Doing Good, Feeling Good: Causal Evidence from Canadian Volunteers[*]

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Abstract

Volunteers are reputedly healthier and happier than their non-volunteering counterparts. But is this a causal link or are healthier, happy individuals simply more likely to volunteer? Some papers have attempted to identify the causal relationship using an instrumental variable methodology; most relying on measures of religiosity as instruments for volunteering. No studies of such nature have been conducted in Canada. We rely on a novel instrument, a measure physical proximity to volunteer opportunities and use data from Canadian General Social Surveys to fill this gap. Employing a conditional mixed process (CMP) model, we find that volunteering is a robustly significant predictor of health, and positively affects life satisfaction for female and middle-aged individuals.

Key words: Volunteering; volunteering and health; volunteering and life satisfaction.

1. Introduction

Of the many factors found to be associated with individuals' overall well-being, volunteering is particularly intriguing. Volunteering has been linked to prolonged longevity older adults (e.g. Musick et al. (1999)), better self-reported health (e.g. Morrow-Howell et al. (2003)), as well as greater happiness, life satisfaction, self-esteem, sense of control over life, and depression (Thoits and Hewitt (2001)).[1] Various mechanisms have been put forth to explain these relationships: volunteering is thought to strengthen social networks which decrease stress and increase well-being (e.g., Pilkington, 2012); volunteering is also thought to lead to higher incomes through, for instance, the acquisition of human capital (e.g. Cozzi et al., 2013) which in turn affect well-being; and volunteering has also been associated with a 'warm glow' that makes us feel good about ourselves (Fiorillo and Nappo, 2016).

Identifying a causal link from volunteering to health or well-being is complicated because of unobserved heterogeneity (omitted variable bias) and reverse causality. Unobservable factors can jointly affect volunteering and health outcomes: a daily walker may be both more likely to report good health and be more likely to be aware of her local community's activities and needs. In general, more agreeable people may be both healthier/more satisfied with life and more likely to volunteer (Bekkers, 2010; Omoto et al. 2010). Reverse causality may arise if individuals in poor health do not have the capacity to participate in volunteer activities, whereas healthy individuals do.

Only five studies have attempted to identify a causal link between volunteering and health or happiness, of which three employ an IV approach and rely on measures of 'religiosity' as instruments. Borgonovi (2008) uses the US Social Capital Community Benchmark Survey (2000)

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[1] These three papers all use data from the Americans' Changing Lives study.

of 23,143 persons to investigate 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 monthly volunteers are 4% more likely to report being in excellent health and 5% more likely to report being very happy when compared to their non-volunteering counterparts. Using the same survey, Schultz et al. (2008) focus on two cities, Duluth, Minnesota, and Superior, Wisconsin, to investigate the causal relationship between social capital (as measured by 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 stint of volunteering each year increases the probability of being healthy by 11%. Fiorillo and Nappo (2016) use the British Income and Living Conditions Survey (2006) to investigate the causal relationship between volunteering and self-perceived health with religious participation as their instrument. They find that being a volunteer has a large, positive impact on the probability of reporting very good or good health status (of 45%).

The fourth paper looking at causality, Gimenez-Nadal and Molina (2015a), uses the Well-Being Module of the American Time Use Survey from 2010 and exploits 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. No statistical relationship between volunteering and happiness is found.[2] The final paper, Binder and Freytag (2013), moves away from the IV approach, favoring 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 thought to affect both volunteering and subjective

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[2] The published version of this paper (Gimenez-Nadal and Molina, 2015b) removed the discussion of the IV model, and focused on associations.

well-being. They find that volunteering increases well-being, and that the magnitude of this association grows with continued volunteering.

