The Impact of Retirement on Health Behaviours

By Caroline Larlee
(6402877)

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Supervisor: Professor Catherine Deri Armstrong

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Abstract

The objective of the analysis is to identify the causal effects of being retired for at least one year on health behaviours. To estimate the effect of retirement, biannual data from the 2004 to 2014 Health and Retirement Study (HRS) is used. The endogeneity of retirement is acknowledged in our model by using an instrumental variable approach with the social security eligibility ages of 62 and 65 as instruments. Additionally, the longitudinal nature of the data gives us the ability to estimate an individual Fixed Effect (FE) model to control for unobservable time-invariant individual heterogeneity. The retirement parameter estimates of the FE-2SLS model show that being retired for at least one year is associated with a 26 percentage point increase in the likelihood of meeting the physical activity guidelines and a 17 percentage point increase in the likelihood of getting a flu shot, but a 9 percentage point decrease in the likelihood of getting a cholesterol blood test. Thus retirement is associated with some improvement in health behaviours.

1. Introduction

There has been significant growth in the proportion of individuals aged 65 and older within the North American population since the 1960's. The proportion of senior citizens (65+) is projected to further increase from 14% in 2015 to 21% in 2050 (U.S. Census Bureau, 2016). A change in fertility rates, in part due to the decline in fertility following the post WWII baby boom, and an increase in life expectancy are the main explanations as to why we are experiencing an aging population.

People are now expected to live longer; as of 2017 the life expectancy in the U.S. is 79 for women and 76 years for men (Centers for Disease Control and Prevention, 2016). As the North American population ages, individuals are spending more years in retirement. In the United States, the eligible ages for social security benefits with and without a penalty is 62 and 65 years old, suggesting that a person is expected to live for about 15 to 20 years in retirement. This increase in pensionable time implies an increase in government expenditure. The U.S. government's expenditure on social security has increased from 12.8% of GDP in 1980 to 19.3% in 2016 (Organization for Economic Co-Operation and Development, 2017).

In America, the health care costs per capita for seniors are 3 to 5 times greater than the costs for people below 65 years old (Centres for Disease Control and Prevention, 2003). Although, since the implementation of the Affordable Care Act ACA law in 2010, the number of uninsured Americans has decreased significantly from 45.5 million in 2012[1] to 28.6 million Americans in 2015 (CDC, 2012 and 2015).

The aging population affects the structure of the government's budgetary allocation towards social expenditures, forces changes in the health care system regarding its focus on senior citizens and increases Medicare health insurance costs.

[1] 2012 is prior to when people were required to have insurance, but after the ACA had passed.

Understanding how individuals spend their time in retirement can have important implications on their health behaviours and thus health care spending. Research papers by Dave et al. and Bonsang et al. (2012), Bound and Waidmann (2007), Kämpfen and Maurer (2016), Levy et al. (2004), Henkens and Solinge (2008)**,** Deb et al. (2011) and more explore this question empirically. Their findings are discussed in the Literature Review section of this paper. A person at work could be experiencing a stressful or physically demanding environment, where retirement would typically have a positive effect on health. On the other hand, working may keep the mind busy, socially engaged, or physically active, so the lifestyle change from work to retirement may negatively affect a person's mental and physical health or increase alcohol and smoking behaviours. Depending on the circumstances leading up to retirement, the impact on health behaviours post retirement may vary. For instance, having an illness, access to health insurance, being wealthy, or living with a partner may have an effect on behavioural decisions post retirement, which may in turn promote negative (or positive) health behaviours. Whether people are engaging in healthy or unhealthy behaviours due to retirement will affect the economy in a variety of ways, since there must be an increase or reallocation of scarce health care system resources to support these elderly people throughout their retirement.

The objective of the analysis is to identify the causal effects of being retired for at least one year on health behaviours. The health behaviours we will focus on are: physical activity, getting a cholesterol blood test[2], getting the flu shot, alcohol consumption and smoking habits. To properly estimate the effect of retirement, the data from six waves of the Health and Retirement Study (HRS) is used. A person's health condition, and therefore health behaviours,

[2] A cholesterol blood test should be done every 5 years after the age of 65 for both men and women. If the individual has high cholesterol, diabetes, heart related problems, kidney problems or other health conditions, a test should be done at least once a year (U.S. National Library of Medicine, 2017).

may directly affect the timing of retirement, so a model estimating the effect of retirement on health behaviours would likely suffer from endogeneity. We address the endogeneity problem by following Bound and Waidmann (2007), Bonsang et al (2012) and Kämpfen and Maurer (2016), and instrument retirement with the (social security) eligibility ages. Additionally, the longitudinal data gives us the ability to control for unobserved time-invariant individual heterogeneity. The retirement parameter estimates of the FE-2SLS model show that being retired for at least one year is associated with a positive effect of 26 percentage points on meeting the physical activity guidelines, a 9 percentage point decrease in getting cholesterol blood tests and a 17 percentage point increase in getting a flu shot.

There are two ways in which this paper contributes to the literature. As opposed to the majority of the literature concentrating on the instantaneous effects of retirement on various outcomes, this analysis focuses on how being retired for at least one year affects health behaviours. Studying the delayed effect of retirement is important because individuals take time to adapt to a drastic change in lifestyle. Secondly, we investigate the causal relationship of retirement on getting a cholesterol blood test and the flu shot. These relationships have not been previously analysed in the literature, but are important variables to investigate since preventive health behaviours may avoid or delay future health problems and decrease medical costs. Additionally, we re-examine the effect of retirement on health behaviours that have already been studied using a more rigorous identification strategy.

2. Literature Review

According to the Grossman (1972) model, a person's available time towards non-market activities increases after retirement. An individual can choose to spend this time investing in healthy behaviours like physical health and increasing preventive behaviours, or

the additional time can be spent engaging in unhealthy behaviours such as consuming more alcoholic beverages and smoking. In the model the depreciation rate of health rises with age, so it is predicted that older individuals will invest more in healthy behaviours. The predictions of this model with regards to retirement have been tested in a wide range of papers, which we summarize below.

2.1 Retirement, cognitive functioning and mental health

Mental health and cognitive functioning are vital functions of overall health and can impact health behaviours. A drastic lifestyle change, like retirement, may affect a person's mental health and cognitive functioning. The daily social interactions with co-workers and physical movement during work may have been an individual's only means of social support and physical activity; therefore potentially impacting mental health after retirement, or perhaps retirement improves mental health due to a reduction in stress levels and thus decreasing depression. The literature suggests that activities do have an effect on cognitive functioning. Thus, cognitive abilities may be higher prior to retirement, since individuals are constantly engaging in work related activities and accomplishing tasks. The following papers are not directly related to our work, but remain important to consider since the effects of retirement on mental health and cognitive functioning can play a role on health behaviours after retirement.

The study by Dave et al. (2008) uses the Health and Retirement Study (HRS) to investigate how retirement affects physical and mental health by using an ordinary least squares model. To account for unobserved individual time-invariant heterogeneity they use fixed effects estimates. To control for the potential endogeneity, the authors do not include people who reported having physical or mental health issues the wave before they retired since health problems prior to retirement could effect the individuals' decision to retire. They

estimate that retirement is associated with a 17-22% increase in experiencing difficulties associated with mobility and daily activities and a 9% decrease in mental health. Bonsang et al. (2012) estimate the causal impact of retirement on cognitive functioning using HRS data. To take into account the endogenous decision to retire they use an instrumental variable approach by using the eligibility ages of retirement as instruments. The authors are also able to control for individual time invariant heterogeneity using a fixed effects estimator. To account for the possibility that the effect of retirement does not appear instantaneously, Bonsang et al. (2012) allow for such a delayed effect my including a lag term in their model. Using their FE-2SLS estimate, they find there is a significant and robust 10% decrease in the cognitive functioning score due to being retired for at least one year.

2.2 Retirement and physical Health

The literature regarding the effects of retirement on physical activity and the assumptions on time constraint mentioned by the Grossman model suggest that older individuals will invest more time towards physical activity once they have retired.

Bound and Waidmann (2007) study the effect of retirement on health in the United Kingdom using the English Longitudinal Study of Aging survey (ELSA). To determine this causal relationship and control for the endogeneity issue, they use the ages of 65 for men and 60 for women as instrumental variables. These ages are when individuals start receiving state retirement benefits in the UK. They found that for men, retirement has a small but significant effect on physical health. Two important issues arise from this study; the public pension eligibility ages for men and women are different, therefore different instruments are used for each gender and so the analysis does not provide comparable results. Another issue reported by the authors, and also mentioned by Bonsang et al. (2012), is that only the contemporaneous

effect of retirement on physical health is measured, but it is possible that the change in lifestyle has a delayed and not an instant affect on physical health since people naturally take time to adapt to change.

A more recent study measuring the causal effect of retirement on physical health using a specific measure for physical health: the 2008 US government physical guidelines was done by Kämpfen and Maurer (2016). The guidelines state that for positive health benefits older adults should do 150 minutes every week of moderate activity (like gardening or walking), or 75 minutes every week of vigorous activity (like swimming laps or jogging), or an equal combination of both (Office of Disease Prevention and Health Promotion, 2017). The authors combine the health data from the US Health and Retirement Study (HRS) and use the guidelines as a benchmark to define their dependent variable. To determine the causal effect of retirement on physical activity, and take into account the potential unobservable factors that may affect both variables, the authors use a similar IV approach as Bound and Waidmann, although now men and women have the same eligibility ages to retire. The early age to retire in the US is 62 and the normal age is 65. To address the time-invariant heterogeneity, the endogeneity of retirement and individual heterogeneity, the authors choose to test their results using FE-IV estimates. They show that retirement increases the probability of meeting the physical activity guidelines by 20 to 40 percentage points for men and women. These results support the initial assumption that retired individuals have more time to devote to physical activity compared to working individuals.

2.3 Retirement and preventive behaviours

There are very few studies that examine the effect of retirement on preventive behaviours, although one study by Levy et al. (2004) investigates how 50 to 80 year olds

engage in preventive health behaviours. The authors use data from the Ohio Longitudinal Study of Aging and Retirement (OLSAR) and multivariate linear regressions to estimate this effect and find that people who have a positive perception of their aging will engage in more preventive behaviours such as a decrease in alcohol consumption and smoking cigarettes, change in diet, increase in physical activity, medication compliance and regular doctor visits.

We found no studies that investigate the effect of retirement on getting a cholesterol blood test and a flu shot, but there are studies that show that retirement has an effect on cholesterol levels and that older people are more likely to get the influenza virus. Behncke (2012) focus on retirement and its affect on different health outcomes. With data from the English Longitudinal Study of Ageing (ELSA) the authors are able to estimate this causal effect using an instrumental variable approach with the ages eligible for retirement for men and women as instruments. The authors find that retirement increases the risk of heart related diseases, cancer, high blood pressure, high cholesterol, and difficulties with physical activity. Focusing on the influenza virus, Thompson et al. (2004) estimate influenza related hospitalizations by age group with American data from the National Hospital Discharge Survey (NHDS) and World Health Organization Collaborating Laboratories influenza surveillance data. Using Poisson regression models and controlling for how long the influenza virus lasted for each year from 1979 to 2001, the estimates show an increase in Influenza related hospitalization rates for people aged from 65-69, 70-74, from 75-79, 80 to 84 and again from 85 and older. The authors also find that there has been an increase in the rate of elderly people being hospitalized because of the virus due to the consistent growth in the elderly population. Given that health is found to decline in retirement, understanding how retirement affects preventative measures may be informative.

2.4 Retirement, drinking and smoking behaviours

In theory and empirically, retirement leads to individuals investing in healthy behaviours, such as exercising more often, but having more time for non-market activities may also lead to an increase in unhealthy behaviours, such as an increase in alcohol consumption and smoking.

The study by Henkens and Solinge (2008) investigates how voluntary and involuntary retirement effects smoking, drinking and physical activity. The authors estimate this relationship with multinomial logistic models using panel data taken from the Netherlands Interdisciplinary Demographic Institute (NIDI). Their results show that voluntarily and involuntary retirement has a positive effect on physical activity but individuals also engage more often in unhealthy behaviours such as smoking and drinking. Comparing the voluntariness of retirement, people who retired involuntarily had a higher probability of increased smoking habits and a lower probability of smoking and drinking less. Hence, the results show that involuntary retirees may be using unhealthy behaviours to deal with the mental issues that were triggered from leaving work in an unplanned manner. Studying the difference between voluntary and involuntary retirement may help determine by how much the setting revolving retirement affects post retirement behaviours.

Focusing on involuntary retirement, Deb et al. (2011) estimate the effect of job loss on overweight and drinking from HRS data. To address the potential endogeneity of job loss, they exploit variation due to exogenous business closures. Deb et al. use a finite mixture model to estimate the effect of job loss on these behaviours between groups of individuals who respond to stress differently than the average. The results show that business closures do not have an important effect on unhealthy behaviours, although individuals who were pursuing unhealthy

behaviours prior to loosing their job were more likely to engage in unhealthy behaviours afterwards.

