied (1). Z_{it}^* is unobserved latent variable for volunteering.

Z_{it} is an endogenous volunteer variable which takes the value one if the respondent did any unpaid volunteer activities during the past 12 months and zero otherwise. IV_{it} is a vector of exogenous instruments (access and its square) and X_{it} is the vector of socioeconomic controls. In the model of life satisfaction, we also control for health status as previous research has shown a strong relationship between self-rated health and life satisfaction (e.g., Binder and Freytag 2013; Borgonovi, 2008). The regression models are weighted by the probability weights, and the standard errors are corrected for heteroskedasticity.

4. Results

We start with a simple ordered probit model to estimate the effect of volunteering on health and life satisfaction without addressing endogeneity. Table 2 reports the resulting marginal effects which give the correlations between volunteering and each category of health and life satisfaction. From this table we see that taking part in volunteer activities is associated with a increase the probability of reporting excellent/very good health status by 0.061 points, decreasing the probability of reporting good and fair/poor health status by 0.029 and 0.033 points. It also increases the probability of reporting high life satisfaction by 0.048 points, with a commensurate fall in the probability of reporting medium and low life satisfaction of 0.04 and 0.08 points respectively. But, not accounting for the endogeneity of volunteering in this model can lead to biased, unreliable, estimates.

Table 3 presents the IV estimates for the effects of volunteering on health and life satisfaction status using the CMP approach. The Cragg-Donald Wald F statistic (35 and 33) which tests the joint correlation between the instruments (access and access squared) and volunteering indicates that they are highly correlated with the volunteering variable. The rho statistic measuring the covariance of the error terms in equations (1) and (2) indicates that volunteering is endogenous for

both the health and life satisfaction variables, rendering the CMP approach preferable to the ordered probit model.

Taking part in volunteer activities has a much larger positive impact on health status once endogeneity is addressed when compared to our previous results. Volunteering increases the probability of reporting excellent/very good health status by 0.239 points and decreases the probability of reporting good and fair/poor health status by 0.10 and 0.138 points. However, the impact of volunteering on life satisfaction while positive, is statistically insignificant once endogeneity is taken into account. Before examining the robustness of these results, we note the importance of several other factors in helping to explain health and life satisfaction.

We see from table 3 that health deteriorates with age,³ is associated with marital status, age of children in the household, immigrant status, and improves with income and education level. Looking at life satisfaction, several factors are associated with its improvement, including age, being married, the presence of young children, and health. While one might think of health and life satisfaction going hand in hand, a few factors are correlated differently with these two measures. These include: male being positively associated with excellent health, and negatively with life satisfaction; higher age reducing health and increasing life satisfaction; a university degree being strongly correlated with excellent health but with an insignificant association on life satisfaction; similarly, employment status is associated with health but not life satisfaction; urban dwellers have higher health but lower life satisfaction, *ceteris paribus*.

Our main model dealing with endogeneity reveals that volunteering leads to better health but that it has no statistical impact on life satisfaction. To examine the stability of this finding, we

³ In Grossman (1972) age has a non-linear relationship with health. We also estimated the models with age squared and found that it did not affect substantially the link from volunteering to health or life satisfaction so we reported the more parsimonious specification.

perform a series of robustness tests, including estimating the model with different instruments, exploring a series of other specifications and parsing the data in several ways.

To render this analysis more comparable to existing studies, we estimate models using a measure of religiosity and the length of time living in city or local community as alternative instruments. The literature has established that measures of religiosity may motivate volunteering behaviour (e.g., Borgonovi, 2008; Fiorillo and Nappo, 2017); and Schultz et al. (2008) argue that the number of years living in community is correlated with social capital (volunteering), through its effect on the mobility rate (DiPasquale and Glaeser, 1999).

We re-estimate the models using religiosity and length of time living in city or community as separate instruments. To measure length of living in a city or community we use the responses to the question “How long have you lived in this city or local neighbourhood?” which is collected in six categorical formats. We recode these into a dichotomous variable which takes value one if an individual has lived in the community more than 10 years and zero otherwise. To measure religiosity, we use responses to the question “Not counting events such as weddings or funerals, during the past 12 months, how often did you participate in religious activities or attend religious services or meetings?” which has five categorical responses. We recode this into a binary variable that takes value one if the individual participated in religious activities at least once a week and zero otherwise.