We are the first to investigate the causal link between volunteering and health and volunteering and life satisfaction in Canada and the first to use a novel instrument, namely physical proximity (access) to charitable organizations, to identify these causal links. We also separate our sample by sex and age and uncover group-specific effects. Access is measured as the number of registered charities within a three-kilometer radius of an individual's residence. It has been shown that physical proximity to charities increases both knowledge and awareness of volunteer opportunities, as well as decreasing the time cost of volunteering; this measure of access is associated with a meaningful increase in the likelihood of volunteering (Deri Armstrong et al. 2016). To render our work comparable 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 Canadian 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: 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

Two main sources of data are used in this study: Statistics Canada's General Social Surveys (GSS) and administrative tax data containing information on the locations of all registered charities in Canada. The GSS are nationally representative, cross-sectional social surveys that focus on one topic annually while also collecting a host of socio-economic and family characteristics. We use data from 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, as these are the only ones to provide information on volunteering, self-perceived health and life satisfaction. The second source of data is the T3010 Revenue Canada tax returns of registered charities in Canada from 2003-2012. Under the *Income Tax Act* registered charities in Canada must file a Registration Charity Return (Form T3010) every year in order to maintain their charitable status. Among other things, we have data on the name, location, field of activity and business numbers of all charitable organizations across Canada from 2003 to 2009. There were 78,205 registered charities in 2003 and 83,668 in 2009. About 90% are charitable organizations and 10% are charitable foundations (we include both of these because individuals volunteer in foundations). Over 80% of these organizations are located in four provinces: Ontario (35%), Quebec (20%), British Columbia (14%) and Alberta (11%).[3] 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%). As discussed in more detail below, we merge the reported postal codes of these registered charities with the postal codes of the respondents' residences from the GSS to create our main instrument, proximity to volunteer opportunities.

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[3] On a per capita basis while Saskatchewan (5 per 1,000), Prince Edward Island (4 per 1,000) and Manitoba (4 per, 1000) lead the country, Quebec (2 per 1,000) and Newfoundland (2 per 1,000) have the fewest number of charities per capita.

The original sample pooled from the five GSS cycles 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 a correct six-digit postal code (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.

We consider two measures of well-being: self-perceived health and life satisfaction. 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; (1-3), (4-7), and (8-10): very dissatisfied, somewhat satisfied and very satisfied, respectively.

Individual's participation in formal volunteer work is based on the question "In the past 12 months, did you do unpaid volunteer work for any organization?" coded as a binary yes/no response. 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.[4] Year fixed effects are added to capture secular time trends in self-rated health and life satisfaction.

Table 1 presents some descriptive statistics for the full sample, and for the three categories of self-reported health and the three categories of life satisfaction. In general, 39% of respondents report formal volunteer activities within the past 12 months. The sample is comprised of slightly more women than men, and the average age is 45 years. Most respondents are either married or living in common law relationships (62%), have more than a 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 our sample work full-time. Approximately 50% live in households that earn an annual income 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 excellent or very good overall health. 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 those in poorer health. 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%). A similar pattern is observed for life satisfaction. Most

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[4] Data on population size at the postal code level are not available; we estimate this population by using the geographic attribute files from the 2006 and 2011 censuses which contain population data at the dissemination block level, the lowest geographic level after the postal code level. Then, in order to find out how many postal codes are attributed to each dissemination block, we merge the geographic attribute files with the postal code conversion file (PCCF). We divide the population size at the dissemination block by the total number of postal codes that each dissemination block encompasses, which effectively assumes that the population is distributed evenly across postal codes. Using, again, the PCCF to find the corresponding coordinates (longitude and latitude) of each postal code, we construct a 3km circle around each postal code and then sum the population that falls within this band.

individuals (66%) report being very satisfied with life; these individuals 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 on average younger, more educated, more likely to work full-time, to have young children at home, live in households with higher earnings and be Canadian born, relative to the other life satisfaction groups. Life satisfaction varies less regionally compared to self-reported health: the provinces with the greatest proportion of respondents reporting strong life satisfaction were Newfoundland Labrador (72%) and Quebec (69%), and the provinces with the lowest proportion were Ontario (64%) and British Columbia (65%).