Kuerbis and Sacco (2012) review the literatures examining the effect of retirement on drinking patterns. They find that drinking patterns after retirement depend mainly on the context around the retirement decision combined with the individual's characteristics. The way a person reacts post retirement may be based on how a person felt at work. They find that people with highly stressful jobs or high job satisfaction have a higher probability of having problems with alcohol after retirement.

3. Empirical Strategy

The objective of the analysis is to measure the causal impact of retirement on health behaviours. To achieve this goal, let's first construct a simple linear probability model (LPM):

$$healthbehaviors_{it} = \beta_0 + \beta_1 ret_{it} + \beta_2 x_{it} + \varepsilon_{it} \qquad (1)$$
$$= \beta_0 + \beta_1 ret_{it} + \beta_2 x_{it} + \mu_i + \nu_{it}$$

Where $healthbehaviours_{it}$ are physical activity, alcohol consumption, preventive behaviours, and smoking behaviours for individual i at time t. The main independent variable is retired for at least one year (ret_{it}) for individual i at time t. Additionally, a list of explanatory variables (x_{it}) such as age, race, years of education, health and others have been included to the model to control for observable individual characteristics that could have an effect on our dependent variable, these control variables are clarified in the data section of the paper. The variable ε_{it} denotes the unobserved error term for individual i at time t that can be decomposed into a time-invariant individual heterogeneity error (μ_i) i.e. the error that arises due to unobserved differences between each individual i and an idiosyncratic error (ν_{it}) i.e.

this error occurs due to the unpredictable changes over time and for each individual, so $\varepsilon_{it} = \mu_i + \nu_{it}$.

To correctly estimate the causal effect of being retired for at least one year on health behaviours, the error term (ε_{it}) and being retired for at least one year (ret_{it}) must be uncorrelated ($E[\varepsilon_{it} ret_{it} | x_{it}] = 0$). There are two reasons this assumption may not hold in equation (1). The first issue is retirement may not be exogenous to health behaviours, hence health behaviours such as lack of physical activity and alcohol abuse could drive someone into retiring earlier. Another concern is there are common unobservable factors that may be simultaneously affecting a person's health behaviours and their decision to retire, like a partner's influence on both the decision to retire and the change in health behaviours. Empirically speaking, this is an individual heterogeneity issue.

As seen in the literature review, to address these issues the eligibility ages to retire are often used as instrumental variables on the decision to retire and can also be applied in this particular analysis. The age of 62 is the early retirement age and when social security benefits can be claimed with a penalty and at the normal age of retirement of 65, full social security can be claimed without penalties. Another aspect we have seen in the literature is that retirement may not affect health behaviours instantaneously, or that behaviours may be inflated during the first year post retirement. This might be the case since a sizable lifestyle change may influence certain behaviours for only a short period of time. Therefore, measuring the contemporaneous effect of retirement on health behaviours may not be an adequate way to model our analysis. The effect on health behaviours should not be measured based on current variables at time *t*, but with past variables at time *t-1*. This is the reason why the main retirement variable in this analysis is a dummy variable indicating if the individual has been retired for <u>at least one year</u>

and with instrumental variables indicating if a person is greater than 62 and greater than 65 years of age.

The instruments will address the endogeneity of the retirement variable and the individual heterogeneity issues. For the IVs to be valid, there are two assumptions that need to be addressed: there must be a non-zero association between the instruments ($Early_{it}$ and $Normal_{it}$) and the decision to retire (ret_{it}) i.e. $E\left[(Early_{it} ret_{it}) \middle| x_{it}\right] \neq 0$ (similarly for the $Normal_{it}$ instrument), and secondly the exclusion restriction assumption, meaning the instruments and the dependent variable ($healthbehaviours_{it}$) must be uncorrelated, so $E[(Early_{it} v_{it} | x_{it}] = 0$ (similarly for the $Normal_{it}$ instrument).

The assumptions are valid since being eligible to receive social security benefits provides the individual with a monetary incentive and influences their decision to retire. Additionally, the eligibility ages may effect the involuntary decision to retire since the retirement ages have become a social norm. Therefore, people are pressured from their peers, employers and society because they are expected to retire at the ages of 62 or 65. This assumption is verified in the first stage estimation. As for the exclusion restriction assumption, being eligible to retire with certain benefits at specific ages has no direct impact on health behaviours, although there can be an indirect association between the two, since the eligibility ages affect the decision to retire, which then in turn may influences behaviours.

The instrumental variable model used to estimate the causal relationship between being retired for one year and health behaviours is the following:

$$healthbehaviours_{it} = \beta_0 + \beta_1 ret_{it} + \beta_2 x_{it} + \mu_i + \nu_{it} \quad (2)$$

With the first-stage equation:

$$ret_{it} = \gamma_0 + \gamma_1 x_{it} + \gamma_2 Early_{it} + \gamma_3 Normal_{it} + \omega_i + \eta_{it} \quad (3)$$

Where $Early_{it}$ and $Normal_{it}$ are the instrumental variables, $\omega_i + \eta_{it}$ are the unobserved errors corresponding to equation (3), ω_i represents the error occurring due to the unobserved individual heterogeneity and η_{it} the error through time and individuals.

The second-stage is to estimate the causal effect of the predicted values $\widehat{ret_{it}}$, obtained from equation (3), on health behaviours. Substituting equation (3) into (2), we get:

$$healthbehaviours_{it} = \beta_0 + \beta_1\gamma_0 + (\beta_1\gamma_1 + \beta_2)x_{it} + (\beta_1\gamma_2)Early + (\beta_1\gamma_3)Normal + \beta_1(\omega_i + \eta_{it}) + \mu_i + \nu_{it} \quad (4)$$

Let $\delta_0 = \beta_0 + \beta_1\gamma_0, \delta_1 = \beta_1\gamma_1 + \beta_2, \delta_2 = \beta_1\gamma_2, \delta_3 = \beta_1\gamma_3, \delta_4 = \beta_1$ and $\delta_5 = 1$

Renaming the coefficients to the above convention, we get the two-stage least squares model (2SLS):

$$healthbehaviours_{it} = \delta_0 + \delta_1 x_{it} + \delta_2 Early_{it} + \delta_3 Normal_{it} + \delta_4(\mu_i + \nu_{it}) + \delta_5(\omega_i + \eta_{it}) \quad (5)$$

The causal effect parameter $(\widehat{\beta_1})$ from equation (2) will be estimated by using the instrumental variable coefficients $\widehat{\delta_2}$, $\widehat{\delta_3}$ and given the individual characteristics (x_{it}) estimates from the equation (5). The majority of the dependent variables used in this analysis are dichotomous variables; therefore the linear regression and 2SLS model predictions may be problematic. A probit model measuring the marginal effects of our dummy variable estimates are reported to provide a comparison with our LPM and to confirm that our estimation method is appropriate.[3]

To verify the validity of our instrumental variable assumptions, there are several tests that can be conducted using a computer programming system, such as STATA. First, there is the Stock & Yogo (2005) test for weak instruments. This test will check if the chosen instruments are sufficiently correlated with the endogenous retirement variable,

[3] When there are many dummy variables in a regression, the LPM and probit model results tend to have different magnitudes *because* of the large number of dummy variables being used.

where the null hypothesis is that the instruments are weak. The Durbin-Wu-Hausman test (Hausman's specification test) will check for correlations with the error term. The null hypothesis of the test is that being retired for one year is not correlated with the error term. Hence, rejecting the null hypothesis means the variable is endogenous, since it is correlated with the error term and so the 2SLS estimation method is preferred. The third test is the Sargan–Hansen test of overidentifying restrictions. This test will determine if the instruments are correlated with the error term.[4] The null hypothesis is there is no correlation between the instruments and the error term. In this case, to ensure the validity of our instruments, we do not want to reject the null hypothesis since the instruments must act as exogenous shocks to our model. If these tests are in favour of the instrument variable model, we can be confident that a 2SLS model will provide suitable estimates.

Fixed Effects (FE) estimates can be used to control for the unobserved time-invariant individual heterogeneity: μ_i and ω_i. Using fixed effects estimates assumes differences across individuals remain constant over time, thus a cluster is created for each individual (19,038 individuals/clusters). This method will ensure retirement and the unobserved time-invariant heterogeneity are uncorrelated and so $E[(\mu_i \omega_i)|x_{it}] = 0$. Using an instrumental variable approach and FE estimates will provide us with estimates demonstrating the causal relationship between retirement and health behaviours.

4. The Data

4.1 The Health and Retirement Study (HRS)

The longitudinal data collected from the University of Michigan Health and Retirement Study (HRS) in the United States is used to conduct this empirical analysis. To have a

[4] This test always assumes that at least one instrument is valid. Thus, we are testing for the validity of one IV, assuming the other IV is valid.

representative sample and significant statistical power, the years 2004 (wave 7) to 2014 (wave 12), six waves are used for this analysis.

The HRS biennial panel survey began in 1992 following Americans born between 1931 and 1941 and continues to collect information on people aged 50 years and older. In 1998 the HRS merged its data with the Asset and Health Dynamics Among the Oldest Old (AHEAD) study providing information on individuals born prior to 1924, who were 70 years old and older in 1993. The HRS provides information on individuals and their partners as they transition into retirement, whereas the AHEAD survey focuses on an older generation and examines an individual's lifestyle post-retirement. Combining the two studies provides data regarding diverse physical health and mental health outcomes, behaviours, employment status, financial status, social security, activities and more, prior to and after retirement.

To increase the sample size of people aged 50 and over, two additional cohorts were added in 1998: the Children of the Depression Era (CODA) and War Babies (WB). As of 1998, the final version of the HRS, with all cohorts included, consisted of people born between 1890 and 1947. Additionally, the HRS has included the "Early Boomers" born between 1948-1953 in 2004 and the "Baby Boomers", born in 1954-1959 in 2010. HRS continues to conduct interviews every two years from the time the individual enters the survey until death.

The regression analysis, as well as the variable and sample selection is largely based on the studies done by Bonsang et al. (2012) and Kämpfen and Maurer (2016). These studies focus on the impact of retirement on cognitive functioning and physical activity using an instrumental variable approach as well as fixed effect estimates.

The RAND HRS data file is used for this analysis. The data file offers a "user-friendly" version of the HRS data and has a more consistent naming convention of the variables across

the 2004 to 2014 waves. To avoid measurement error problems in the Fixed Effect models we shorten the time span in which we observe each individual by restricting the sample to people aged from 51 to 75 (212,440 observations are excluded).[5]

4.2 The Dependent Variables: Healthy Behaviours

The health behaviours considered for the analysis are physical activity, preventive behaviours, alcohol consumption and smoking. The Physical Activity section of the HRS questionnaire provides the appropriate responses to quantitatively measure these behaviours.

4.2.1 Physical Activity

There are three variables available to measure the respondent's level of physical activity: vigorous activity, moderate activity or mild activity. For vigorous activity, the individual is asked "How often do you take part in sports or activities that are vigorous, such as running or jogging, swimming, cycling, aerobics or gym workout, tennis, or digging with a spade or shovel?". The questions for the other two levels of physical activity are similar but have a different set of activities, such as "…gardening, cleaning the car, walking at a moderate pace, dancing, floor or stretching exercises?" for moderate activities and "…vacuuming, laundry, home repairs?" for mild activities. The response to each question can range from every day to never. If the respondent did not know their answer, refused or if there are missing observations, they are not included in the sample (9 observations excluded).[6]

According to the 2008 US government physical guidelines, for positive health benefits older people should engage in 150 minutes every week of moderate activity, or 75 minutes every week of vigorous activity, or an equal combination of both. Reproducing the same

[5] After excluding all waves prior to 2004, there was 35,116 observations excluded for people younger than 51 and 177,324 observations excluded for people older than 75.
[6] Note that regarding the number of observations excluded from the sample, the sample selection process for the control variables was conducted prior to the selection of the dependent variables and retirement variable.

variable definitions as Kämpfen and Maurer (2016), the physical guidelines are used as a benchmark to measure an individual's level of physical activity. The dummy variable is equal to one if the respondent met the physical activity guideline. The respondent is classified as meeting the guideline if they are classified in one the three following categories: they perform vigorous or moderate activity everyday, or do both everyday. If they reported doing vigorous activity more than once a week and moderate activity at least 1-3 times per month and lastly, if they reported doing vigorous activity once a week and moderate activity at least more than once a week.