The top half of table 4 reports the results from the CMP model when we use length of time living in the community as an instrument for being a volunteer; the bottom half uses frequent religious attendance as the instrument. We also provide the estimated effect of the instrument in the first stage of the regressions along with several standard tests required of instruments. Turning first to the top of the table, volunteering increases the probability of reporting excellent/very good

health by 0.168 points, decreasing the probability of reporting good and fair/poor health status by 0.076 and 0.093 points respectively, when volunteering is identified through those who have lived more than 10 years in their community. This impact is smaller in magnitude than the results reported for our main specification when access to volunteer opportunities is the instrument. When it comes to life satisfaction, however, identifying volunteers with this alternative instrument results in volunteering leading to a positive impact on life satisfaction – in contrast to the statistically insignificant effects reported in our main specification. Now, volunteering leads to a large, statistically significant, increase of 0.169 points in the highest measure of life satisfaction, reducing the other two measures by -.139 and 0.030 respectively.

While using frequent religious participation as an instrument further reduces the impact of volunteering on health, it remains large and positive. Volunteering now leads to an increase in the probability of reporting excellent/very good health status of 0.123 points, decreasing the probability of reporting good and fair/poor health status by 0.057 and 0.066 points respectively. We also find that volunteering has a positive and significant impact on life satisfaction of just a bit more than was reported in the top half of table 4.

Seven additional models are estimated to examine the robustness of our results. The impact of volunteering on health and life satisfaction for these models is reported in table5. To ease comparison, we repeat the estimated effects of volunteering on health and life satisfaction for the simple ordered probit and for the CMP main specification in the first two results columns of this table. Table 5 thus presents the estimated impact of volunteering on health and life satisfaction for nine regression models in total, with all of the other estimated effects and diagnostic statistics suppressed for brevity.

Income is an important determinant of health (e.g., Ettner, 1996; Lynch & Kaplan, 2000). But, income may also be endogenous to the outcomes. For example, individuals in poor health are less likely to be in the labour force, hence earning less money. To check the sensitivity of our results to the possible endogeneity of income, we re-estimate the model using the more exogenous measure of ‘permanent’ income rather than current income. To measure permanent income, we follow McDonald and Kennedy (2004) and rely on a set of dummy variables reflecting the type of dwelling in which the individual resides, whether the dwelling is owned by a member of household and whether the individual receives investment income. Including these dummy variables rather than income categories into the main CMP specification confirms that volunteering leads to a large and positive impact of volunteering on health, and, again, no statistical effect on life satisfaction. As reported in column (3) we see that volunteering leads to an increase in the likelihood of being in excellent or very good health of 0.314 points (larger than the 0.239 found in the main specification), lowering the other two categories by 0.117 and 0.198 respectively.

Fiorillo and Nappo (2017) argue that social connections can directly affect volunteering and health; for instance, individuals with more social contacts may be more likely to hear about (be asked to engage in) volunteer opportunities. In addition, many studies show how social networking (e.g., ties with friends and family members and civic engagement) is directly linked to individual health and well-being (e.g., Helliwell and Putnam, 2004). To account for this possibility, we conduct a further robustness check by estimating the main CMP model including measures of formal and informal social networks. One problem with including these variables – and the main reason why they were not in the main model – is that questions about networks were not asked in all of the GSS cycles. To measure informal networks, the GSS (2003, 2008 and 2013) has questions about face to face contacts with friends and relatives who do not reside in the household.

We construct dummy variables for three levels of social interactions: high (over five interactions a month), medium (three to five interactions a month) and low (under three interactions a month). To measure formal social networks, these cycles ask questions about the civic engagement of respondents.⁴ We construct a dummy variable which takes the value one if the respondent was a member or participant in at least one of these eight different organizations and zero otherwise.

The estimated impact of being a volunteer on health and life satisfaction once account is taken of social networks, is reported column (4) of table (5). Volunteering continues to have a positive and significant effect on health, but it is now smaller than in the main model: an increase in excellent/very good health of 0.167 points as opposed to 0.239. We continue to find an insignificant effect from volunteering on life satisfaction.

Some groups have been found to respond differently to volunteering than others. To examine this possibility, we estimate the causal effect of volunteering on health and life satisfaction by sex and by age groups. Columns (5) and (6) present the results from the main CMP model when the data are parsed by sex. Two conclusions stand out. First, the impact of volunteering on health is very similar between females and males – the impact on excellent health is a bit larger for females (0.243 points) than males (0.212 points) which is made up of a larger reduction in poor health by females when compared to males. Secondly, volunteering has a strong positive impact on life satisfaction for women and no statistical impact on life satisfaction for men. We cannot say why this is the case, possibly this result reflects the types of activities undertaken by men and women, but we leave this puzzle to future research.

