



Impact of volunteering on cognitive decline of the elderly

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ARTICLE INFO

JEL codes:

I12
J14
E32
N33
N13
C41

Keywords:

Cognitive ability
Pro-social engagement
Volunteering
Selectivity
Health

ABSTRACT

Cognitive decline among the elderly imposes a large welfare and health care cost on the individual as well as society. Little however is known about factors that can mitigate cognitive decline. Using seven waves of the Health and Retirement Study and a fixed effects – instrumental variable methodology, this study estimates the effects of volunteering on old age cognitive decline. Although cognitive decline is an inevitable aspect of aging, our results suggest that volunteering participation significantly forestalls its progress among individuals aged 60 years and older.

1. Introduction

Cognitive decline among the elderly, an inevitable component of aging, imposes a large personal and public health care cost. Recent estimates show that cognitive decline, along with its co-morbidities of dementia and Alzheimer's disease, affects 14.7% of the US population above age 70 in 2010, with an associated health care cost between \$157 and \$215 billion (Hurd et al., 2013). Additionally, cognitive decline negatively impacts personal wealth and retirement savings (Smith et al., 2010; Banks and Oldfield, 2007). Suboptimal pension and asset management, by cognitively impaired individuals, may cause significant welfare loss for the elderly and their households. Costs associated with cognitive decline will likely rapidly rise with the aging of the Baby-Boom generation.

Normal cognitive aging is aggravated by retirement. In addition to the negative income shock following retirement, loss of an engaged lifestyle, including loss of a work related social network, negatively impacts cognitive function post-retirement (Rohwedder and Willis, 2010). Little however is known of alternative forms of engagement that can serve as a substitute for the separation from formal employment, thereby mitigating cognitive decline among the elderly. This study investigates volunteering participation as a protective factor that can mitigate cognitive decline. In comparison to other post-retirement

activities, volunteering is unique in its ability to provide mental, physical and social stimulation simultaneously.

This study makes two contributions to the existing literature. First, it contributes to the literature on determinants of cognitive ability. Specifically, the study evaluates if volunteering of any kind and at levels typically seen in the population can mitigate cognitive decline in a nationally representative sample of elderly Americans. Second, the study contributes to the large existing literature on health benefits of pro-social behavior. This study provides the first causal evidence of a favorable impact of pro-social behavior on individual (cognitive) health.

The study uses a fixed effects-instrumental variable (FE-IV) strategy to provide the first population-level evidence of a plausibly causal impact of volunteering on cognitive decline. Onset of daily living limitations of spouses provide an exogenous shock to the individual's time constraint that forces a reallocation of time. Subject to the identifying assumption that changes in spousal daily living limitations do not directly impact the individual's cognitive decline,¹ the results show that volunteering has a causal protective effect on cognitive decline in the elderly. The estimate of the protective effect of volunteering on cognitive decline is robust to a wide array of additional socioeconomic and demographic controls.

The study has several policy implications. If volunteering can help

Version September 2017. Special thanks to Mark Wilhelm, Anne Royalty, Vidhura Tennekoon, Richard Steinberg, Gopi Shah Gowda, the Editor and two anonymous referees for their valuable suggestions and comments.

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¹ Detailed discussion of conditions under which the identifying assumption is expected to hold and its implications for our analyses presented in Section 3 Data and Methods below.

compensate for the loss of engagement post-retirement, individuals can use this to mitigate cognitive decline associated with aging. Given the large health care and personal costs associated with cognitive decline, a protective effect of volunteering on cognitive decline would imply large health care and personal gains. Volunteers could also generate large positive externalities by providing useful services to otherwise underserved communities. The results are also conceptually important for the large literature on the benefits of pro-social behavior on the doer (Konrath, 2012). Despite being vast, the existing literature is uninformative on the causal effects at the population level.

The structure of the remaining paper is as follows. The next section places this study in context of the existing literature linking pro-social behavior with cognitive decline. This is followed by an overview of the Health and Retirement study with an in depth discussion of the key independent variable, volunteering participation and the outcome of interest, cognitive decline. Section 3 also discusses the fixed effects-instrumental variable method for the estimation of the causal impact of volunteering on cognitive decline, along with the underlying identification assumptions and their validity in the current context. Results are presented in Section 4. Section 5 provides estimates of the financial implications of volunteering for cognitive decline. Section 6 concludes.

2. Past literature

Age, gender, income, race (Karlman et al., 2009), education (Banks and Mazzonna, 2012), in utero and early life conditions (Case and Paxson, 2009; Cunha and Heckman, 2007), non-work related social network size (family and friends; Cornwell and Waite, 2009; Hawkey and Cacioppo, 2010), marital status (Karlman et al., 2009), health, engagement in cognitive and physical activity and individual personality traits like conscientiousness and extroversion (James et al., 2011; Wilson et al., 2007) have been associated with old age cognitive decline (Mendez and Adair, 1999; Factor-Litvak and Susser, 2004). Findings from these earlier descriptive studies cannot be interpreted causally. Moreover, even though knowledge of the socioeconomic and demographic predictors of cognitive decline help identify vulnerable individuals, these factors are infrequently malleable for the already adult population facing age related cognitive decline, limiting their usefulness as policy instruments.