4.2.2 Preventive Behaviours

This measure is based on the answers given by respondents concerning preventive health tests. The tests considered in this analysis are: a blood test for cholesterol and a flu shot.[7] The respondent answers yes (=1) or no (=0) if a cholesterol blood test was done or if they received a flu shot since the last survey (normally in the past 2 years). If the survey is being conducted in an even wave and if the respondent was interviewed in the last survey, these individuals are not asked these questions and are given the value ".a = asked in previous wave" as their response. In this analysis, the ".a" observations are replaced with their answer given in the previous survey.[8] Therefore, the preventive behaviour variables must be interpreted as "got a cholesterol blood test [or flu shot] done in the last 2 to 4 years". Individuals who did not know the answer, refused, skipped the question or had a missing observation were dropped from the sample (1,311 observations).

[7] The HRS asked respondent about other preventive health tests: self-checks for breast lumps, a mammogram, a pap smear, and a check for prostate cancer. These tests were not included in this study since they refer to either only females or males.
[8] The HRS the preventive behaviour questions are only asked in odd waves (every four years) and only new respondents entering the study will be asked in the even waves.

4.2.3 Alcohol Consumption

Respondents are asked if they have ever had an alcoholic beverage, if they answered yes, they are then asked how many days a week they drink alcohol and the number of drinks they had per day on average. We will study both of these measures separately in this analysis: the number of reported drinks per day and the number of days per week they report consuming alcohol. People who do not drink receive a zero. Respondents who refused, didn't know the answer or if there was missing information, were excluded from the analysis (300 observations).

4.2.4 Smoking

To measure smoking behaviour, the respondents are asked if they have ever smoked and if they currently smoke. They have the option to answer each question with yes (=1) or no (=0). For the purpose of this analysis, we only consider the dummy variable indicating if someone is currently smoking. All people with missing observations are excluded from the sample (421 observations).

4.3 Main Independent Variable: Retirement

To measure the main explanatory variable of interest "being retired for at least one year", we use the same definition as Bonsang et al. (2012) and Kämpfen and Maurer (2016), and define being retired as a person who is out of the labor force, not working for pay and not planning on returning to work.[9] The respondents are then asked in what year their last job ended, this information is used to create the dummy variable for the individual being retired for at least one year. If there are missing observations regarding job status or when they left their

[9] In the HRS, the respondents are asked about their current labor force status (are you working full-time, working part-time, unemployed, partly retired, retired, disabled and not in the labor force.) and if they are currently working for pay, if the person answered these questions with retired, disabled, unemployed or not in the labor force and reported not working for pay, they are considered as retired individuals in this analysis.

job, they are not included in the sample (2,084 observations). Individuals who reported never working, or being younger than 50 when they left their job or, returning to work during the sample period, are also dropped from the sample (9,420 observations).

4.4 Other Independent Variables

Evidently retirement is not the only factor that could fluctuate an older person's health behaviours, so other explanatory variables are included in the model in addition to our main variable. The important variables to consider are the individuals' gender, their age, years of education, household wealth, covered by health insurance, whether or not they live with a partner, number of children, health and race. The reasoning behind choosing each variable, how the variable is defined and its interpretation for this analysis is discussed below. For each variable, all individuals with missing observations are not included (a total of 157,465 observations were excluded) leaving us with a final sample size of 65,909 observations and 19,038 individuals.

Gender

Males and females may have different priorities in terms of health, which naturally leads to differences in how one chooses to modify health behaviours. For each observation, the "male" dummy variable is equal to 1 if the individual is male and 0 if female.

Age

Generally, older individuals are more prone to health problems than the average person and so intuitively, a greater focus may be directed towards health and in turn increase positive health behaviours. We control for the change in health behaviours due to age by creating an age variable equal to the year of the interview minus the date of birth of the individual. Hence, the "age" variable does not necessarily represent the age of the respondent at the time of the

interview, but rather the age of the individual would have turned the year the interview was conducted. The observations with a missing date of birth were dropped. The squared value of age is also included in the model to allow for non-linearities in the relationship between age and health behaviours.

Years of Education

The impact of education on health behaviours is an important idea to consider. The more educated an individual, the more likely they are to actively change health behaviours (Groot et al., 2007). Educated people tend to consider long-term outcomes and are conscious of how actions today can lead to possible positive (or negative) consequences in the future. Therefore, educated people are aware that changing behaviours today can lead to a healthier tomorrow. We measure total years of education with values ranging from 1 to 17+ years and categorize individuals who have more than 17 years of education as a person with "17+" years. We also add the years of education squared to our model to account for non-linearities.

Household Wealth

Household wealth could have important consequences on how one behaves regarding heath behaviours. Having the proper means to invest in health equipment, medical help, or knowledge, may impact health behaviours. The HRS measures the net value in nominal dollars[10] of total household wealth (including the value of the second home minus total debt) every two years. To incorporate household wealth in our model, a dummy variable is included indicating if the individual is above or below the mean wealth level of the sample.[11] This variable can be interpreted as a person being classified as wealthy or not.

[10] Since the HRS only considers household wealth in nominal dollars, it is not taking into account the inflation rate.
[11] The average wealth level (*not* considering the inflation from 2004 to 2014) used in this analysis is $455,600.50, with 17,523 observations having a household wealth equal or above this amount, and 48,386 observations below.

Covered by Health Insurance

Having health insurance will influence the individuals' decision towards seeking medical help, getting tests done, receiving prescriptions, and so consequently increasing their overall health awareness and therefore influencing behaviours. In the United-States, Medicare health insurance covers all individuals over the age of 65, thus considering this variable is important to our analysis. The dummy variable included in our analysis indicates if an individual is covered by any government health insurance or has access to health insurance from a previous employer or is covered through the spouse's previous or current employer.

Living with a Partner

A dummy variable is included for respondents who are living with a partner. We consider someone living with a partner if they are married or partnered. This characteristic is important since people are greatly influenced by individuals with whom they spend time and share similar values with, such as family, friends, and partners.

Number of Children

Having children greatly affect an individuals lifestyle. Thus, the number of children you have may affect how you prioritise time towards health behaviours. In our analysis, this variable indicates the number of living children (including step children) for each respondent, where observations range from 0 to 21.

Health

If an individual is diagnosed by a doctor with health problems, or has had a history of health related issues, this will most likely change health behaviours. To include this effect in our model, three dummy variables were created to measure if the individual has ever had the following conditions diagnosed by a doctor: high blood pressure or hypertension, a heart

related disease (heart attack, coronary heart disease, angina, congestive heart failure, or other heart problems) and third; has had a possible stroke or transient ischemic attack. Each variable is recorded with a yes (=1) or no (=0) answer.

Race

A person's ethnicity may be an important characteristic to include in our model due to the innate cultural and health differences between races, hence we create two dummy variables: black/ African American and other race. The variables are equal to one if they are of that race, or 0 if they are white/Caucasian.

4.5 Summary Statistics

Table 1 provides the average for each variable included in our analysis by age subsets[12] from 51 to 75. There are 43% to 32% of respondents who meet the physical activity guidelines from 51 to 75 years old, people substantially decrease the number of alcoholic drinks they had per day as they get older, 76% to 89% of respondents have taken a cholesterol blood test and 44% to 73% have taken a flu shot in the last 2-4 years, and 22% to 10% of respondents report smoking. There is an increase from 8% to 75% of respondents who are retired for at least one year from 51 to 75.[13] The majority of our sample are women, live with a partner, white, are not considered wealthy and have health insurance (99% after the age of 65). Additionally, the last three rows show that health conditions seem to worsen as age increases.

5 Results & Discussion

5.1 Age, retirement, health behaviours and other characteristics

First let's focus on how health behaviours change as age increases, and if there are any noticeable fluctuations around the eligibility ages of retirement. Figures 1.1 to 1.4 illustrate the

[12] Each subset contains 5 years.
[13] Note that at 75 years old 99.3% of respondents are considered retired and 99.2% of respondents are retired for at least one year.

average of the health behaviour outcomes (physical activity, preventive behaviours, drinking and smoking) measured from 55 to 70 years old.[14]

Figure 1.1 shows that the proportion of individuals meeting the guidelines declines from 0.41 to 0.35 but increases at around the age of 63 and again a larger increase at 66. The increase in meeting the physical activity guideline increases one year after the early and normal retirement ages, supporting the assumption that the effect of retirement appears with a one year lag. As age increases we can see that the negative relationship remains fairly consistent.

As for drinking behaviours, Figure 1.2 shows the average number of alcoholic drinks consumed per week and the number of drinks consumed per day. There is no clear change in the number of drinks consumed per week from 55 to 70 years old, which provides no reason to discuss this measure any further. Figure 1.2 b) illustrates that people consume much less per day as they get older. There is also a larger drop in the average drinks consumed per day at the age of 63. An important detail to note is that the majority of people who drank heavily at 55 years old are no longer in the sample when they reach 70, since drinking excessively shortens a person's life expectancy. Consequently, the decrease in the average number of drinks from 55 to 70 may be exaggerated due to attrition bias since many of the heavy drinkers could be dying off and are no longer increasing the average.

The average preventive behaviours outcomes are presented in Figures 1.3 a) and b). There are clear increases in both getting a cholesterol blood test and getting a flu shot in the last 2 to 4 years from 55 to 70 years old. These outcomes come to no surprise; people aged 65 and older are at high risk of getting seriously ill because of the flu, thus the flu vaccination is highly recommended for individuals above 65 years old (Centers for Disease Control and

[14] Only individuals aged from 55-70 are included in these figures to provide a greater emphasis around the eligibility ages of retirement (62 and 65).

Prevention, 2017). Additionally, the recent implementation of the ACA may have an effect on this increase because as of 2010 getting a flu shot and blood tests are covered by the Affordable Care Act law (U.S. Department of Health & Human Services, 2017). There are no noticeable changes in the averages near the early and normal ages of retirement for both preventive behaviours.

Figure 1.4 illustrates the smoking behaviour outcome. On average, people report smoking much less as they get older. Similar to our drinking behaviour outcome, an upward bias due to attrition is a concern for proper interpretation of this association. Smokers may be dying off during our sampling period, which results in a lower number of overall smokers as age increases.

From these figures and the summary statistics shown in Table 1, we can conclude that age is associated with health behaviour outcomes because there are consistent decreases or increases in health behaviours from 55 to 70 years old. When estimating the causal effect of retirement on health behaviours, age is an important variable to include in the regression analysis. Additionally, the physical activity and drinking behaviours have fluctuations around the early and normal eligibility ages to retire, reinforcing the assumption that the eligibility ages are associated with health behaviours.

Figure 2 graphs the estimated retirement probability changes as a person becomes one year older from 55 to 70. The figure uses the coefficient estimates from the following equation:

$$RET_{it} = c_i + \sum_{a=56}^{70} \gamma_a DUM_{it}^a + \varepsilon_{it}$$

Where RET_{it} is the retirement dummy variable indicating if a person is retired at time *t*, and γ_a are the estimates to the parameter: $DUM_{it}^a = 1[age_{it} \geq a]$. DUM_{it}^a is the dummy

variable indicating if the individual is younger or has reached the age of $55 < a \leq 70$, c_i is the individual fixed effect for individual i, which can also be interpreted as the slope coefficients on the dummy variables DUM_{it}^{a} and lastly, ε_{it} is the error term. The figure shows a sizable increase in the probability of retiring at the age 62 and a small but noticeable increase at 65. The early and normal ages of retirement do in fact significantly increase the probability of retiring, so we can expect the eligibility ages to have a positive and direct association on an individual's decision to retire.

5.2 Main results

Table 3 to 7 present the estimates of the causal effect of being retired for at least one year on physical activity, drinking behaviours, getting a cholesterol blood test, a flu shot and smoking behaviours. A pooled dichotomous probit regression reporting marginal effects is conducted and compared with the pooled linear probability model. For all five behaviours, the estimates from the pooled linear probability model (LPM) and the pooled probit regression (dprobit) have similar magnitudes identical signs and significance levels. Since the coefficient estimates between the two models are comparable, a linear fixed effect (FE), a two-stage least square model (2SLS) and a FE-2SLS model offers meaningful interpretation and provides selection on the unobservables to properly identify the causal effect of retirement on health behaviours. Table 2 presents the FE-2SLS estimates from the first-stage equation. The early and normal eligibility ages of retirement plus one have positive effects on being retired for at least one year by 6.3 and 7.9 percentage points with a less than 0.1% significance level. These results are very similar to the first stage estimates of the 2SLS model without controlling for time-invariant individual heterogeneity. The Stock and Yogo test for weak instruments show that the instruments are highly correlated with the retirement variable. The Kleibergen-Paap rk

Wald F statistic[15] = 182.4 is greater than the Stock and Yogo critical values, thus we can reject the null hypotheses that the instruments are weak.