⁴ Specifically, the GSS (2003, 2008 and 2013) asks: “in the past 12 month, were you a member or participant in: a union or professional association; ...a political party or group; ... a sports or recreational organization (such as a hockey league, health club, or golf club); ... cultural/ educational group (such as a theatre group, book club or bridge club); ... a religious-affiliated group (such as church youth group or choir); ... a school group, neighbourhood, civic or community association (such as PTA, alumni, block parents or neighbourhood watch); ...service club (such as Kiwanis, Knights of Columbus or the legion); ... other”.

People take part in volunteer activities for various reasons at different stages of their life. According to the General Social Survey of Giving, Volunteering and Participating (CSS GVP, 2013), many more respondents aged 65 and over report that they volunteer to improve their health when compared to other age groups. To see if volunteering has differential impacts on health or life satisfaction across ages, we parse the sample into three groups (individuals aged <35; aged >65; $35 \leq \text{aged} \leq 65$). The results are reported in the last three columns of table 5. A few stark differences are revealed across the age groups. The impact on health from volunteering by the youngest and middle aged groups is very similar: for both groups, excellent/very good health increased – by 0.207 points for the youngest group and by 0.274 for the middle one. The attendant fall in fair/poor health is much larger for the middle group than the younger one. The impact on life satisfaction, however, differs completely across these two groups. For younger volunteers, there is no statistical impact on their reported life satisfaction, whereas for the middle group volunteering increases their satisfaction. Finally, we find no effect whatsoever from volunteering to health and life satisfaction for the older group. We were surprised at this result, especially for life satisfaction as conventional wisdom certainly suggests that volunteering helps bring meaning to one’s life and for retired individuals, would help promote satisfaction.

5. Conclusions

Except for those aged 65 and over, the result that volunteering leads to better health is robust to a wide variety of specifications. The size of this effect, however, does vary depending upon specification and instruments employed – although it is always a relatively large effect. Volunteering results in a higher probability of reporting excellent or very good health in the range of 0.167 to 0.314 points which represent large percentage increases in the estimated probability of volunteering. These magnitudes lie outside of those reported in the literature. For instance, Fiorillo

and Nappo (2017), find that after controlling for endogeneity, volunteering increases the probability of self-perceived good health by 1% point. Binder and Freytag (2013) using propensity score matching find that taking part in volunteer activities increases life satisfaction by 11.3% points.

Our results for life satisfaction are a bit less robust. We find that female volunteers report higher life satisfaction in comparison to their non-volunteering counterparts, as do all individuals aged between 35 and 65 years. Otherwise, life satisfaction is not affected by volunteering.

The choice of instrument matters in terms of the size of the effect. Individuals who are induced to change their volunteer behaviour because of proximity to charitable organizations have a larger effect on reported health than those who volunteer because of length of time in the community or because of regularly attending a place of worship. Moreover, all of these effects are larger than the one estimated by the ordered probit approach. This finding makes sense as the ordered probit estimates effects averaged over the total sample while the CMP estimates the local average effects (LATE) for those induced to change their behaviour by the instruments

Like all empirical analyses, we are hampered by the availability of data. Longitudinal data that follows individuals over time would be ideal for discerning the causal impact of volunteering on health and life satisfaction, but these do not exist. In addition, we have to rely on self-reported health and life satisfaction; it would have been useful to be able to compare these results to those arising from more objective outcome measures. Finally, more and better information on the types of volunteer activities undertaken by individuals would shed light on why some groups respond differently to volunteering than others. If we could distinguish volunteer activities that require interacting with others from those that do not, this may provide some explanation for these differing impacts.

Our results suggest that volunteering does lead to improved health for most of the population – the exception being the elderly. Life satisfaction may increase for some volunteers. These results provide further support for policies designed to encourage and promote volunteering.

