

Pinpointing Causality Between Lifestyle Behaviors and Health: Benefits of Volunteering in Old Age

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Abstract

The University of Michigan Health and Retirement Study is a longitudinal study surveying around 20,000 Americans to build a database for analyzing questions related to challenges and opportunities of aging. Many studies use this database to analyze the effects of different lifestyle practices on various measures of health (Lum and Lightfoot (2005), E. S. Kim et al. (2020)). Causal relationships can be difficult to identify when related to lifestyle practices and health benefits because of the difficulty of isolating variables and controlling for outcomes. Our research seeks to address this challenge by assessing existing work on the effects of volunteering on the health of aging populations including analysis on mental and physical health. We plan to improve on existing research by identifying gaps in causational analysis and potential methods for further assessment of causality between lifestyle practices and health outcomes, focusing on errors related to selection bias, lack of baseline controls, and limited models. Building on prior findings that link volunteering to reduced depression, slower decline in self-rated health, and lower mortality, we aim to evaluate whether these associations hold once important confounders are accounted for. Observational studies in this space are often limited by self-selection into volunteering, which creates systematic differences between groups that can bias results. By identifying and adjusting for these differences, we aim to clarify whether volunteering itself produces meaningful health benefits or if the associations reported in past research primarily reflect pre-existing advantages among volunteers. Our project will use the extensive data in HRS to examine these relationships, focusing on outcomes such as mental health, physical functioning, and reported well being. We hope that by using an extensive set of covariates, we will be able to account for different factors and hidden influences that influence both volunteering and health outcomes.

Literature Review/Background

We use the Health and Retirement Study dataset for our analysis. The HRS (Health and Retirement Study) is sponsored by the National Institute on Aging (grant number NIA U01AG009740) and is conducted by the University of Michigan (Michigan (2022)). This dataset provides longitudinal data on around 20,000 Americans including data on health, mobility, demographic, values, and more. Numerous analytical studies use this data to identify correlations between different life practices and health outcomes, including many specifically looking at the impact of social volunteering on health for older adults. Many of these reports highlight correlations between social volunteering and physical and mental health.

Lum and Lightfoot (2005) used the dataset to examine whether volunteering 100+ hours per year is associated with better health outcomes for people over the age of 70. They found that volunteering is associated with a slower decline in self-reported health and functioning, lower rates of depression, and lower mortality rates. Their research mainly uses regression analysis to show a strong association, but lacks methods to account for potential self-selection.

E. S. Kim et al. (2020) used HRS data for adults over 50 to identify whether changes in volunteering is linked to changes in various health and wellbeing outcomes, finding links between volunteering more than 100 hours per year is linked with lower mortality. Their research controlled for many covariates, and used covariate adjustment in their regression.

Lorenti, De Rose, and Racioppi (2025) looks at connections between depression and volunteering, finding that volunteering reduces the probability of depression among early retirees, especially for women. The research considers co-variables including employment, partnership status, income, and health comorbidities.

S. Kim, Halvorsen, and Han (2023) assess direct association between volunteering and heart conditions, studying seven cardiovascular disease biomarkers. They found associations between volunteering 200+ hours a year and a lower risk for clinically high diastolic blood pressure, as well as an association between increased volunteering and lower likelihoods of blood pressure. They sought a more specific approach than studies that identify broad impacts. They used propensity score weighting (IPTW or inverse probability of treatment weighting) to adjust their selection into volunteering based on factors related to age, gender, race, Hispanic ethnicity, education, employment status, health, depressive symptoms, marital status, informal volunteering, wealth, and income. This is a good example of an exhaustive selection of attributes to account for in potential pre-selection.

Many of these studies do a good job of addressing various potential co-variables through the use of propensity scores and other methods. Some do not use the most effective approaches to control such variables and therefore cannot identify strong causal relationships beyond correlations.

Missing Pieces (Causality)

While many of these studies find that older adults who volunteer report better mental health and overall wellbeing in various health categories, the research is primarily correlational. Some studies do identify and account for potential co-variates, but there is still a space for greater research that moves from the correlational observations of consistent trends and identifies causational patterns between volunteering and various health benefits in old age.