5.2.1 Health behaviour: Physical activity

In table 3, the pooled LPM and probit model parameter estimates of the effect of retirement on physical activity are statistically significant (p-value < 0.001) and negative. Although when taking into account the unobserved individual heterogeneity and endogeneity in the equation, the FE, instrumental variable and FE-2SLS models give significant and positive estimates. These results differ since there are unobservable characteristics that are positively affecting the physical activity behaviour and not being considered in the pooled models. The result of the FE model including time-invariant individual heterogeneity show that people retired for at least one year are 2.4 percentage points more likely to meet the guidelines at the 0.1% significance level. Whereas when the IV strategy is used our results are similar to those of Kämpfen and Maurer (2016), where retired people have a positive effect of 26.1 percentage points of meeting the guidelines at the 0.1% significance level. The reason why the estimated effects are so large may be because the IV estimates measure the Local Average Treatment Effects (LATE), hence we measure the effect of retirement on physical activity for the people who retired because of the eligibility ages. These individuals may be better educated and healthier than the other people who did not retire because of the financial incentives of the eligibility ages, therefore increasing the magnitude of our 2SLS estimate. The results of the three IV tests are shown at the bottom the table 3. The Endogeneity (D-W-H) test reports a p-value < 0.001, hence we can reject the null hypothesis that our main independent variable is

[15] When a 2SLS estimation method is used and the standard errors are clustered or robust, the weak instrument test using the Cragg-Donald Wald F statistic is no longer valid since the i.i.d assumption is dropped. The Kleibergen-Paap Wald rk F statistic provides a similar and robust estimate and can be used for this test (STATA/SE, 14.2).

exogenous. This result implies that being retired for one year is interrelated with our dependent variable, so the estimates of an OLS regression is inconsistent and the FE-2SLS model is preferred. The Sargan-Hansen test of overidentification restrictions has a p-value > 0.05, hence we cannot reject the null hypothesis that the IVs are not correlated to the error term. For the IVs to be valid, this is the desired result since we want them to be exogenous i.e. not correlated to the error term. The IV tests show that conditional on the validity of one IV, the other instrument is valid.

5.2.2 Health behaviour: Alcohol consumption

For drinking behaviours, the pooled model and the FE model in Table 4 show that being retired for at least one year has a negative effect on the number of drinks consumed per day by 4 percentage points at the 5% level of significance. The models that include the early and normal eligibility ages of retirement as instruments show negative and positive effects of retirement on the number of drinks per day. The estimates from FE-2SLS model is positive but statistically insignificant at the 5% level, thus the causal effect of being retired for at least on year on the number of drinks consumed per day is zero. The Sargan-Hansen IV test suggests the IVs are exogenous since the p-value > 0.05, although the D-W-H test results in a p-value > 0.05, this implies that we cannot reject the null hypothesis that retirement is exogenous to the number of drinks per day. For this health behaviour, misspecification of the regression equation may be contributing to the invalidity of our instruments.

5.2.3 Health behaviour: Preventive behaviours

Table 5 and 6 demonstrate the estimates of the effect of being retired for at least one year on having a cholesterol blood test or a flu shot done in the last 2 to 4 years. The 2SLS and FE-2SLS results show that being retired for at least 1 year has a negative effect of 12.2

percentage points on getting a blood test for cholesterol, while adding the time-invariant individual heterogeneity results in a smaller negative effect of 9.4 percentage points. Both of these estimates are significant at the 5% level. By contrast, retired individuals have a different reaction towards the flu shot. The preferred FE-2SLS model shows that being retired for at least one year will have a positive effect on getting the flu shot within two to four years of 17.3-percentage points with a 0.1% level of significance. The endogeneity and overidentification IV tests for both models demonstrates that retirement is in fact endogenous to both preventive behaviours, since the D-W-H test results in p-values smaller than 0.05. The results of the Sargan-Hansen test shows that the instruments are not correlated to the error term since both p-values of the test are greater than 0.05, failing to reject the null hypothesis that the instruments are exogenous. The tests provide sufficient evidence that the FE-2SLS models are valid for the preventive behaviour outcomes.

5.2.4 Health behaviour: Smoking

The last health behaviour of interest is smoking behaviour. Both pooled regressions in Table 7 show that retirement has a positive and highly significant association with smoking behaviour. The FE model shows that retirement negatively effects smoking by 0.9 percentage points statistically significant at the 1% level. The models where the early and normal retirement ages are used as instruments show no causal effect of retirement on smoking behaviours since the estimates are statistically insignificant. Additionally, the D-W-H p-value is very large implying that our retirement variable is exogenous in the FE-2SLS model and is not an accurate estimation. We did not include the person's level of addiction to Nicotine as a control variable in the regression because there is no measure for this in the HRS. This variable would have been a potentially important measure to control for since it does influence a

persons decision to smoke, therefore making it more difficult to see a change in smoking behaviors due to retirement. We cannot conclude an important or significant causal effect of being retired for at least one year on smoking behaviours.

5.3 Control variables

Our control variable estimates from tables 3 to 7 show that men compared to women do behave differently in terms of health behaviours. The 2SLS estimates show that in our sample males meet the physical activity guidelines by 10.6 percentage points more than women, increase their number of drinks per day by 73.2 percentage points and smoke by 4.3 percentage points more than women. In contrast, men are only slightly less likely to engage in preventive behaviours compared to women.

To verify that the effect of retirement on health behaviours is not gender driven, regressions are conducted on only males and only females. Analyzing the effects of the FE-2SLS model from the tables 8 to 17, retirement is found to have similar effects on meeting physical activity guidelines and smoking behaviours for both men and women. For women, the effect of retirement has a significant effect (p-value < 0.05) on their number of drinks consumed per day, whereas we did not find a significant effect with the sample including males and females (0.329 vs. 0.216) or only males. Males have a slightly larger negative and significant (p-value < 0.05) effect of being retired for at least 1 year on getting a cholesterol b1ood test than when combining both genders (-0.193 vs. -0.094). Lastly, women have a small increase in the flu shot behavior compared to the complete sample (0.219 vs. 0.173).

In tables 3 to 7, the FE-2SLS estimates for age and age squared confirms the assumption that age has an effect on health behaviour outcomes. There are positive and significant effects of age on both preventive behaviours and a negative effect of age on

smoking. Additionally, individuals of black ethnicity and other races compared to whites have worse health behaviour outcomes.

The coefficients related to health illnesses such as: being diagnosed with high blood pressure, heart disease or a stroke are relevant estimates to consider since having one of these health conditions will influence how someone chooses to behave regarding their health. Individuals who are diagnosed with these health conditions are less likely to meet the physical activity guidelines, consume alcohol per day and smoke. The parameter estimates for the effect of being diagnosed with a health condition on preventive behaviours in the last two to four years are all positive. Individuals with high blood pressure or who has had a stroke have cholesterol blood tests and flu shots more often. And people with heart disease are more likely to get a cholesterol blood test. Summarizing these results, if an individual is diagnosed with a serious health condition, they are more likely to decrease the amount of behaviours that contribute to the worsening of their diagnosis, such as drinking alcohol and smoking cigarettes. People with an illness exercise less; possibly because exercise is physically demanding and may be a more challenging behaviour to change after retirement under these circumstances or perhaps they are sick because they never exercised to begin with. In contrast, people with poor health conditions do engage in preventive behaviours. This outcome is not surprising since the flu can cause serious illness, especially for individuals with a poor immune system, and so the flu shot is a relatively easy preventive behaviour to engage in. Similarly, with health conditions like these, cholesterol tests are highly recommended by doctors and are important to properly monitor the individual's health conditions.

A specification test excluding individuals who have been diagnosed with a health condition (high blood pressure, high cholesterol, heart disease, diabetes, history of strokes, etc.)

in the wave prior to retirement may be a valuable test to consider for future research. These people may be causing an upward bias in the estimates on how much being retired for at least one year impacts health behaviours. The retirement parameter estimates when excluding these individuals could result in different outcomes, since being diagnosed with a health condition may encourage an individual to retire and to focus on improving health behaviours.

The FE-2SLS estimates show that more people with health insurance have had a cholesterol blood test in the last 2 to 4 years, a flu shot and smoke. Health insurance encourages people to engage in preventive behaviours and smoke since they have less of a financial burden when it comes to using their available health care. A specification test excluding individuals who have health insurance may be of value to investigate in future research to ensure the robustness of the results.

5.4 Limitations

In the literature review, the effects of involuntary retirement on drinking patterns and the impact of business closures on unhealthy behaviours are discussed. The results by Kuerbis and Sacco (2012) demonstrate how health behaviours can differ depending on the voluntariness of retirement. Investigating the difference between voluntary and involuntary by adding a control variable for voluntary retirement and conducting a specification test by excluding involuntary retirees may have influenced the results.

Sample attrition is a relevant concern in this analysis since the people dying off during the sample period may be affecting heath behaviour outcomes. On average, people engaging in positive behaviours will live longer than people engaging in unhealthy behaviours. Hence, the outcomes while ensuring a balanced sample i.e. including only individuals who were present in all six waves, are of interest and would be a valuable specification to test in future research. If

the outcomes using a balanced panel and an unbalanced panel are similar after applying this test, then the estimated outcomes are robust.

Similarly to the analysis done by Kämpfen and Maurer (2016), we do not use sample probability weights in this analysis since the HRS provides weights for each individual at every wave and cannot be properly clustered at the individual level to create our FE and FE-2SLS estimates. Additionally, the mean of the weighted data and un-weighted data were compared prior to the analysis and resulted in very similar averages, thus an unweighted summary statistics is provided in Table 1. The mean of the weighted data and un-weighted data were compared prior to the analysis and resulted in very similar averages. Since our observations are not weighted, the results of this analysis do not properly represent the U.S population. Nonetheless, the sample does contain approximately 66 thousand observations, thus the results are meaningful and cannot be ignored.

6. Conclusion

The results of our analysis show that being retired for at least one year has a causal effect on various health behaviours. We use a FE-2SLS model to estimate this effect and to control for the unobservable characteristics. From our first-stage equation, we found that the eligibility ages of retirement (plus one) have a significant impact on the decision to retire and being retirement for at least one year. Our results show that the normal and early retirement ages increase the probability of retirement by 6-8 percentage points. This result confirms our assumption that the instruments and our endogenous independent variable (being retired for at least one year) are correlated. This result and the IV tests we conducted provide sufficient evidence that the instruments are valid.

The main results show that being retired for at least one year will have a positive effect of 26 percentage points on meeting the physical activity guidelines, a negative effect of 9 percentage points on cholesterol blood tests and a positive effect on the flu shot of 17 percentage points. We find no statistically meaningful effects of retirement on the number of alcoholic drinks consumed per day and smoking. When stratifying the sample by gender, the preferred model shows that being retired for at least one year for women has a positive effect on the number of drinks consumed per day by 33 percentage points and a larger positive effect on getting the flu shot in the last 2 to 4 years. Whereas, the results with only men included in the sample shows a larger decrease in getting a cholesterol blood test.

Our results also highlight that a pooled LPM or probit model are not reliable ways to estimate a causal effect in such contexts, since retirement is not exogenous to health and health related behaviours. Thus future work in this area needs to be undertaken with this in mind.

While one might think retirement is associated with many challenges that could lead to worsening health related behaviours, we found that being retired for at least on year suggests an increase in good health behaviours. Although, our results show that there is a negative effect on getting a cholesterol blood test. This result may be because people are engaging in other health behaviours after retirement (and thus becoming healthier) or retirement may be reducing stress, therefore reducing high blood pressure. If a person becomes healthy after retirement, cholesterol blood tests only need to be done every five years instead of on a yearly basis (U.S. National Library of Medicine, 2017). Future work should investigate why fewer cholesterol blood checks are being done post retirement. Some individuals are engaging in health enhancing behaviours after retirement, but most are still far from achieving the minimum

guideline for physical activity, engaging in preventive behaviours and reducing drinking and smoking behaviours, thus there is still room for improvement.

To encourage seniors to engage in health behaviours, the U.S. government can implement or change policies, as well as modify the health care system. An example of how the government has encouraged physical activity is by developing an exercise and physical activity campaign called "Go4Life" in 2015. This National Institute on Aging (NIH) campaign provides a variety of exercises and courses, motivational tips and other materials to encourage adults 50 and older to fit physical activity in their lives. One way the United States has modified the health care system is by implementing the Affordable Care Act (ACA) law in 2010. The objectives of the ACA is to reduce medical costs, increase access to health insurance and to protect patients from being taken advantage of by insurance companies **(**U.S. Department of Health & Human Services, 2017).

The government must find ways to stabilize social expenditures even though the length of time and the number of individuals in retirement is increasing due to an increase in life expectancy and the baby boomer generation. One way the United States plans to reduce costs is by increasing the normal age of retirement. The eligible age to receive full social security benefits for people born in 1960 or later has increased from 65 to 67 years old (Social Security Administration U.S.A., 2017).

