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Early Retirement, Mental Health and Social Networks

Axel Börsch-Supan
Munich Center for the Economics of Aging (MEA) of the
Max Planck Institute for Social Law and Social Policy, Munich, Germany; and
National Bureau of Economic Research (NBER), Cambridge, Mass., USA

and

Morten Schuth
Munich Center for the Economics of Aging (MEA) of the
Max Planck Institute for Social Law and Social Policy, Munich, Germany;

Abstract

This paper explores the inter-relationships between early retirement, mental health - including cognition and subjective well-being - and the size and composition of social networks among older people. While early retirement enables more leisure and relieves stressful job conditions, it also accelerates cognitive decline. We argue in this paper that early retirement has side effects on the retirees' social networks. Social contacts are a side effect of employment that keeps workers mentally agile. Social contacts, especially with friends, however, decline gradually after retirement, with an acceleration effect when retirement was early. These side effects appear to explain part of the accelerated cognitive ageing that occurs after early retirement.

Address:
Prof. Axel Börsch-Supan, Ph.D.
Morten Schuth
Munich Center for the
Economics of Aging (MEA),
Amalienstrasse 33
D-80799 Munich, Germany
Email: axel@boersch-supan.de

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1. Introduction

This paper explores the inter-relationships between early retirement, mental health - including cognition and subjective well-being - and the size and composition of social networks among older people. We argue that early retirement has side effects on the retirees' social networks. These side effects appear to explain part of the accelerated cognitive ageing that occurs after early retirement.

Early retirement is popular in Europe. It is seen as a much appreciated social achievement which increases personal well-being, particularly among employees who suffer from work-related health problems. First introduced in the 1970s and 1980s, generous early retirement provisions in most European countries were instituted with few actuarial adjustments, if any (Gruber & Wise 1999). But times have changed since then. In response to the growth of the older segment of the population and to the precarious financial state of the public pension system, the costs of early retirement have come under increased scrutiny. This has led to a string of pension reforms in Europe, since the 1990s, reducing pay-as-you-go pension benefits and introducing multi-pillar pension systems with supplemental occupational and individual pensions, in addition to the traditional unfunded retirement insurance (Börsch-Supan 2012).

Despite the enormous increase in life expectancy all over Europe, policymakers are still largely unwilling to challenge the widely popular early and normal retirement ages. Politically speaking, reducing the generosity of early retirement is often seen as “touching the third rail,” with a fatal shock delivered at the next election. A case in point is France, where a timid increase in the retirement age, from 60 to 62 years, was partially reverted after the most recent presidential elections.

While many studies have addressed the macro connotations of early retirement, particularly its large costs, another body of literature has looked at the individual implications of early retirement. An immediate benefit from early retirement is the receipt of income support without the necessity to continue working, enabling individuals to enjoy more leisure. Moreover, early retirement relieves workers who feel constrained in their place of work, whether due to stressful job conditions or to work-impeding health problems. For such individuals, early retirement should manifest itself in an improvement of well-being and, potentially, also health. On the other hand, early retirement might also be harmful, because

individuals who stop working may lose a purpose in life. This might, in turn, decrease subjective well-being and mental health.

Research on these issues is complicated by the fact that the measures of well-being and health which are commonly available in general purpose surveys may suffer from justification bias (Bound 1991). That is, early retirees may report worse health in order to justify their early exit from the workforce. Moreover, early retirement is not an exogenous outcome, but is likely to be related to ill health and lower cognitive abilities. For example, persons in bad health are likely to retire earlier but also to report worse life satisfaction. Finally, those that hope or believe that life satisfaction will increase after retirement are more likely to retire at any age. We thus face the usual task of disentangling cause and effect.

The separation of selection effects and reverse causality from the genuine impacts of early retirement on well-being and health requires advanced econometric techniques which sometimes make results controversial. The econometric problem is to find a counterfactual value for well-being and health had a person not taken early retirement. The usual instruments for identifying such a counterfactual are policy changes in early retirement rules, such as changes in the pensionable age or changes in the actuarial adjustments. The Survey of Health, Ageing and Retirement in Europe (SHARE), used for this paper and described in Section 2, is useful in this respect, as it gives institutional variation across countries to provide the necessary counterfactual. Moreover, since SHARE is a panel, the data also include conditioning variables describing health and well-being in earlier stages of life.