3. Methodology

Volunteering may be endogenous in a model of wellbeing. Omitted variables (naturally more optimistic individuals may be both more satisfied with life and have a higher propensity for volunteering) and reverse causality (those in poorer health are less able to volunteer) render ordered probits or linear probability models inappropriate. We employ a two stage IV method (the recursive Conditional Mixed Process model, detailed below) using physical access to charitable organizations (plus its square) as the main instruments for identifying volunteering. 'Access' measures the number of charitable organizations in the three kilometer buffer around a respondent's home (proxied by their postal code). As always, a valid an instrument must satisfy two conditions: first, be correlated with the endogenous variable, here volunteering, and second, be uncorrelated with the error term in the main regression, the exclusion restriction. Elsewhere it is shown that increasing the number of charitable organizations within a 3km radius around an individual's place of residence increases the predicted probability of volunteering (Deri Armstrong et al. 2016). Proximity to charities is argued to affect volunteering by both increasing the information about volunteer opportunities and by decreasing travel time. To satisfy the exclusion

restriction the ideal instrument would be derived from a natural or random experiment (Angrist and Krueger, 2001). Unfortunately, this is not the case here. We need our instrument to be independent of self-reported health or self-reported life satisfaction. Arguably, the location of charitable organizations satisfies this requirement insofar as it is unlikely to be affected by the health or happiness of any given individual. That being said, the location of charities is not random: their level of activity is a function of both local needs and the charities' abilities to access the necessary resources to provide their services. The number of charities in an area may be correlated with well-being related characteristics of the area (but not of any giving individual). Controlling for other geographic characteristics such as population density (which may reflect, for instance, the location of clients), should help to capture these area-specific effects to help ensure that the impact of access to charitable organizations affects an individual`s health and life-satisfaction only through its effect on volunteering.

To render our analysis more comparable to existing studies, we also 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, 2016); 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). 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?" From these responses we construct a binary variable that takes value one if the individual participated in religious activities at least once a week and zero otherwise. To measure length of time the respondent has lived in her city or community we use the responses to the

question "How long have you lived in this city or local neighbourhood?" and construct a variable that takes the value one if an individual has lived in the community more than 10 years and zero otherwise.

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 (or 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).

The CMP can be written as:

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

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

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

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

where Y_{it}^* is an 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 an 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 as listed in Table 1. 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 provided in the GSS, and the standard errors are corrected for heteroskedasticity.

4. Results

We start with a simple ordered probit model that ignores endogeneity; the resulting marginal effects are presented in table 2. We see that volunteering is associated with increases in the probability of reporting excellent/very good health status of 0.061 points, and decreases in the probability of reporting good and fair/poor health status of 0.029 and 0.033 points. It is also associated with increases in the probability of reporting high life satisfaction of 0.048 points, with a commensurate fall in the probability of reporting medium and low life satisfaction of 0.04 and 0.08 points. But, the fact that volunteering may be endogenous in this model means that these estimates are likely to be biased and not reflect the underlying causal relationship.

Table 3 presents the IV estimates for the effects of volunteering on health and life satisfaction status using the CMP approach. Turning first to the test statistics assessing the validity of the

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instruments at the bottom of the table, the Cragg-Donald Wald F statistic (35 and 33) reflects the joint correlation between the instruments (access and access squared) and volunteering is well above the benchmark minimum value of 10, indicating that our instruments are sufficiently correlated with the volunteering variable. The first stage estimates demonstrate that access increases volunteering at a decreasing rate. The rho statistic measuring the covariance of the error terms in equations (1) and (2) (($\text{Cov}(\varepsilon_{it}, u_{it})$)) indicates that volunteering should be viewed as endogenous to both health and life satisfaction, and that the CMP approach is thus preferable to the ordered probit model.

From table 3 we see that taking part in volunteer activities has a much larger positive impact on health status once endogeneity is addressed. 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. The impact of volunteering on life satisfaction while positive, is found to be statistically insignificant once endogeneity is taken into account. These results reflect the local average treatment effects – that is the impact on the outcome variable of having volunteered as a result of proximity to a volunteering opportunity – as opposed to the average effect over the entire sample as calculated by the probit model. 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, as expected. It is also 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 as 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 insignificantly associated with life satisfaction; similarly, employment status is associated with health but not life satisfaction; and 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 has no statistical impact on life satisfaction. To examine the stability of this finding, we 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.