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8. Figures

Figure 1: Average of the health behaviour outcome from 55 to 70 years old

Fig. 1.1: Meeting the Physical Activity Guidelines

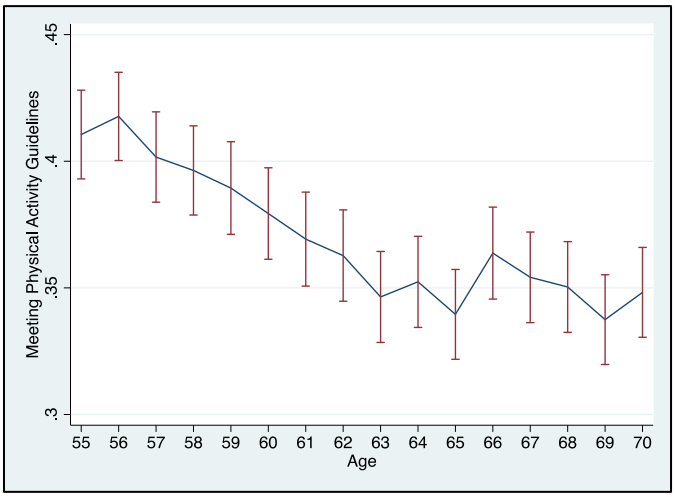
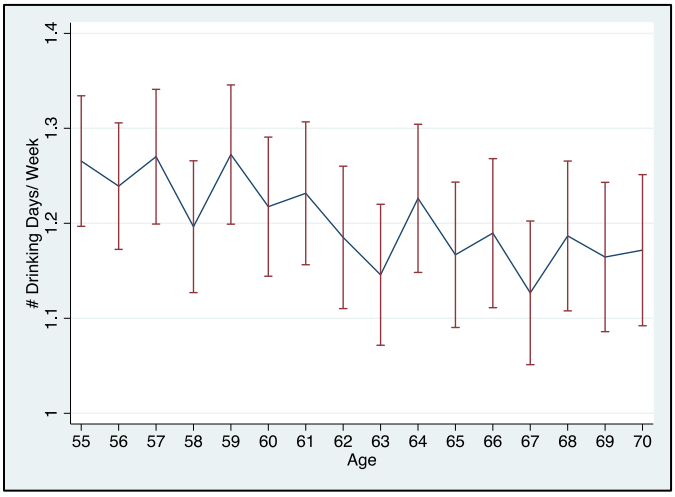


Figure 1.2: Drinking Behaviour

a) Drinking - number of days/ week **b) Drinking - number drinks/ day**



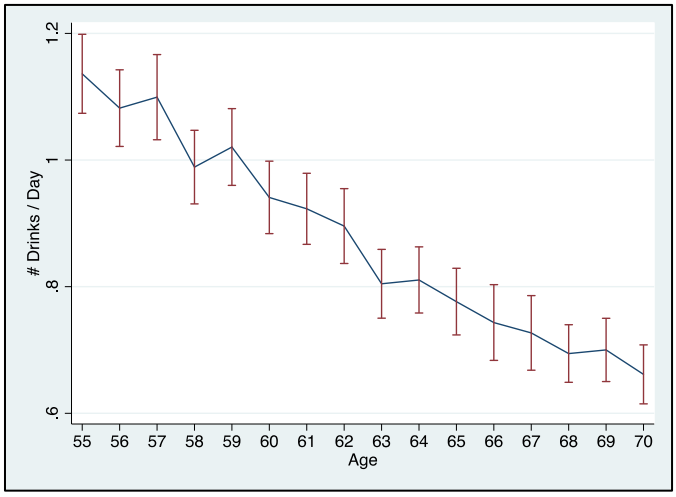


Fig. 1.3: Preventive behaviours

a) Cholesterol – blood test **b) Flu shot**

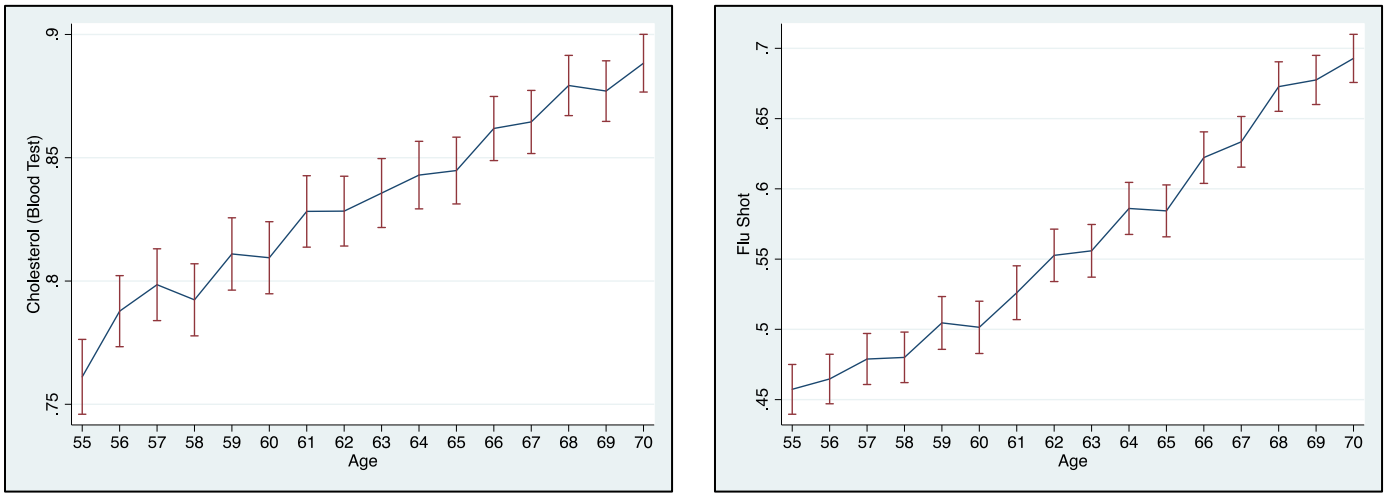


Figure 1.4: Smoking behaviour

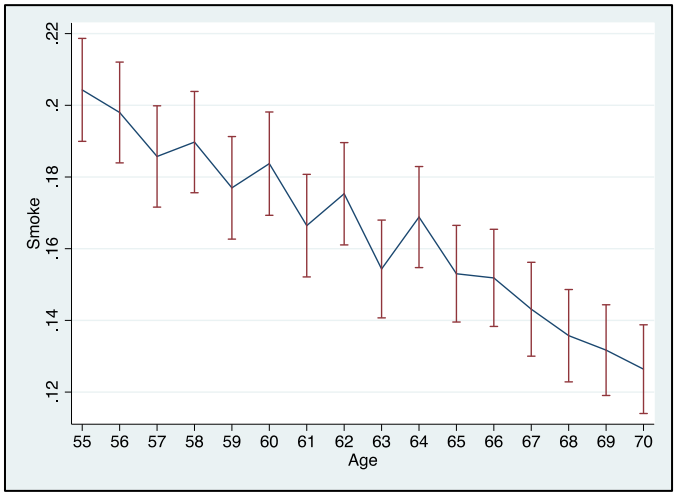
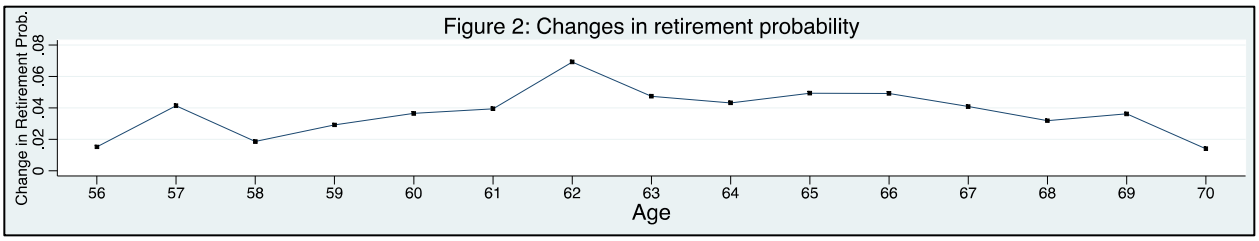


Figure 2: Changes in the retirement probability



6. Tables

Table 1: Summary Statistics

Age:	51-55	56-60	61-65	66-70	71-75
Dependent Variables					
Meeting the Physical Activity Guidelines	0.43	0.40	0.35	0.35	0.32
	(0.494)	(0.489)	(0.478)	(0.477)	(0.465)
Drink (Yes or No)	0.69	0.63	0.57	0.52	0.48
	(0.463)	(0.482)	(0.495)	(0.500)	(0.5)
# Drinks / Week	1.28	1.24	1.19	1.17	1.13
	(1.926)	(1.936)	(2.010)	(2.088)	(2.109)
# Drinks / Day	1.19	1.03	0.84	0.71	0.60
	(1.900)	(1.672)	(1.457)	(1.399)	(1.171)
Cholesterol (Blood test, Yes or no)	0.76	0.80	0.84	0.87	0.89
	(0.430)	(0.400)	(0.370)	(0.332)	(0.311)
Flu Shot (Yes or No)	0.44	0.49	0.56	0.66	0.73
	(0.496)	(0.500)	(0.496)	(0.474)	(0.444)
Smoke Now (Yes or No)	0.22	0.19	0.16	0.14	0.10
	(0.411)	(0.390)	(0.370)	(0.345)	(0.295)
Main Independent Variables					
Retired (Yes or No)	0.11	0.22	0.44	0.64	0.77
	(0.318)	(0.416)	(0.496)	(0.481)	(0.424)
Retired at Least 1 Year	0.08	0.19	0.39	0.61	0.75
	(0.272)	(0.392)	(0.488)	(0.488)	(0.436)
Other Independent Variables					
Male	0.43	0.45	0.44	0.45	0.46
	(0.496)	(0.497)	(0.496)	(0.498)	(0.498)
Living with a Partner	0.74	0.71	0.71	0.70	0.64
	(0.44)	(0.455)	(0.452)	(0.457)	(0.48)
White	0.67	0.69	0.75	0.80	0.81
	(0.47)	(0.461)	(0.435)	(0.4)	(0.39)
Black	0.21	0.21	0.18	0.16	0.15
	(0.407)	(0.404)	(0.386)	(0.363)	(0.358)
Other Race	0.12	0.10	0.07	0.04	0.04
	(0.323)	(0.302)	(0.257)	(0.205)	(0.188)
# of Children	2.70	2.83	3.05	3.31	3.45
	(1.816)	(1.917)	(1.985)	(2.069)	(2.186)
Years of Education	13.34	13.33	13.08	12.71	12.45
	(2.876)	(2.988)	(2.993)	(3.021)	(3.092)
Wealthy	0.19	0.24	0.29	0.31	0.30
	(0.396)	(0.424)	(0.451)	(0.462)	(0.456)
Health Insurance (Fr. Gov't or Employer)	0.78	0.79	0.82	0.99	0.99
	(0.414)	(0.406)	(0.387)	(0.122)	(0.106)
High Blood Pressure	0.40	0.48	0.56	0.63	0.67
	(0.490)	(0.500)	(0.496)	(0.483)	(0.469)

Table 1: Summary Statistics (continued)					
Heart Disease	0.10 (0.296)	0.13 (0.334)	0.18 (0.387)	0.24 (0.429)	0.31 (0.461)
Stroke	0.02 (0.145)	0.03 (0.179)	0.05 (0.223)	0.07 (0.247)	0.09 (0.282)
65,909 observations and 19,038 Individuals	10,782	14,472	13,500	13,697	13,458

Table 2: First stage 2SLS

First Stage 2SLS Models		
Dependent Variable:	**Retired at Least One Year**	
Models:	**2SLS**	**FE-2SLS**
Early Retirement Age + 1 (>62)	0.077***	0.079***
	(0.006)	(0.006)
Normal Retirement Age + 1 (>65)	0.056***	0.063***
	(0.006)	(0.006)
Male	-0.068***	-
	(0.005)	
Age	0.018***	0.016**
	(0.005)	(0.006)
Age^2 /100	0.006	0.010*
	(0.004)	(0.004)
Years of Education	0.012**	-
	(0.004)	
(Years of Education)^2	-0.001***	-
	(0.000)	
Living with a Partner	-0.009	-0.007
	(0.005)	(0.008)
# of Children	0.002	0.015***
	(0.001)	(0.003)
Wealthy	0.004	0.007
	(0.005)	(0.006)
Health Insurance (Gov't or Emp.)	-0.020***	-0.027***
	(0.006)	(0.006)
High Blood Pressure	0.036***	0.014*
	(0.005)	(0.007)
Heart Disease	0.067***	0.041***
	(0.006)	(0.009)
Stroke	0.103***	0.040**
	(0.01)	(0.015)
Other Race	-0.009	-
	(0.009)	

Table 2: First stage 2SLS (continued)		
Black	0.029***	-
	(0.007)	
Constant	-1.007***	-1.105***
	(0.151)	(0.176)
N = 65,909 obs. and 19,038 Individuals. Clustered robust standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001.		