Retirement is a plausible predictor of cognitive decline that individuals can somewhat influence. Conceptually, the negative income shock and the loss of a work related social network could lead to a rapid decline in cognitive function post-retirement (Rohwedder and Willis, 2010; Mazzonna and Peracchi, 2012). But, empirical evidence of such a relationship is mixed. For instance Coe et al. (2012) find no clear relationship between retirement duration and later-life cognition for white-collar workers and even a favorable impact of retirement on the cognitive wellbeing for blue-collar workers.

Looking at other deliberate behavior that individuals can use to mitigate cognitive decline, the Experience Corps randomized experiment provides encouraging evidence suggesting a potentially protective, causal effect of volunteering on cognitive decline. The study finds significantly lower memory loss in seniors who were assigned to cognitively demanding, high intensity volunteering roles (Carlson et al., 2008; Fried et al., 2004). The results from the study are encouraging but their external validity is not known. Firstly, the treatment was not a typical volunteering experience. The 352 adults, 60 years and older, who were randomly treated were assigned to tutoring school students for 15 or more hours per week for a year or more. Prior to starting the tutoring, volunteers received group training for a week and then served as volunteers in groups they had trained with. Therefore, the favorable causal effect of the volunteering could be due to several atypical aspects of the Experience Corps experiment. First, Experience Corps volunteers volunteered for at least 15 h per week compared to most conventional volunteering commitments of about two hours per week. Second, the Experience Corps volunteers tutored school students, an activity that is

cognitively more demanding than many of the other usual volunteering activities like, shelving or serving in a soup kitchen. Third, the Experience Corps experiment started with a week of training that in itself would be educational and could favorably impact cognitive scores, even without the subsequent volunteering. Finally, identification of the causal effect of volunteering on cognitive ability was further complicated by the fact that to be included in the treatment group the individual, at baseline, had to be cognitively intact with an above average cognitive score.² Since rate of cognitive decline may depend upon baseline cognitive ability, some of the ‘causal’ effect may in fact be a selection effect. This study explores the generalizability of the kind of results produced by the Experience Corps experiment to the general population. Comparing volunteers to non-volunteers, all forms of volunteering and individuals along the entire distribution of baseline cognitive ability we estimate the impact of volunteering on cognitive decline.

A parallel literature has found a positive association between volunteering and the volunteer’s subjective mental wellbeing (Konrath, 2012; Lum and Lightfoot, 2005). Subjective mental wellbeing includes emotions like depression, feelings of isolation and levels of happiness.³ In contrast, cognitive functioning measures the respondent’s *intelligence* and this distinction is critical.⁴ Depression and cognitive ability are theoretically and empirically different constructs. In this study we explore if deliberate social behavior, specifically volunteering, can slow down the TICS score based measure of cognitive decline.

3. Data and methods

The study uses seven waves (1998–2010) of the nationally representative Health and Retirement Study, a study of Americans aged 50 years and older.^{5,6} The dependent variable is the modified version of the Telephone Interview for Cognitive Status (TICS) score based on Folstein’s Mini Mental Status Examination (MMSE; Lanska et al., 1993, Roccaforte et al., 1992, Wilson and Bennett, 2005). The HRS version of the TICS evaluates two main components of the respondent’s cognitive status – fluid and crystallized intelligence. *Crystallized* intelligence/ability is defined as factual knowledge, which is likely to continue growing, even if slowly over one’s lifetime. Consequently, cognitive decline due to aging does not typically refer to declines in crystallized intelligence. Cognitive decline customarily refers to slowing down of the speed of information processing, i.e. decline in *fluid* intelligence.

In the HRS, crystallized intelligence is quantified based on the respondent’s ability to correctly report ‘today’s date’ (Month, day, year and day; score 0–4), identify two objects for a total score of 0–2 and name the current President and Vice President of the United States (0–2 points) for a total crystallized intelligence score ranging from 0–8. Fluid intelligence is measured on a scale of 0–27 and captures memory and working memory status. Memory is tested using immediate and delayed word recall with a score ranging between 0–20. Working memory is

² Cutoff cognitive score of 24 compared to the average of about 22.91 for a similar cohort (refer Appendix Table A.1).

³ The HRS includes the Center for Epidemiologic Studies Depression (CESD) scale to measure the emotional wellbeing of the respondent. The CESD scale captures emotions experienced by the respondent: depression, everything is an effort, sleep is restless, felt alone, felt sad, and could not get going, all or most of the time (negative emotions), felt happy and enjoyed life, all or most of the time (positive emotions). All analyses includes, as a control, the individual’s CESD scale. However, results remain mostly unchanged if we re-estimate the impact of volunteering on cognitive ability without controlling for the individual’s CESD scores (refer Appendix D).

⁴ See below detailed discussion of HRS’s TICS cognitive ability scores.

⁵ Two recent waves of the HRS from 2012 and 2014 are currently available but not included as they do not include the cognition module.

⁶ HRS may include both spouses in the sample but, for our analyses we have only retained the main HRS respondent as a distinct observation. Spousal health limitations are used as instrumental variables for identification and including both spouses in the sample would imply that the IV of one observation will be the control for another, making the interpretation of estimates from such a sample less intuitive.

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