Table 4 reports re-estimations of the basic CMP model using alternative instruments: the top half of the table reports the results when length of time living in city or community is used as an instrument for volunteering; the bottom half reports these results when religiosity is used as an instrument for volunteering. We also provide the estimated effect of the instrument in the first stage of the regressions along with several standard tests of instruments. Volunteering is found to increase 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.[5]

Seven additional models are estimated to examine the robustness of our results, reported in table 5. To ease comparison, we report again the estimated effects of volunteering from the simple ordered probit and for the CMP main specification in the first two columns. Table 5 thus presents the estimated impact of volunteering on health and life satisfaction for nine regression models in total; estimates for the covariates and the diagnostic statistics are suppressed for brevity.

Income is an important determinant of health (e.g., Ettner, 1996; Lynch & Kaplan, 2000). But, income may also be endogenous to our measures of wellbeing: individuals in poor health are less likely to be in the labour force, and hence earn less money. To check the sensitivity of our results to the possible endogeneity of income, we re-estimate the model using an arguably more exogenous 'permanent' measure of income (as compared to current income used in earlier models). 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

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[5] For completeness, we also ran the model with both instruments together and found results that are in between the magnitudes just reported for the instruments run separately: increasing health by 0.127 and life satisfaction by 0.229. Finally, we ran the model with all four instruments – similar results but now excellent health increases by 0.137 and very satisfied with life increases by 0.232.

dwelling is owned by a member of household and whether the individual receives investment income. Including these dummy variables instead of the categorical measure of income used in the main specifications has little effect on the main result. As reported in column (3), volunteering leads to a large and positive impact of volunteering on health (an increase in the likelihood of being in excellent or very good health of 0.314 points and a decrease in the likelihood of fair/poor health of 0.198 points), and, no statistical effect on life satisfaction.

Fiorillo and Nappo (2016) 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 re-estimating the main CMP model including measures of formal and informal social networks. One problem with including these variables – and the 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.[6] We construct a dummy variable which takes the value one if the respondent was a

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[6] 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".

member or participant in at least one of these eight different organizations and zero otherwise. When controls for social networks are included as additional controls (column 4), the estimated effect of volunteering on health becomes smaller but remains significant: an increase in excellent/very good health of 0.167 points as opposed to 0.239. Again no significant effect of volunteering on life satisfaction is found.

Next, we examine how the estimated effect of volunteering varies by gender (columns 5 and 6) and by age group (columns 7-9). 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: volunteering increases excellent/very good health by 0.243 points for the female subsample as compared to 0.212 points for the male subsample and there is a commensurate greater reduction in poor health for females as 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.

When the sample is parsed into three age groups (individuals aged<35; aged>65; 35≤aged≤65) interesting and stark differences are revealed (columns 7-9). The impact on health from volunteering by the two younger age groups is very similar: volunteering increases the likelihood of excellent/very good health by 0.207 points for the youngest group and by 0.274 for the middle group. The attendant fall in fair/poor health is much larger for the middle group than the younger one. However, no health return from volunteering is found for the oldest age group. This result is a little surprising given the oft-espoused 'finding' that volunteering improves the health of older/retired individuals (e.g., Harris and Thoresen, 2005; Okum et al. 2013). Once

endogeneity is taken into account, we do not detect a causal effect: in other words, our results suggest that healthier older individuals are volunteering, which makes sense.

Volunteering is found to impact life satisfaction only for the middle group, individuals 35-65 year old. For them, volunteering increases the probability of being very satisfied with life by 0.130 points. That no effects of volunteering are found for the older age group once again flies in the face of 'conventional wisdom': our results suggest that it is the more satisfied older individuals who volunteer rather than volunteering causing them to be more satisfied.