Table 3: Effects on meeting the physical activity guidelines

Health Behaviours:	Meeting Physical Activity Guidelines				
Models:	Pooled[16]				
	LPM	dprobit	FE	2SLS	FE-2SLS
Retired at least one year	-0.034***	-0.098***	0.024***	0.214**	0.261***
	(0.006)	(0.016)	(0.007)	(0.069)	(0.069)
Male	0.089***	0.249***	-	0.106***	-
	(0.006)	(0.015)		(0.007)	
Age	-0.022***	-0.058***	0.008	-0.015*	0.003
	(0.006)	(0.017)	(0.007)	(0.006)	(0.007)
Age^2 /100	0.016***	0.042**	-0.01	0.004	-0.013*
	(0.005)	(0.013)	(0.005)	(0.004)	(0.005)
Years of Education	-0.021***	-0.052***		-0.025***	
	(0.004)	(0.01)	-	(0.004)	-
(Years of Education)^2	0.002***	0.004***	-	0.002***	-
	(0.000)	(0.000)		(0.000)	
Living with a Partner	0.015*	0.048**	-0.011	0.014**	-0.01
	(0.006)	(0.017)	(0.010)	(0.006)	(0.01)
# of Children	0.000	-0.001	0.004	-0.001	0.001
	(0.001)	(0.004)	(0.004)	(0.001)	(0.004)
Wealthy	0.110***	0.291***	0.012	0.077***	0.010
	(0.006)	(0.017)	(0.008)	(0.006)	(0.008)
Health Insurance (Gov't or Emp.)	-0.009	-0.028	-0.005	-0.005	-0.002
	(0.007)	(0.019)	(0.008)	(0.006)	(0.008)
High Blood Pressure	-0.080***	-0.220***	0.002	-0.070***	-0.002
	(0.005)	(0.015)	(0.008)	(0.006)	(0.008)
Heart Disease	-0.052***	-0.156***	-0.016	-0.065***	-0.025*
	(0.006)	(0.019)	(0.01)	(0.008)	(0.01)
Stroke	-0.074***	-0.241***	-0.044**	-0.103***	-0.054***
	(0.01)	(0.033)	(0.016)	(0.013)	(0.015)
Other Race	0.001	0.005	-	0.003	-
	(0.010)	(0.028)		(0.010)	
Black	0.025***	-0.076***	-	-0.043***	-
	(0.007)	(0.020)		(0.007)	

[16] Only the LPM and dprobit models use pooled data.

Table 3: Effects on meeting the physical activity guidelines (continued)					
Constant	1.097*** (0.191)	1.569** (0.534)	0.260 (0.220)	1.034*** (0.202)	-
N = 65,909 obs. and 19,038 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001.					
IV tests of the 2SLS models					
Durbin-Wu-Hausman p-value (Endogeneity)	-	-	-	0.221	0.0004
Sargan-Hansen p-value (Overidentification)	-	-	-	0.002	0.052
Kleibergen-Paap rk Wald F statistic (Weak Instruments)	-	-	-	128.284	182.395
Stock & Yogo critical values: 10 % max. IV Size = 19.93 15 % max. IV size = 11.59 20% max. IV size = 8.75 25% max. IV size = 7.25					

Table 4: Effects on the number of drinks consumed per day

Health Behaviours:	**# Drinks/ Day**			
Models:	Pooled			
	LPM	**FE**	**2SLS**	**FE-2SLS**
Retired at least one year	-0.039*	-0.040*	-0.045	0.216
	(0.02)	(0.017)	(0.164)	(0.152)
Male	0.705***	-	0.732***	-
	(0.022)		(0.025)	
Age	-0.118***	-0.018	-0.053**	-0.023
	(0.022)	(0.018)	(0.017)	(0.017)
Age^2 /100	0.070***	0.008	0.026*	0.004
	(0.017)	(0.014)	(0.012)	(0.013)
Years of Education	0.069***		0.074***	
	(0.014)	-	(0.015)	-
(Years of Education)^2	-0.003***		-0.003***	
	(0.001)	-	(0.001)	-
Living with a Partner	-0.121***	-0.089**	-0.100***	-0.087***
	(0.021)	(0.028)	(0.019)	(0.026)
# of Children	0.002	0.020	0.005	0.016
	(0.005)	(0.012)	(0.006)	(0.012)
Wealthy	0.175***	0.022	0.068***	0.02
	(0.02)	(0.017)	(0.014)	(0.017)
Health Insurance (Gov't or Emp.)	-0.046	-0.035	-0.058**	-0.031
	(0.028)	(0.023)	(0.021)	(0.022)
High Blood Pressure	0.011	-0.027	-0.01	-0.031
	(0.019)	(0.021)	(0.017)	(0.021)
Heart Disease	-0.137***	-0.061	-0.102***	-0.071*
	(0.023)	(0.032)	(0.025)	(0.03)
Stroke	-0.172***	-0.111*	-0.140***	-0.121**
	(0.039)	(0.044)	(0.036)	(0.042)
Other Race	-0.073	-	-0.005	-
	(0.045)		(0.047)	
Black	0.212***	-	-0.198***	-
	(0.024)		(0.024)	
Constant	4.920***	1.772**	2.567***	-
	(0.700)	(0.570)	(0.594)	

N = 65,909 obs. and 19,038 individuals

The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001

Table 4: Effects on the number of drinks consumed per day (continued)				
IV tests of the 2SLS models				
Durbin-Wu-Hausman p-value (Endogeneity)	-	-	1.000	0.089
Sargan-Hansen p-value (Overidentification)	-	-	0.565	0.960
Kleibergen-Paap rk Wald F statistic (Weak Instruments)	-	-	131.527	182.395
Stock & Yogo critical values: 10 % max. IV Size = 19.93 15 % max. IV size = 11.59 20% max. IV size = 8.75 25% max. IV size = 7.25				

Table 5: Effects on preventive behaviours: cholesterol (blood) test in the last 2-4 years					
Health Behaviours:	**Cholesterol (Blood test in last 2-4 years, yes or no)**				
Models:	Pooled				
	LPM	**dprobit**	**FE**	**2SLS**	**FE-2SLS**
Retired at Least One Year	0.009 (0.005)	0.036 (0.021)	0.004 (0.005)	-0.122* (0.056)	-0.094* (0.046)
Male	-0.044*** (0.005)	-0.172*** (0.02)	-	-0.049*** (0.006)	-
Age	0.019*** (0.005)	0.050* (0.023)	0.016* (0.006)	0.019*** (0.006)	0.018*** (0.005)
Age^2 /100	-0.013** (0.004)	-0.029 (0.018)	-0.009 (0.005)	-0.008* (0.004)	-0.007* (0.004)
Years of Education	-0.001 (0.004)	-0.015 (0.013)	-	0.001 (0.004)	-
(Years of Education)^2	0.001*** (0.000)	0.003*** (0.001)	-	0.000**	-
Living with a Partner	0.050*** (0.005)	0.218*** (0.021)	0.005 (0.009)	0.040*** (0.005)	0.005 (0.007)
# of Children	-0.002* (0.001)	-0.010* (0.005)	-0.006 (0.004)	-0.003* (0.001)	-0.004 (0.003)
Wealthy	0.040*** (0.004)	0.198*** (0.023)	0.004 (0.005)	0.023*** (0.004)	0.005 (0.005)
Health Insurance (Gov't or Emp.)	0.168*** (0.007)	0.532*** (0.022)	0.047*** (0.007)	0.098*** (0.006)	0.046*** (0.006)
High Blood Pressure	0.120*** (0.004)	0.514*** (0.019)	0.073*** (0.007)	0.109*** (0.005)	0.074*** (0.006)
Heart Disease	0.068*** (0.004)	0.363*** (0.026)	0.038*** (0.008)	0.067*** (0.006)	0.042*** (0.007)
Stroke	0.028*** (0.007)	0.137** (0.043)	0.032* (0.013)	0.045*** (0.01)	0.036*** (0.011)
Other race	0.008 (0.009)	0.035 (0.037)	-	-0.001 (0.009)	-
Black	-0.027*** (0.006)	-0.116*** (0.025)	-	-0.032*** (0.006)	-
Constant	-0.162 (0.170)	-2.068** (0.719)	0.103 (0.208)	-0.206 (0.192)	-

Table 5: Effects on preventive behaviours: cholesterol (blood) test in the last 2-4 years (continued)					
N = 65,909 obs. and 19,038 individuals The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001					
IV tests of the 2SLS models					
Durbin-Wu-Hausman p-value (Endogeneity)	-	-	-	0.195	0.0375
Sargan-Hansen p-value (Overidentification)	-	-	-	0.893	0.258
Kleibergen-Paap rk Wald F statistic (Weak Instruments)	-	-	-	131.937	182.395
Stock & Yogo critical values: 10 % max. IV Size = 19.93 15 % max. IV size = 11.59 20% max. IV size = 8.75 25% max. IV size = 7.25					

Table 6: Effects on preventive behaviours: flu shot in the last 2-4 years

Health Behaviours:	**Flu Shot (in last 2-4 years, yes or no)**				
Models:	Pooled				
	LPM	**dprobit**	**FE**	**2SLS**	**FE-2SLS**
Retired at Least One Year	0.037***	0.103***	-0.002	0.147*	0.173***
	(0.007)	(0.019)	(0.006)	(0.063)	(0.051)
Male	-0.066***	-0.179***	-	-0.049***	-
	(0.007)	(0.019)		(0.008)	
Age	-0.008	-0.043*	0.018**	0.008	0.015**
	(0.007)	(0.019)	(0.007)	(0.006)	(0.005)
Age^2 /100	0.015**	0.057***	-0.002	0.001	-0.004
	(0.006)	(0.015)	(0.005)	(0.005)	(0.004)
Years of Education	-0.011*	-0.032*	-	-0.009*	-
	(0.005)	(0.013)		(0.005)	
(Years of Education)^2	0.001***	0.003***	-	0.001***	-
	(0.000)	(0.001)			
Living with a Partner	0.038***	0.104***	0.003	0.026***	0.004
	(0.007)	(0.02)	(0.009)	(0.006)	(0.008)
# of Children	-0.005**	-0.014**	0.001	-0.004**	-0.002
	(0.002)	(0.005)	(0.004)	(0.001)	(0.003)
Wealthy	0.031***	0.087***	-0.008	0.003	-0.01
	(0.007)	(0.02)	(0.006)	(0.005)	(0.005)
Health Insurance (Gov't or Emp.)	0.140***	0.366***	0.021**	0.052***	0.023***
	(0.008)	(0.021)	(0.006)	(0.006)	(0.006)
High Blood Pressure	0.080***	0.219***	0.038***	0.058***	0.035***
	(0.006)	(0.018)	(0.007)	(0.006)	(0.006)
Heart Disease	0.079***	0.222***	0.016	0.037***	0.009
	(0.008)	(0.022)	(0.009)	(0.008)	(0.008)
Stroke	0.055***	0.157***	0.053***	0.044***	0.046***
	(0.013)	(0.038)	(0.014)	(0.012)	(0.012)
Other Race	0.016	0.044	-	0.008	-
	(0.012)	(0.034)		(0.012)	
Black	-0.094***	-0.255***	-	-0.096***	-
	(0.009)	(0.024)		(0.009)	
Constant	0.298	0.081	-0.552*	-0.144	-
	(0.223)	(0.615)	(0.217)	(0.213)	

Table 6: Effects on preventive behaviours: flu shot in the last 2-4 years (continued)					
N = 65,909 obs. and 19,038 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001					
IV tests of the 2SLS models					
Durbin-Wu-Hausman p-value (Endogeneity)	-	-	-	Chi2(13) = -1.79	0.0004
Sargan-Hansen p-value (Overidentification)	-	-	-	0.140	0.071
Kleibergen-Paap rk Wald F statistic (Weak Instruments)	-	-	-	131.321	182.395
Stock & Yogo critical values: 10 % max. IV Size = 19.93 15 % max. IV size = 11.59 20% max. IV size = 8.75 25% max. IV size = 7.25					