While volunteering itself may cause better health for various reasons, it is necessary to consider many factors that may contribute to both health outcomes and likelihood to volunteer. For example, older adults who volunteer are likely already healthy enough to be mobile or independent, allowing them to volunteer. It is possible that older adults who are suffering from chronic or severe illness or health burdens are not as physically capable of volunteering, introducing a selection bias. Another factor to consider is socio-economic status. Wealthier adults may have more time to dedicate to volunteering, while also having the funds necessary to ease other burdens that can contribute to health problems. Social connection also could impact these results. Much of the literature cites the social benefit of volunteering as a potential contributing factor to improved health outcomes.

Although a handful of studies have begun using propensity score matching to address selection bias, these approaches often remain limited. Many rely on a limited set of covariates or focus only on a narrow set of outcomes such as mortality or physical health biomarkers. We hope to build on these efforts by examining the results across several health outcomes and subgroups, allowing us to better understand the possible health benefits of volunteering in old age.

Course Topic to Fill the gap

In order to address this gap, our research aims to use propensity score weighting to achieve stronger results that move beyond correlation toward causation. By leveraging this approach on longitudinal HRS data, we aim to better account for baseline differences between volunteers and non-volunteers and reduce bias caused by self-selection. We will also explore subgroup-specific effects to understand how benefits may vary across populations.

Potential areas to address:

- similar underlying health conditions: do people with similar chronic or burdensome health conditions demonstrate differences in these or other conditions when volunteering compared to others with the same conditions? ex mobility
- socio-economic status: does the outcome hold when balanced across socio-economic groups?
- intensity of volunteering: are effects stronger for individuals who volunteer more frequently compared to occasional volunteers, after controlling for confounders?

- differences by age group: are causal effects different for different age ranges of older adults, after adjusting for covariates like functional limitations?

Data Organization

The HRS data contains tens of thousands of data points on a wide range of areas related to values, personal history, family status, health, mobility, and more in alphabetically labeled groups. The tables below lists covariates that we account for, the corresponding dataset from the survey, and some variables that fit into the category.

Methodology

We used the HRS datasets for the years 2020 and 2022. From these data sets, we pulled variables for our targets, predictors, and covariates for propensity scoring. We chose three variables to represent target categories related to physical health, mental health, and overall life satisfaction, two variables representing predictors of volunteering, and 18 variables on a variety of themes to include in the propensity scores. Each of these are listed below.

Propensity Score Based on: - wealth/socio-economic: none - age: RA019 - sex: none - race: SBO91M - employment status: current job status (SJ005M1) - education level: highest level of education (SB014) - physical: weight (SC139), heart condition (SC036), pain limits activities (SC106), ever had depression (SC271), arthritis (SC070), weak immune system (SC297), alzheimers (SC272) - mobility: ability to drive (SG037), difficulty hearing (SV401), difficulty seeing (SV402), difficulty walking (SV404) - social: relationship with others (SV215) - memory rating: rd101

Variable	Category	Dataset Label	Description
physical health	Target	SC001	from 2022; self-assessed physical health rating on a scale of 1-10
mental health	Target	SC150	from 2022; the last 12 months have you felt depressed for more than 2 weeks at a time
life satisfaction	Target	SB000	from 2022; self-assessed current life satisfaction rating

Variable	Category	Dataset Label	Description
volunteered (general)	Predictor	SG086	from 2022; volunteered in past 12 months
volunteered (hours)	Predictor	SG195-197	from 2022; below/around/over 100 hours
age	Covariate	RA019	age in years
race	Covariate	SB091M	primary race
employment	Covariate	SJ005M1	current job status, employed vs. unemployed
education	Covariate	SB014	highest level of education received
physical: weight	Covariate	SC139	weight
physical: heart condition	Covariate	SC036	yes/no has had heart condition
physical: pain	Covariate	SC106	pain limits activities
physical: depression history	Covariate	SC271	ever had depression
physical: arthritis	Covariate	SC070	arthritis
physical: weak immune system	Covariate	SC297	weak immune system
physical: alzheimers	Covariate	SC272	ever had alzheimers
physical: hearing	Covariate	SV401	difficulty hearing
physical: seeing	Covariate	SV402	difficulty seeing
physical: memory	Covariate	RD101	self assessed memory level
mobility: driving	Covariate	SG037	ability to drive
mobility: walking	Covariate	SV404	difficulty walking
social: relationships	Covariate	SV215	relationships with others

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