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, while always large, does vary depending upon specification and instruments employed. Volunteering results in a higher probability of reporting excellent or very good health in the range of 0.167 to 0.314 points. These magnitudes lie outside of those reported in the literature. For instance, Fiorillo and Nappo (2016), find that after controlling for endogeneity, volunteering increases the probability of self-perceived good health by 0.01 points. Binder and Freytag (2013) using propensity score matching find that taking part in volunteer activities increases life satisfaction by 0.113 points.

Our results for life satisfaction are a bit less robust. We find that volunteering has no statistical impact on reporting life satisfaction with two important exceptions: female volunteers report higher life satisfaction in comparison to their non-volunteering counterparts, as do individuals aged between 35 and 65 years.

The choice of instrument also 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 that ignores endogeneity. The ordered probit estimates average effects for 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 follow 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 the range of estimated returns to volunteering we find. 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.

Overall, we conclude that volunteering causes improved reported health for most of the population, but its causal impact on life-satisfaction is much less wide-spread. These health benefits provide further support for policies designed to encourage and promote volunteering.

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Table 1: Weighted summary statistics for the full sample, by self-reported health status and by self-rated life satisfaction

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	2.50
Independent Variables							
Volunteer	38.70	42.29	35.81	29.12	41.43	33.86	27.20
Sex (%)							
Male	49.26	49.90	49.28	46.30	48.98	50.12	45.72
Age (#)							
Age	44.81	42.41	46.31	52.23	45.09	43.99	47.70
Marital status (%)							
Married/common law	62.09	62.84	62.37	58.09	65.76	55.55	46.86
Widowed	4.64	3.40	5.14	9.08	4.47	4.81	6.98
Separated/divorced	6.71	5.63	7.00	10.90	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	17.00	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	40.40	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	26.00	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	10.90	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	31.00	21.75	14.79	28.77	21.84	13.15
Age of youngest child in the household (%)							

Table 1: Weighted summary statistics for the full sample, by self-reported health status and by self-rated life satisfaction

Variable	Full sample	Excellent/very good	Good	Fair/poor	Very satisfied	Somewhat satisfied	Very dissatisfied
No children	58.10	56.47	58.24	65.16	57.76	58.35	63.90
Youngest child in household is <5 years old	11.77	13.17	10.98	7.25	12.37	10.80	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	13.20	12.17	14.18	15.57	12.84	13.92	13.65
Length of time living in Canada (%)							
Born in Canada	78.98	80.30	76.57	78.54	80.1	76.73	77.42
Immigrant, over 15 years	12.92	11.37	14.53	16.26	12.57	13.50	15.12
Immigrant, less 15 years	7.79	8.02	8.60	4.90	7.080	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	1.70	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	0.40	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	3.00	2.85	3.24	3.14	3.10	2.82	2.70
Alberta	10.59	10.99	10.03	10.06	10.37	11.04	10.74
British Columbia	13.52	13.39	13.69	13.70	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	14.50	15.81	12.9	12.29	14.97	13.81	10.86
2005	15.00	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	15.20
2010	16.84	15.21	18.78	19.75	15.31	19.85	19.40
2013	37.07	39.83	33.47	32.88	38.66	33.90	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 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***	-0.029***	-0.033***	0.048***	-0.040***	-0.008***
	(0.004)	(0.002)	(0.002)	(0.004)	(0.003)	(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- All models include the full set of covariates reported in table 1. The full results are available on request.