Table 7: Effects on smoking behaviours

Health Behaviours:	**Smoke Now (Yes or No)**				
Models:	Pooled				
	LPM	**dprobit**	**FE**	**2SLS**	**FE-2SLS**
Retired at least one year	0.047***	0.204***	-0.009**	0.025	0.017
	(0.005)	(0.024)	(0.003)	(0.034)	(0.03)
Male	0.046***	0.188***	-	0.043***	-
	(0.005)	(0.024)		(0.006)	
Age	0.011*	0.089***	-0.013***	-0.008*	-0.014***
	(0.005)	(0.023)	(0.004)	(0.003)	(0.003)
Age^2 /100	-0.014***	-0.097***	0.006*	0.001	0.0056*
	(0.004)	(0.018)	(0.003)	(0.003)	(0.002)
Years of Education	0.033***	0.157***	-	0.038***	-
	(0.004)	(0.02)		(0.004)	
(Years of Education)^2	-0.002***	-0.009***	-	-0.002***	-
	(0.000)	(0.001)			
Living with a Partner	-0.075***	-0.311***	-0.01	-0.035***	-0.010*
	(0.006)	(0.024)	(0.005)	(0.004)	(0.005)
# of Children	0.003*	0.013*	0.004*	0.003*	0.004*
	(0.001)	(0.006)	(0.002)	(0.001)	(0.002)
Wealthy	-0.058***	-0.330***	0.003	-0.012***	0.002
	(0.005)	(0.027)	(0.003)	(0.003)	(0.003)
Health Insurance (Gov't or Emp.)	-0.051***	-0.161***	-0.012**	-0.019***	-0.012**
	(0.007)	(0.025)	(0.004)	(0.004)	(0.004)
High Blood Pressure	-0.032***	-0.144***	-0.015***	-0.020***	-0.016***
	(0.005)	(0.022)	(0.004)	(0.004)	(0.004)
Heart Disease	0.001	0.005	-0.034***	-0.022***	-0.035***
	(0.006)	(0.028)	(0.006)	(0.005)	(0.005)
Stroke	0.042***	0.176***	-0.034**	-0.012	-0.035***
	(0.012)	(0.044)	(0.011)	(0.009)	(0.009)
Other race	-0.040***	-0.171***	-	-0.034***	-
	(0.01)	(0.043)		(0.009)	
Black	0.004	0.005	-	0.023***	-
	(0.007)	(0.029)		(0.008)	
Constant	0.009	-3.049***	0.777***	0.545***	-
	(0.170)	(0.734)	(0.113)	(0.12)	

N = 65,909 obs. and 19,038 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001

Table 7: Effects on smoking behaviours (continued)					
IV tests of the 2SLS models					
Durbin-Wu-Hausman test (Endogeneity)	-	-	-	0.995	0.388
Sargan-Hansen p-value (Overidentification)	-	-	-	0.564	0.656
Kleibergen-Paap rk Wald F statistic (Weak Instruments)	-	-	-	131.959	182.395
Stock & Yogo critical values: 10 % max. IV Size = 19.93 15 % max. IV size = 11.59 20% max. IV size = 8.75 25% max. IV size = 7.25					

7. Appendix

Table 8: Effects on meeting the physical activity guidelines for females only

Health Behaviours:	**Meeting the Physical Activity Guidelines (Females)**				
Models:	**Pooled**				
	LPM	**dprobit**	**FE**	**2SLS**	**FE-2SLS**
Retired at least one year	-0.021**	-0.067**	0.034***	0.242**	0.279**
	(0.007)	(0.022)	(0.009)	(0.093)	(0.099)
Age	-0.020*	-0.054*	0.008	-0.015*	0.002
	(0.008)	(0.023)	(0.009)	(0.008)	(0.009)
Age^2/100	0.014*	0.039*	-0.01	0.004	-0.012
	(0.006)	(0.0018)	(0.007)	(0.006)	(0.007)
Years of Education	-0.020***	-0.046**	-	-0.024***	-
	(0.005)	(0.015)		(0.005)	
(Years of Education)^2	0.002***	0.004***	-	0.002***	-
	(0.000)	(0.001)		(0.000)	
Living with a Partner	0.017*	0.054*	-0.01	0.009	-0.01
	(0.007)	(0.021)	(0.012)	(0.007)	(0.012)
# of Children	0.000	-0.002	0.008	0.000	0.005
	(0.002)	(0.005)	(0.006)	(0.002)	(0.006)
Wealthy	0.103***	0.277***	0.01	0.070***	0.009
	(0.009)	(0.024)	(0.011)	(0.008)	(0.011)
Health Insurance (Gov't or Emp.)	-0.005	-0.02	-0.002	0.001	0.003
	(0.009)	(0.026)	(0.010)	(0.008)	(0.01)
High Blood Pressure	-0.083***	-0.238***	0.003	-0.078***	-0.002
	(0.007)	(0.02)	(0.011)	(0.008)	(0.011)
Heart Disease	-0.056***	-0.181***	-0.029*	-0.072***	-0.037**
	(0.008)	(0.027)	(0.013)	(0.011)	(0.013)
Stroke	-0.060***	-0.221***	-0.036	-0.097***	-0.051*
	(0.013)	(0.048)	(0.021)	(0.018)	(0.021)
Other Race	0.007	0.024	-	0.009	-
	(0.014)	(0.039)		(0.014)	
Black	-0.031***	-0.095***	-	-0.049***	-
	(0.009)	(0.027)		(0.009)	
Constant	0.997***	1.301	0.187	1.025***	-
	(0.248)	(0.724)	(0.288)	(0.272)	

N = 36,580 obs. and 10,350 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001

Table 9: Effects on the number of drinks consumed per day for females only

Health Behaviours:	**# Drinks/ Day (Females)**			
Models:	**Pooled**			
	LPM	**FE**	**2SLS**	**FE-2SLS**
Retired at least one year	-0.063***	-0.039*	0.118	0.329*
	(0.019)	(0.016)	(0.161)	(0.158)
Age	-0.078***	-0.003	-0.033*	-0.013
	(0.02)	(0.016)	(0.016)	(0.016)
Age^2 /100	0.047**	0.001	0.013	-0.002
	(0.016)	(0.012)	(0.011)	(0.011)
Years of Education	0.040***	-	0.043***	-
	(0.011)		(0.011)	
(Years of Education)^2	-0.001	-	0.000	-
	(0.001)		(0.001)	
Living with a Partner	-0.017	-0.045	-0.018	-0.045
	(0.018)	(0.027)	(0.017)	(0.025)
# of Children	-0.004	0.023*	-0.001	0.018
	(0.005)	(0.011)	(0.004)	(0.011)
Wealthy	0.218***	0.018	0.084***	0.016
	(0.021)	(0.017)	(0.014)	(0.017)
Health Insurance (Gov't or Emp.)	-0.015	-0.02	-0.021	-0.013
	(0.027)	(0.019)	(0.018)	(0.019)
High Blood Pressure	-0.045*	-0.022	-0.040*	-0.029
	(0.018)	(0.02)	(0.016)	(0.019)
Heart Disease	-0.051*	-0.056*	-0.066***	-0.068**
	(0.021)	(0.023)	(0.019)	(0.023)
Stroke	-0.114***	-0.125**	-0.140***	-0.147***
	(0.033)	(0.042)	(0.034)	(0.041)
Other Race	-0.198***	-	-0.161***	-
	(0.034)		(0.035)	
Black	-0.131***	-	-0.145***	-
	(0.023)		(0.022)	
Constant	3.272***	0.763	1.671**	-
	(0.646)	(0.522)	(0.576)	

N = 36,580 obs. and 10,350 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001.

Table 10: Effects on preventive behaviours: cholesterol (blood) test in the last 2-4 years for females only

Health Behaviours:	Cholesterol (Blood test in last 2-4 years, yes or no) (Females)				
Models:	Pooled				
	LPM	dprobit	FE	2SLS	FE-2SLS
Retired at least one year	0.009	0.037	-0.001	-0.053	-0.004
	(0.006)	(0.028)	(0.007)	(0.077)	(0.066)
Age	0.023**	0.079*	0.026**	0.025**	0.026***
	(0.007)	(0.031)	(0.009)	(0.008)	(0.007)
Age^2 /100	-0.016**	-0.052*	-0.016*	-0.015**	-0.016**
	(0.006)	(0.024)	(0.007)	(0.005)	(0.005)
Years of Education	0.000	-0.009	-	-0.002	-
	(0.005)	(0.02)		(0.005)	
(Years of Education)^2	0.000*	0.002*	-	0.001*	-
	(0.000)	(0.001)		(0.000)	
Living with a Partner	0.042***	0.193***	0.006	0.036***	0.006
	(0.006)	(0.027)	(0.011)	(0.006)	(0.009)
# of Children	-0.003*	-0.014*	-0.003	-0.003	-0.003
	(0.001)	(0.006)	(0.004)	(0.001)	(0.004)
Wealthy	0.031***	0.144***	0.008	0.020***	0.008
	(0.006)	(0.031)	(0.007)	(0.005)	(0.006)
Health Insurance (Gov't or Emp.)	0.148***	0.491***	0.043***	0.084***	0.043***
	(0.010)	(0.03)	(0.009)	(0.008)	(0.008)
High Blood Pressure	0.103***	0.454***	0.062***	0.092***	0.062***
	(0.006)	(0.025)	(0.01)	(0.007)	(0.008)
Heart Disease	0.059***	0.320***	0.041***	0.058***	0.041***
	(0.006)	(0.036)	(0.011)	(0.008)	(0.009)
Stroke	0.021*	0.104	0.027	0.031*	0.027
	(0.01)	(0.06)	(0.018)	(0.014)	(0.016)
Other Race	0.021	0.083	-	0.018	-
	(0.012)	(0.053)		(0.012)	
Black	-0.015	-0.074*	-	-0.018*	-
	(0.008)	(0.033)		(0.008)	
Constant	-0.256	-2.909**	-0.223	-0.315	-
	(0.226)	(0.971)	(0.276)	(0.263)	

N = 36,580 obs. and 10,350 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001

Table 11: Effects on preventive behaviours: flu shot in the last 2-4 years for females only

Health Behaviours:	Flu Shot (in last 2-4 years, yes or no) (Females)				
Models:	Pooled				
	LPM	dprobit	FE	2SLS	FE-2SLS
Retired at least one year	0.048***	0.131***	-0.001	0.172	0.219**
	(0.009)	(0.026)	(0.008)	(0.089)	(0.075)
Age	-0.004	-0.029	0.026**	0.013	0.021**
	(0.009)		(0.009)	(0.009)	(0.007)
Age^2 /100	0.010	0.041*	-0.009	-0.005	-0.011*
	(0.007)	(0.021)	(0.007)	(0.006)	(0.005)
Years of Education	-0.01	-0.027	-	-0.009	-
	(0.007)	(0.018)		(0.006)	
(Years of Education)^2	0.001**	0.002**	-	0.001***	-
	(0.000)	(0.001)		(0.000)	
Living with a Partner	0.034***	0.093***	0.009	0.025**	0.009
	(0.009)	(0.025)	(0.011)	(0.008)	(0.01)
# of Children	-0.004	-0.011	0.008	-0.002	0.004
	(0.002)	(0.006)	(0.005)	(0.002)	(0.004)
Wealthy	0.038***	0.108***	-0.002	0.007	-0.003
	(0.01)	(0.028)	(0.008)	(0.007)	(0.007)
Health Insurance (Gov't or Emp.)	0.136***	0.349***	0.012	0.044***	0.017*
	(0.011)	(0.029)	(0.008)	(0.008)	(0.008)
High Blood Pressure	0.081***	0.223***	0.035***	0.057***	0.031***
	(0.009)	(0.024)	(0.010)	(0.008)	(0.008)
Heart Disease	0.069***	0.194***	0.017	0.033**	0.01
	(0.011)	(0.032)	(0.012)	(0.011)	(0.011)
Stroke	0.037*	0.103	0.036	0.025	0.023
	(0.019)	(0.055)	(0.019)	(0.017)	(0.017)
Other Race	0.004	0.011	-	0.001	-
	(0.018)	(0.047)		(0.017)	
Black	-0.125***	-0.336***	-	-0.123***	-
	(0.012)	(0.032)		(0.011)	
Constant	0.227	-0.166	-0.769**	-0.244	-
	(0.301)	(0.827)	(0.289)	(0.298)	

N = 36,580 obs. and 10,350 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001.

Table 12: Effects on smoking behaviours for females only

Health Behaviours:	Smoke Now (Yes or No) (Females)				
Models:	Pooled				
	LPM	dprobit	FE	2SLS	FE-2SLS
Retired at least one year	0.045***	0.199***	-0.006	0.015	0.007
	(0.007)	(0.032)	(0.004)	(0.047)	(0.043)
Age	0.007	0.058	-0.012**	-0.008	-0.012**
	(0.007)	(0.032)	(0.004)	(0.005)	(0.004)
Age^2 /100	-0.011*	-0.072**	0.005	0.001	0.005
	(0.006)	(0.025)	(0.003)	(0.003)	(0.003)
Years of Education	0.039***	0.195***	-	0.044***	-
	(0.005)	(0.031)		(0.005)	
(Years of Education)^2	-0.002***	-0.011***	-	-0.002***	-
	(0.000)	(0.001)		(0.000)	
Living with a Partner	-0.068***	-0.298***	-0.010	-0.030***	-0.01
	(0.007)	(0.031)	(0.006)	(0.005)	(0.006)
# of Children	0.001	0.002	0.002	0.000	0.002
	(0.002)	(0.008)	(0.003)	(0.002)	(0.003)
Wealthy	-0.058***	-0.329***	0.000	-0.011**	0.000
	(0.007)	(0.039)	(0.004)	(0.004)	(0.004)
Health Insurance (Gov't or Emp.)	-0.037***	-0.124***	-0.018***	-0.021***	-0.018***
	(0.009)	(0.034)	(0.005)	(0.005)	(0.005)
High Blood Pressure	-0.024***	-0.115***	-0.006	-0.009	-0.006
	(0.007)	(0.03)	(0.006)	(0.005)	(0.005)
Heart Disease	-0.001	-0.002	-0.029***	-0.020**	-0.030***
	(0.009)	(0.039)	(0.008)	(0.007)	(0.007)
Stroke	0.040*	0.166**	-0.017	-0.002	-0.018
	(0.016)	(0.061)	(0.013)	(0.011)	(0.012)
Other Race	-0.052***	-0.234***	-	-0.051***	-
	(0.013)	(0.063)		(0.012)	
Black	-0.014	-0.067	-	0.001	-
	(0.010)	(0.04)		(0.009)	
Constant	0.116	-2.174*	0.714***	0.511**	-
	(0.225)	(0.999)	(0.142)	(0.162)	

N = 36,580 obs. and 10,350 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01.