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Table 1: Weighted summary statistics for the full sample and by self-reported health status and self-rated life satisfaction: GSS Surveys. REF = reference group in regressions

Variable	Full sample	Excellent/very good	Good	Fair/poor	Very satisfied	Somewhat satisfied	Very dissatisfied
Dependent variables (%)							
Self-reported health		57.83	29.38	12.79			
Self-rated life satisfaction					66.19	31.31	2.5
Independent Variables							
Volunteer	38.7	42.29	35.81	29.12	41.43	33.86	27.2
Sex (%)							
Male	49.26	49.9	49.28	46.3	48.98	50.12	45.72
Age (#)							
Age	44.81	42.41	46.31	52.23	45.09	43.99	47.7
Marital status (%)							
Married/common law	62.09	62.84	62.37	58.09	65.76	55.55	46.86
Widowed	4.64	3.4	5.14	9.08	4.47	4.81	6.98
Separated/divorced	6.71	5.63	7	10.9	5.28	8.92	16.85
Single/never married	26.51	28.08	25.44	21.84	24.43	30.67	29.22
Education level (%)							
Less than high school	16.88	13.66	18.69	27.28	16.64	17	21.65
Graduated from high school	29.52	28.38	31.41	30.31	28.79	30.8	32.73
Post-secondary diploma or certificate	28.25	28.74	28.18	26.21	28.38	27.99	28.22
University degree	24.96	28.9	21.26	15.67	25.82	23.83	16.53
Health status (%)							
Excellent/very good	57.83				68.97	37.29	20.32
Good	29.38				24.41	40.4	22.94
Fair/poor	12.79				6.62	22.31	56.74
Labour force status (%)							
Full-time	37.32	40.04	37.31	25.04	37.6	37.58	26.67
Part-time	27.89	30.83	26	18.92	28.38	27.45	20.49
Not employed	33.91	28.25	35.77	55.24	33.16	34.06	51.81
Household income (%)							
Less than \$20,000	5.97	4.13	6.41	13.26	4.73	7.67	17.33
\$20,000-\$39,999	13.18	10.9	14.84	19.68	11.96	15.22	20.05
\$40,000-\$59,999	15.12	14.41	16.19	15.89	14.67	16.04	15.57
\$60,000-\$79,999	12.79	12.96	13.32	10.79	12.91	12.79	9.45
\$80,000-\$99,999	10.54	11.69	9.77	7.12	10.98	9.88	7.12
Over \$100,000	26.21	31	21.75	14.79	28.77	21.84	13.15

Table 1: Weighted summary statistics for the full sample and by self-reported health status and self-rated life satisfaction: GSS Surveys. REF = reference group in regressions

Variable	Full sample	Excellent/very good	Good	Fair/poor	Very satisfied	Somewhat satisfied	Very dissatisfied
Age of youngest child in the household (%)							
No children	58.1	56.47	58.24	65.16	57.76	58.35	63.9
Youngest child in household is <5 years old	11.77	13.17	10.98	7.25	12.37	10.8	7.87
Youngest child in household is between 5-14 years old	16.93	18.19	16.6	12.02	17.03	16.93	14.59
Youngest child in household is >14 years	13.2	12.17	14.18	15.57	12.84	13.92	13.65
Length of time living in Canada (%)							
Born in Canada	78.98	80.3	76.57	78.54	80.1	76.73	77.42
Immigrant, over 15 years	12.92	11.37	14.53	16.26	12.57	13.5	15.12
Immigrant, less 15 years	7.79	8.02	8.6	4.9	7.08	9.35	7.04
Urban/Rural indicator (%)							
Urban	82.09	82.71	81.68	80.19	81.09	84.04	83.96
Province of residence of the respondent (%)							
Newfoundland and Labrador	1.61	1.7	1.44	1.58	1.76	1.31	1.35
Prince Edward Island	2.95	2.87	2.95	3.34	2.97	2.87	3.31
Nova Scotia	0.42	0.41	0.41	0.45	0.43	0.4	0.41
New Brunswick	2.31	2.12	2.44	2.88	2.39	2.12	2.56
Quebec	23.62	23.49	23.99	23.38	24.8	21.54	18.59
Ontario	38.42	38.71	38.1	37.86	37.44	40.24	41.76
Manitoba	3.56	3.46	3.72	3.61	3.58	3.49	3.75
Saskatchewan	3	2.85	3.24	3.14	3.1	2.82	2.7
Alberta	10.59	10.99	10.03	10.06	10.37	11.04	10.74
British Columbia	13.52	13.39	13.69	13.7	13.16	14.18	14.81
Population size (#)							
Population size-3km	41,756	41,912	41,719	41,139	39,876	45,431	45,503
Year (%)							
2003	14.5	15.81	12.9	12.29	14.97	13.81	10.86
2005	15	13.86	16.65	16.34	14.05	16.63	19.72
2008	16.59	15.29	18.21	18.75	17.01	15.81	15.2
2010	16.84	15.21	18.78	19.75	15.31	19.85	19.4
2013	37.07	39.83	33.47	32.88	38.66	33.9	34.81
Number of observations	110,624	63,974	32,501	14,149	73,222	34,636	2,766