Table 3: The causal effect of volunteering on 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)
Volunteer	0.239***	-0.100***	-0.138***	0.057	-0.048	-0.009
	(0.094)	(0.028)	(0.066)	(0.061)	(0.051)	(0.010)
Male	0.008	-0.003*	-0.004	-0.014***	0.012***	0.002***
	(0.005)	(0.002)	(0.003)	(0.004)	(0.004)	(0.001)
Age	-0.003***	0.001***	0.002***	0.002***	-0.001***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Widowed	0.030***	-0.013***	-0.017***	-0.041***	0.034***	0.007***
	(0.007)	(0.003)	(0.004)	(0.007)	(0.006)	(0.001)
Separated/divorced	-0.039***	0.017***	0.023***	-0.120***	0.101***	0.019***
	(0.008)	(0.005)	(0.004)	(0.006)	(0.005)	(0.001)
Single/never married	-0.023***	0.010***	0.013***	-0.065***	0.055***	0.010***
	(0.006)	(0.003)	(0.003)	(0.006)	(0.005)	(0.001)
Less than high school	-0.054***	0.023***	0.031***	0.043***	-0.036***	-0.007***
	(0.011)	(0.007)	(0.004)	(0.006)	(0.005)	(0.001)
Graduated from high school	-0.008	0.004	0.005	0.011**	-0.009**	-0.002**
	(0.007)	(0.003)	(0.004)	(0.005)	(0.004)	(0.001)
University degree	0.038**	-0.016*	-0.022***	-0.007	0.006	0.001
	(0.017)	(0.009)	(0.008)	(0.009)	(0.007)	(0.001)
Part-time	0.000	-0.000	-0.000	0.002	-0.002	-0.000
	(0.010)	(0.004)	(0.006)	(0.007)	(0.006)	(0.001)
Not employed	-0.076***	0.032***	0.044***	0.010	-0.008	-0.002
	(0.006)	(0.003)	(0.007)	(0.007)	(0.006)	(0.001)
Less than $20,000	-0.166***	0.070***	0.096***	-0.103***	0.087***	0.016***
	(0.026)	(0.019)	(0.008)	(0.011)	(0.009)	(0.002)
$20,000-$39,999	-0.098***	0.041***	0.057***	-0.078***	0.066***	0.012***
	(0.017)	(0.012)	(0.006)	(0.008)	(0.007)	(0.001)
$40,000-$59,999	-0.062***	0.026***	0.036***	-0.054***	0.046***	0.009***

Table 3: The causal effect of volunteering on 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)
	(0.014)	(0.008)	(0.005)	(0.008)	(0.006)	(0.001)
$60,000-$79,999	-0.054***	0.023***	0.031***	-0.037***	0.031***	0.006***
	(0.010)	(0.007)	(0.004)	(0.007)	(0.006)	(0.001)
$80,000-$99,999	-0.017*	0.007	0.010**	-0.032***	0.027***	0.005***
	(0.009)	(0.004)	(0.005)	(0.007)	(0.006)	(0.001)
Youngest child in household is <5 years old	0.017**	-0.007**	-0.010*	0.007	-0.006	-0.001
	(0.008)	(0.003)	(0.005)	(0.007)	(0.006)	(0.001)
Youngest child in household is between 5-14 years old	-0.023**	0.010**	0.014*	-0.023***	0.020***	0.004***
	(0.012)	(0.004)	(0.008)	(0.008)	(0.007)	(0.001)
Youngest child in household is >14 years	-0.041***	0.017***	0.024***	-0.041***	0.035***	0.007***
	(0.006)	(0.003)	(0.004)	(0.006)	(0.005)	(0.001)
Immigrant, over 15 years	-0.024***	0.010**	0.014***	0.007	-0.006	-0.001
	(0.009)	(0.005)	(0.004)	(0.006)	(0.005)	(0.001)
Immigrant, less than 15 years	0.005	-0.002	-0.003	-0.026**	0.022**	0.004***
	(0.014)	(0.006)	(0.008)	(0.010)	(0.009)	(0.002)
Good				-0.208***	0.175***	0.033***
				(0.005)	(0.005)	(0.001)
Fair/poor				-0.402***	0.338***	0.064***
				(0.009)	(0.009)	(0.002)
Urban	0.013	-0.005*	-0.007	-0.019***	0.016***	0.003***
	(0.008)	(0.003)	(0.005)	(0.006)	(0.005)	(0.001)
Newfoundland and Labrador	0.043***	-0.018***	-0.025***	0.047***	-0.039***	-0.007***
	(0.008)	(0.005)	(0.005)	(0.008)	(0.007)	(0.001)
Prince Edward Island	-0.013*	0.005*	0.008	0.015**	-0.013**	-0.002**
	(0.008)	(0.003)	(0.005)	(0.008)	(0.006)	(0.001)
Nova Scotia	0.000	-0.000	-0.000	0.010	-0.008	-0.002
	(0.010)	(0.004)	(0.006)	(0.011)	(0.009)	(0.002)
New Brunswick	-0.021**	0.009**	0.012***	0.038***	-0.032***	-0.006***