Table 13: Effects on meeting the physical activity guidelines for males only

Health Behaviours:	Meeting the Physical Activity Guidelines				
Models:	Pooled				
	LPM	dprobit	FE	2SLS	FE-2SLS
Retired at least one year	-0.051***	-0.138***	0.011	0.155	0.214*
	(0.009)	(0.024)	(0.011)	(0.099)	(0.093)
Age	-0.024*	-0.062*	0.007	-0.013	0.006
	(0.009)	(0.025)	(0.011)	(0.009)	(0.01)
Age^2 /100	0.017*	0.044*	-0.009	0.003	-0.014
	(0.007)	(0.020)	(0.008)	(0.007)	(0.008)
Years of Education	-0.021***	-0.053***	-	-0.024***	-
	(0.005)	(0.014)		(0.006)	
(Years of Education)^2	0.001***	0.004***	-	0.002***	-
	(0.000)	(0.001)		(0.000)	
Living with a Partner	0.01	0.031	-0.012	0.02	-0.009
	(0.010)	(0.027)	(0.016)	(0.011)	(0.016)
# of Children	0.000	0.000	-0.002	-0.002	-0.005
	(0.002)	(0.005)	(0.007)	(0.002)	(0.007)
Wealthy	0.118***	0.306***	0.013	0.082***	0.011
	(0.010)	(0.025)	(0.012)	(0.008)	(0.012)
Health Insurance (Gov't or Emp.)	-0.014	-0.039	-0.010	-0.013	-0.008
	(0.011)	(0.029)	(0.012)	(0.01)	(0.012)
High Blood Pressure	-0.075***	-0.195***	0.001	-0.058***	-0.001
	(0.008)	(0.021)	(0.012)	(0.008)	(0.012)
Heart Disease	-0.046***	-0.125***	0.001	-0.054***	-0.01
	(0.009)	(0.026)	(0.015)	(0.012)	(0.016)
Stroke	-0.086***	-0.255***	-0.054*	-0.104***	-0.058**
	(0.014)	(0.044)	(0.024)	(0.019)	(0.022)
Other Race	-0.007	-0.016	-	-0.006	-
	(0.015)	(0.04)		(0.015)	
Black	-0.018	-0.05	-	-0.035**	-
	(0.011)	(0.031)		(0.012)	
Constant	1.300***	2.054**	0.358	1.083***	-
	(0.298)	(0.794)	(0.34)	(0.302)	

N = 29,329 obs. and 8,688 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01.

Table 14: Effects on the number of drinks consumed per day (males)

Health Behaviours:	**# Drinks/ Day**			
Models:	**Pooled**			
	LPM	**FE**	**2SLS**	**FE-2SLS**
Retired at least one year	-0.038	-0.043	-0.246	0.069
	(0.037)	(0.034)	(0.293)	(0.261)
Age	-0.172***	-0.039	-0.083**	-0.04
	(0.042)	(0.035)	(0.032)	(0.033)
Age^2 /100	0.102**	0.018	0.047	0.016
	(0.033)	(0.027)	(0.024)	(0.024)
Years of Education	0.097***	-	0.110***	-
	(0.026)		(0.026)	
(Years of Education)^2	-0.005***	-	-0.006***	-
	(0.001)		(0.001)	
Living with a Partner	-0.296***	-0.142*	-0.228***	-0.140*
	(0.049)	(0.06)	(0.043)	(0.055)
# of Children	0.015	0.016	0.016	0.015
	(0.010)	(0.023)	(0.012)	(0.025)
Wealthy	0.139***	0.03	0.059*	0.028
	(0.036)	(0.03)	(0.025)	(0.03)
Health Insurance (Gov't or Emp.)	-0.091	-0.056	-0.105*	-0.055
	(0.055)	(0.046)	(0.042)	(0.044)
High Blood Pressure	0.089*	-0.029	0.032	-0.03
	(0.035)	(0.039)	(0.031)	(0.038)
Heart Disease	-0.198***	-0.063	-0.126**	-0.069
	(0.042)	(0.064)	(0.048)	(0.06)
Stroke	-0.213**	-0.09	-0.131*	-0.093
	(0.069)	(0.076)	(0.062)	(0.072)
Other Race	0.057	-	0.139	-
	(0.084)		(0.087)	
Black	-0.325***	-	-0.276***	-
	(0.048)		(0.05)	
Constant	7.924***	3.100**	4.586***	-
	(1.364)	(1.112)	(1.104)	

N = 29,329 obs. and 8,688 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001.

Table 15: Effects on preventive behaviours: cholesterol (blood) test in the last 2-4 years for males only

Health Behaviours:	Cholesterol (Blood test in last 2-4 years, yes or no)				
Models:	Pooled				
	LPM	dprobit	FE	2SLS	FE-2SLS
Retired at least one year	0.01	0.044	0.010	-0.196*	-0.193**
	(0.007)	(0.032)	(0.008)	(0.082)	(0.064)
Age	0.012	0.007	0.003	0.009	0.005
	(0.008)	(0.034)	(0.01)	(0.008)	(0.008)
Age^2 /100	-0.008	0.003	0.001	0.001	0.005
	(0.006)	(0.027)	(0.008)	(0.006)	(0.006)
Years of Education	-0.002	-0.023	-	0.003	-
	(0.005)	(0.018)		(0.005)	
(Years of Education)^2	0.001**	0.003***	-	0.000	-
	(0.000)	(0.001)		(0.000)	
Living with a Partner	0.067***	0.268***	0.004	0.044***	0.001
	(0.009)	(0.034)	(0.014)	(0.01)	(0.012)
# of Children	-0.002	-0.006	-0.008	-0.003	-0.006
	(0.002)	(0.007)	(0.006)	(0.002)	(0.005)
Wealthy	0.049***	0.260***	0.000	0.025***	0.003
	(0.006)	(0.033)	(0.008)	(0.006)	(0.007)
Health Insurance (Gov't or Emp.)	0.194***	0.586***	0.052***	0.119***	0.051***
	(0.011)	(0.033)	(0.011)	(0.009)	(0.01)
High Blood Pressure	0.137***	0.578***	0.086***	0.128***	0.088***
	(0.007)	(0.027)	(0.011)	(0.008)	(0.009)
Heart Disease	0.073***	0.399***	0.034**	0.075***	0.045***
	(0.006)	(0.038)	(0.012)	(0.009)	(0.01)
Stroke	0.034***	0.172**	0.036*	0.057***	0.041**
	(0.010)	(0.064)	(0.017)	(0.014)	(0.015)
Other Race	-0.006	-0.011	-	-0.019	-
	(0.014)	(0.052)		(0.014)	
Black	-0.042***	-0.167***	-	-0.046***	-
	(0.01)	(0.038)		(0.011)	
Constant	-0.053	-1.04	0.521	-0.04	-
	(0.258)	(1.074)	(0.316)	(0.283)	

N = 29,329 obs. and 8,688 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001.

Table 16: Effects on preventive behaviours: flu shot in the last 2-4 years for males only

Health Behaviours:	**Flu Shot (in last 2-4 years, yes or no)**				
Models:	**Pooled**				
	LPM	**dprobit**	**FE**	**2SLS**	**FE-2SLS**
Retired at least one year	0.024*	0.066*	-0.003	0.124	0.132
	(0.01)	(0.028)	(0.009)	(0.086)	(0.068)
Age	-0.013	-0.055	0.008	0.001	0.007
	(0.010)	(0.029)	(0.01)	(0.009)	(0.008)
Age^2 /100	0.021*	0.073**	0.007	0.009	0.005
	(0.008)	(0.023)	(0.008)	(0.007)	(0.006)
Years of Education	-0.013	-0.036	-	-0.009	-
	(0.007)	(0.018)		(0.006)	
(Years of Education)^2	0.001***	0.003***	-	0.001***	-
	(0.000)	(0.001)		(0.000)	
Living with a Partner	0.031**	0.086**	-0.012	0.017	-0.009
	(0.012)	(0.032)	(0.014)	(0.011)	(0.012)
# of Children	-0.007**	-0.020**	-0.009	-0.007**	-0.010*
	(0.002)	(0.007)	(0.005)	(0.002)	(0.005)
Wealthy	0.02	0.057	-0.016	-0.003	-0.018*
	(0.010)	(0.029)	(0.008)	(0.007)	(0.008)
Health Insurance (Gov't or Emp.)	0.148***	0.399***	0.034***	0.063***	0.034***
	(0.011)	(0.032)	(0.010)	(0.009)	(0.009)
High Blood Pressure	0.082***	0.224***	0.041***	0.060***	0.039***
	(0.009)	(0.026)	(0.011)	(0.009)	(0.009)
Heart Disease	0.088***	0.251***	0.015	0.040***	0.008
	(0.011)	(0.032)	(0.013)	(0.011)	(0.012)
Stroke	0.069***	0.199***	0.065**	0.059***	0.062***
	(0.018)	(0.054)	(0.021)	(0.017)	(0.017)
Other Race	0.033	0.092	-	0.021	-
	(0.018)	(0.048)		(0.017)	
Black	-0.047***	-0.128***	-	-0.057***	-
	(0.014)	(0.037)		(0.014)	
Constant	0.250	-0.017	-0.286	-0.083	-
	(0.331)	(0.926)	(0.330)	(0.31)	

N = 29,329 obs. and 8,688 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001.

Table 17: Effects on smoking behaviours for males only

Health Behaviours:	Smoke Now (Yes or No)				
Models:	Pooled				
	LPM	dprobit	FE	2SLS	FE-2SLS
Retired at least one year	0.048***	0.211***	-0.013*	0.024	0.019
	(0.008)	(0.035)	(0.005)	(0.048)	(0.041)
Age	0.016*	0.130***	-0.016**	-0.008	-0.016***
	(0.008)	(0.034)	(0.006)	(0.005)	(0.005)
Age^2 /100	-0.019**	-0.131***	0.008	0.000	0.007
	(0.006)	(0.027)	(0.004)	(0.004)	(0.004)
Years of Education	0.028***	0.129***	-	0.032***	-
	(0.006)	(0.026)		(0.006)	
(Years of Education)^2	-0.002***	-0.008***	-	-0.002***	-
	(0.000)	(0.001)		(0.000)	
Living with a Partner	-0.091***	-0.342***	-0.008	-0.042***	-0.007
	(0.011)	(0.038)	(0.009)	(0.008)	(0.008)
# of Children	0.006**	0.025**	0.008*	0.006***	0.007*
	(0.002)	(0.008)	(0.004)	(0.002)	(0.003)
Wealthy	-0.058***	-0.328***	0.006	-0.012**	0.006
	(0.007)	(0.039)	(0.005)	(0.004)	(0.005)
Health Insurance (Gov't or Emp.)	-0.069***	-0.207***	-0.005	-0.017**	-0.004
	(0.011)	(0.036)	(0.006)	(0.006)	(0.006)
High Blood Pressure	-0.039***	-0.171***	-0.026***	-0.030***	-0.026***
	(0.007)	(0.032)	(0.007)	(0.006)	(0.006)
Heart Disease	0.008	0.024	-0.038***	-0.022**	-0.040***
	(0.009)	(0.04)	(0.009)	(0.008)	(0.008)
Stroke	0.043**	0.185**	-0.048**	-0.019	-0.049***
	(0.016)	(0.062)	(0.017)	(0.013)	(0.013)
Other Race	-0.028	-0.113	-	-0.018	-
	(0.014)	(0.060)		(0.014)	
Black	0.030*	0.096*	-	0.053***	-
	(0.012)	(0.044)		(0.012)	
Constant	-0.021	-3.735***	0.867***	0.676***	-
	(0.260)	(1.081)	(0.182)	(0.183)	

N = 29,329 obs. and 8,688 individuals. The pooled models have individual clustered standard errors in parenthesis and the linear FE, 2SLS and FE-2SLS models have robust and clustered standard errors in parenthesis. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001.