Table 2: The effect of volunteering on the health and life satisfaction, ordered probit approach

	Health			Life satisfaction		
	Model (1)			Model (2)		
Variable	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.061*** (0.004)	-0.029*** (0.002)	-0.033*** (0.002)	0.048*** (0.004)	-0.040*** (0.003)	-0.008*** (0.001)
Number of observations	110,624			110,624		

1-The asterisks ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are robust standard errors. 3- The regression models are weighted by the probability weight. 4- Full results available on request.

Table 3: The causal effect of volunteering on the health and life satisfaction, CMP approach

Variable	Health			Life satisfaction		
	Model (3)			Model (4)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Volunteer	0.239*** (0.094)	-0.100*** (0.028)	-0.138*** (0.066)	0.057 (0.061)	-0.048 (0.051)	-0.009 (0.010)
Male	0.008 (0.005)	-0.003* (0.002)	-0.004 (0.003)	-0.014*** (0.004)	0.012*** (0.004)	0.002*** (0.001)
Age	-0.003*** (0.000)	0.001*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)
Widowed	0.030*** (0.007)	-0.013*** (0.003)	-0.017*** (0.004)	-0.041*** (0.007)	0.034*** (0.006)	0.007*** (0.001)
Separated/divorced	-0.039*** (0.008)	0.017*** (0.005)	0.023*** (0.004)	-0.120*** (0.006)	0.101*** (0.005)	0.019*** (0.001)
Single/never married	-0.023*** (0.006)	0.010*** (0.003)	0.013*** (0.003)	-0.065*** (0.006)	0.055*** (0.005)	0.010*** (0.001)
Less than high school	-0.054*** (0.011)	0.023*** (0.007)	0.031*** (0.004)	0.043*** (0.006)	-0.036*** (0.005)	-0.007*** (0.001)
Graduated from high school	-0.008 (0.007)	0.004 (0.003)	0.005 (0.004)	0.011** (0.005)	-0.009** (0.004)	-0.002** (0.001)
University degree	0.038** (0.017)	-0.016* (0.009)	-0.022*** (0.008)	-0.007 (0.009)	0.006 (0.007)	0.001 (0.001)
Part-time	0.000 (0.010)	-0.000 (0.004)	-0.000 (0.006)	0.002 (0.007)	-0.002 (0.006)	-0.000 (0.001)
Not employed	-0.076*** (0.006)	0.032*** (0.003)	0.044*** (0.007)	0.010 (0.007)	-0.008 (0.006)	-0.002 (0.001)
Less than \$20,000	-0.166*** (0.026)	0.070*** (0.019)	0.096*** (0.008)	-0.103*** (0.011)	0.087*** (0.009)	0.016*** (0.002)
\$20,000-\$39,999	-0.098*** (0.017)	0.041*** (0.012)	0.057*** (0.006)	-0.078*** (0.008)	0.066*** (0.007)	0.012*** (0.001)
\$40,000-\$59,999	-0.062*** (0.014)	0.026*** (0.008)	0.036*** (0.005)	-0.054*** (0.008)	0.046*** (0.006)	0.009*** (0.001)

Table 3: The causal effect of volunteering on the health and life satisfaction, CMP approach