Table 3: The causal effect of volunteering on 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)
	(0.008)	(0.004)	(0.004)	(0.008)	(0.007)	(0.001)
Quebec	0.045***	-0.019***	-0.026***	0.061***	-0.051***	-0.010***
	(0.014)	(0.004)	(0.010)	(0.009)	(0.008)	(0.002)
Manitoba	-0.016**	0.007**	0.010**	0.017**	-0.014**	-0.003**
	(0.007)	(0.003)	(0.005)	(0.007)	(0.006)	(0.001)
Saskatchewan	-0.040***	0.017***	0.023***	0.026***	-0.022***	-0.004***
	(0.009)	(0.003)	(0.007)	(0.009)	(0.008)	(0.001)
Alberta	-0.011	0.005	0.006	-0.012*	0.010*	0.002*
	(0.007)	(0.003)	(0.004)	(0.007)	(0.006)	(0.001)
British Columbia	-0.004	0.001	0.002	0.002	-0.002	-0.000
	(0.006)	(0.002)	(0.003)	(0.006)	(0.005)	(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***	-0.014***	-0.020***	0.003	-0.002	-0.000
	(0.005)	(0.002)	(0.003)	(0.005)	(0.004)	(0.001)
Year 2005	-0.049***	0.020***	0.028***	-0.033***	0.028***	0.005***
	(0.006)	(0.005)	(0.003)	(0.005)	(0.004)	(0.001)
Year 2008	-0.075***	0.031***	0.043***	0.017***	-0.014***	-0.003***
	(0.005)	(0.005)	(0.004)	(0.006)	(0.005)	(0.001)
Year 2010	-0.084***	0.035***	0.049***	-0.052***	0.043***	0.008***
	(0.008)	(0.007)	(0.003)	(0.006)	(0.005)	(0.001)
Instrumental variables (first stage)						
Access (3km)	1.65e-4***			1.62e-4***		
	(3.59e-5)			(3.58e-5)		
Access (3km)^2	-5.06e-8**			-5.08e-8**		
	(2.14e-8)			(2.13e-8)		

Table 3: The causal effect of volunteering on 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)
The validity of instruments						
Cragg-Donald Wald F statistics	35			33		
Endogeneity (rho) test	-0.326***			-0.018***		
(Cov(ε_{it}, u_{it}))	(0.000)			(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	Health			Life satisfaction		
	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**	-0.076**	-0.093**	0.169***	-0.139***	-0.030***
	(0.075)	(0.03)	(0.045)	(0.046)	(0.035)	(0.011)
Instrumental variables (first stage)						
Live in city or community >10	0.041***			0 .040***		
	(0.005)			(0.005)		
The validity of instruments						
Cragg-Donald Wald F statistics	152			147		
Endogeneity (rho) test (Cov(ε_{it}, u_{it}))	-0.187***			-0.241***		
	(0.00)			(0.00)		
Number of observations	109,720			109,720		
	Health			*Life satisfaction*		
Variable	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**	-0.057**	-0.066**	0.180***	-0.148***	-0.033***
	(0.02)	(0.001)	(0.011)	(0.017)	(0.013)	(0.004)
Instrumental variables (first stage)						
Frequent religious attendance	0 .236***			0 .234***		
	(0.005)			(0.005)		
The validity of instruments						

Cragg-Donald Wald F statistics	3,945	3,885
Endogeneity (rho) test $(\text{Cov}(\varepsilon_{it}, u_{it}))$	-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 Satisfaction	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

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.