Variable	Health			Life satisfaction		
	Model (3)			Model (4)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
\$60,000-\$79,999	-0.054*** (0.010)	0.023*** (0.007)	0.031*** (0.004)	-0.037*** (0.007)	0.031*** (0.006)	0.006*** (0.001)
\$80,000-\$99,999	-0.017* (0.009)	0.007 (0.004)	0.010** (0.005)	-0.032*** (0.007)	0.027*** (0.006)	0.005*** (0.001)
Youngest child in household is <5 years old	0.017** (0.008)	-0.007** (0.003)	-0.010* (0.005)	0.007 (0.007)	-0.006 (0.006)	-0.001 (0.001)
Youngest child in household is between 5-14 years old	-0.023** (0.012)	0.010** (0.004)	0.014* (0.008)	-0.023*** (0.008)	0.020*** (0.007)	0.004*** (0.001)
Youngest child in household is >14 years	-0.041*** (0.006)	0.017*** (0.003)	0.024*** (0.004)	-0.041*** (0.006)	0.035*** (0.005)	0.007*** (0.001)
Immigrant, over 15 years	-0.024*** (0.009)	0.010** (0.005)	0.014*** (0.004)	0.007 (0.006)	-0.006 (0.005)	-0.001 (0.001)
Immigrant, less than 15 years	0.005 (0.014)	-0.002 (0.006)	-0.003 (0.008)	-0.026** (0.010)	0.022** (0.009)	0.004*** (0.002)
Good				-0.208*** (0.005)	0.175*** (0.005)	0.033*** (0.001)
Fair/poor				-0.402*** (0.009)	0.338*** (0.009)	0.064*** (0.002)
Urban	0.013 (0.008)	-0.005* (0.003)	-0.007 (0.005)	-0.019*** (0.006)	0.016*** (0.005)	0.003*** (0.001)
Newfoundland and Labrador	0.043*** (0.008)	-0.018*** (0.005)	-0.025*** (0.005)	0.047*** (0.008)	-0.039*** (0.007)	-0.007*** (0.001)
Prince Edward Island	-0.013* (0.008)	0.005* (0.003)	0.008 (0.005)	0.015** (0.008)	-0.013** (0.006)	-0.002** (0.001)
Nova Scotia	0.000 (0.010)	-0.000 (0.004)	-0.000 (0.006)	0.010 (0.011)	-0.008 (0.009)	-0.002 (0.002)
New Brunswick	-0.021** (0.008)	0.009** (0.004)	0.012*** (0.004)	0.038*** (0.008)	-0.032*** (0.007)	-0.006*** (0.001)

Table 3: The causal effect of volunteering on the health and life satisfaction, CMP approach

Variable	Health			Life satisfaction		
	Model (3)			Model (4)		
	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Quebec	0.045*** (0.014)	-0.019*** (0.004)	-0.026*** (0.010)	0.061*** (0.009)	-0.051*** (0.008)	-0.010*** (0.002)
Manitoba	-0.016** (0.007)	0.007** (0.003)	0.010** (0.005)	0.017** (0.007)	-0.014** (0.006)	-0.003** (0.001)
Saskatchewan	-0.040*** (0.009)	0.017*** (0.003)	0.023*** (0.007)	0.026*** (0.009)	-0.022*** (0.008)	-0.004*** (0.001)
Alberta	-0.011 (0.007)	0.005 (0.003)	0.006 (0.004)	-0.012* (0.007)	0.010* (0.006)	0.002* (0.001)
British Columbia	-0.004 (0.006)	0.001 (0.002)	0.002 (0.003)	0.002 (0.006)	-0.002 (0.005)	-0.000 (0.001)
Population size-3km	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Year 2003	0.034*** (0.005)	-0.014*** (0.002)	-0.020*** (0.003)	0.003 (0.005)	-0.002 (0.004)	-0.000 (0.001)
Year 2005	-0.049*** (0.006)	0.020*** (0.005)	0.028*** (0.003)	-0.033*** (0.005)	0.028*** (0.004)	0.005*** (0.001)
Year 2008	-0.075*** (0.005)	0.031*** (0.005)	0.043*** (0.004)	0.017*** (0.006)	-0.014*** (0.005)	-0.003*** (0.001)
Year 2010	-0.084*** (0.008)	0.035*** (0.007)	0.049*** (0.003)	-0.052*** (0.006)	0.043*** (0.005)	0.008*** (0.001)
Instrumental variables (first stage)						
Access (3km)		1.65e-4*** (3.59e-5)			1.62e-4*** (3.58e-5)	
Access (3km) ²		-5.06e-8** (2.14e-8)			-5.08e-8** (2.13e-8)	
The validity of instruments						

Table 3: The causal effect of volunteering on the health and life satisfaction, CMP approach

		Health		Life satisfaction		
		Model (3)		Model (4)		
Variable	Pr (excellent/ very good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (very satisfied=1)	Pr (somewhat satisfied=1)	Pr (very dissatisfied=1)
Cragg-Donald Wald F statistics		35			33	
Endogeneity test (atanrho_12)		-0.326*** (0.000)			-0.018*** (0.000)	
Number of observations		110,624			110,624	

1-The asterisks ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are robust standard errors except for the endogeneity test where it is the p-value in parenthesis. 3- The regression models are weighted by the probability weight. 4- Dummy variables for the missing values of marital status, education, immigration status, income level and employment status are also included in the regression models, but suppressed for brevity.

Table 4: The causal effect of volunteering on health and life satisfaction, alternative instruments, CMP approach

Variable	<i>Health</i>			<i>Life satisfaction</i>		
	Pr (excellent/v. good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (v. satisfied=1)	Pr (somewhat satisfied=1)	Pr (v. dissatisfied=1)
Volunteer	0.168** (0.075)	- 0.076* *	-0.093** (0.045)	0.169*** (0.046)	-0.139*** (0.035)	-0.030*** (0.011)
Instrumental variables (first stage)						
Live in city or community >10	0.041*** (0.005)			0.040*** (0.005)		
The validity of instruments						
Cragg-Donald Wald F statistics	152			147		
Endogeneity test (atanrho_12)	-0.187*** (0.00)			-0.241*** (0.00)		
Number of observations	109,720			109,720		
Variable	<i>Health</i>			<i>Life satisfaction</i>		
	Pr (excellent/v. good =1)	Pr (good=1)	Pr (fair/poor=1)	Pr (v. satisfied=1)	Pr (somewhat satisfied=1)	Pr (v. dissatisfied=1)
Volunteer	0.123** (0.02)	- 0.057* *	-0.066** (0.011)	0.180*** (0.017)	-0.148*** (0.013)	-0.033*** (0.004)
Instrumental variables (first stage)						
Frequent religious attendance	0.236*** (0.005)			0.234*** (0.005)		
The validity of instruments						

Cragg-Donald Wald F statistics	3,945	3,885
Endogeneity test (atanrho_12)	-0.109*** (0.00)	-0.275*** (0.00)
Number of observations	109,720	109,720

1-The asterisks ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively. 2-The number in the parentheses are robust standard errors else than endogeneity test (p-value). 3- The regression models are weighted by the probability weight. 4- All the other control variables are suppressed for brevity.

Table 5: Estimated Impact of Volunteering on Health and Life Satisfaction: Seven robustness checks

	Ordered probit (1)	CMP (2)	Control for perm, income (3)	Control for social network (4)	Female (5)	Male (6)	Age < 35 (7)	35 < Age < 65 (8)	Age > 65 (9)	
Health	Pr (exc/v good =1)	0.061*** (0.004)	0.239*** (0.094)	0.314*** (0.052)	0.167** (0.081)	0.243* (0.133)	0.212* (0.127)	0.207** (0.095)	0.274*** (0.049)	0.09 (0.206)
	Pr (good=1)	-0.029*** (0.002)	-0.100*** (0.028)	-0.117*** (0.006)	-0.075** (0.032)	-0.097** (0.037)	-0.097** (0.046)	-0.117*** (0.043)	-0.105*** (0.01)	-0.022 (0.05)
	Pr (fair/poor=1)	-0.033*** (0.002)	-0.138*** (0.066)	-0.198*** (0.046)	-0.092* (0.049)	-0.145 (0.096)	-0.116 (0.082)	-0.090* (0.052)	-0.168*** (0.039)	-0.068 (0.156)
Life Satisf action	Pr (v satisfied=1)	0.048*** (0.004)	0.057 (0.061)	0.102 (0.065)	0.102 (0.064)	0.162** * (0.056)	0.023 (0.061)	0.038 (0.06)	0.130** (0.06)	0.079 (0.067)
	Pr (somewhat satisfied=1)	-0.040*** (0.003)	-0.048 (0.051)	-0.085 (0.053)	-0.085 (0.053)	- 0.131** * (0.042)	-0.019 (0.052)	-0.034 (0.053)	-0.105*** (0.047)	-0.065 (0.055)
	Pr (v dissatisfied=1)	-0.008*** (0.001)	-0.009 (0.01)	-0.017 (0.012)	-0.017 (0.012)	-0.030** (0.015)	-0.003 (0.009)	-0.005 (0.007)	-0.025* (0.013)	-0.014 (0.012)
Number of observations		110,624	110,624	110,624	110,624	61,741	48,863	29,816	57,985	22,823