Börsch-Supan and Jürges (2006), using the German Socio-Economic Panel data, found that individuals were less happy in the year of early retirement than in the years before and after retirement. Moreover, individuals generally attained their pre-retirement satisfaction levels relatively soon after retirement. Hence, the early retirement effect on well-being appears to be negative and short-lived rather than positive and long-lasting, similar to what occurs in the set point model of happiness by Clark et al. (2003). Charles (2002) studied the effect of retirement on depression, and Lindeboom et al. (2002) studied the effect of retirement and other factors (a significant decrease in income, death of the spouse, disability, and a move to a nursing home) on the mental health of individuals, using data from the Longitudinal Aging Study Amsterdam (LASA).

A seminal paper by Adam, Bonsang, Perelman et al. (2007) based on SHARE found that cognition - measured mainly by memory abilities such as delayed word recall - declined during retirement. This controversial finding has sparked an entire literature. While there are a

few papers with the opposite result (Coe et al. 2008, 2012), most studies confirm the early findings (Bonsang, Adam, Perelman et al. 2010, Rohwedder & Willis 2010, Mazzonna & Peracchi 2012) and show that the negative effect on cognition increases with the time in retirement. For a given age, early retirees suffer more from cognitive decline than later retirees, even after correcting for selection and reverse causality effects.

Why does retirement affect cognition and is cognitive decline a reason for declining health and well-being? These are the questions underlying the research in this paper. Its central hypothesis is derived from the anchoring function of employment. Work, even if unpleasant and arduous, provides social contacts. Even disliked colleagues and a bad boss, it may be assumed, are better than social isolation because they provide cognitive challenges which keep the mind active and healthy.

We describe the data briefly in Section 2. The current analysis takes advantage of a major innovation in SHARE Wave 4, the social network data based on a name generator which identifies those persons with whom the respondents "discuss things that are important to them," e.g. "good or bad things that happen to you, problems you are having, or important concerns you may have." In the first step, we find significant correlations among early retirement, mental health and social networks, which give first evidence for our line of reasoning (section 3). This explanation is confirmed and strengthened in the second step when we control for other possible determinants (section 4). Unobserved common factors and potential reverse causality, however, call for an instrumental variable approach. This is done in Section 5, the core of the paper. Using instruments describing the retirement regulations, similar to the approaches taken by Bonsang, Adam, Perelman et al. 2010, Rohwedder & Willis 2010, Mazzonna & Peracchi 2012, plus regional variables describing social capital to instrument for the size and intensity of individual social networks confirms our findings. Section 6 concludes.

2. The SHARE data

The Survey of Health, Ageing and Retirement in Europe (SHARE) is a unique multidisciplinary and cross-national panel database of ex ante harmonized micro data on health, socio-economic status and social and family networks covering most of the European Union and Israel. To date, SHARE has collected three panel waves (2004, 2006, 2010) of current living circumstances and one wave of retrospective life histories (2008, SHARELIFE). Six additional waves are planned until 2024. SHARE gives a broad picture of

life after age 50, measuring physical and mental health, both objectively and subjectively; economic and non-economic activities, income and wealth by sources; intergenerational transfers of time and money within and outside of the family; as well as life satisfaction and well-being. SHARE is harmonized with the US Health and Retirement Study (HRS) and the English Longitudinal Study of Ageing (ELSA) and, together with these two surveys, has become a role model for several aging surveys worldwide. SHARE's scientific power is based on its panel design that grasps the dynamic character of the aging process, its multi-disciplinary approach that delivers the full picture of the individual and societal aging, and its cross-nationally ex-ante harmonized design that permits international comparisons of health, economic and social outcomes in Europe and the US.

After four waves of SHARE more than 150 000 interviews have been conducted with about 86 000 respondents aged 50 and over and their potentially younger partners in 19 countries (AT: Austria, BE: Belgium, CH: Switzerland, CZ: Czech Republic, DE: Germany, DK: Denmark, EE: Estonia, ES: Spain, FR: France, GR: Greece, HU: Hungary, IE: Ireland, IL: Israel, IT: Italy, NL: Netherlands, PL: Poland, PT: Portugal, SE: Sweden, SI: Slovenia).

The SHARE target population consists of all persons born 1954 or earlier in wave 1 (2004/05), 1956 or earlier in wave 2 (2005/06), and 1960 or earlier in wave 4 (2010/11), who have their regular domicile in the respective SHARE country. A person is excluded if she or he is incarcerated, hospitalized, or out of the country during the entire survey period, unable to speak the countries' language(s) or has moved to an unknown address. In addition, current partners living in the household are interviewed regardless of their age. All SHARE respondents that were interviewed in any previous wave are part of the longitudinal sample. They are traced and re-interviewed if they moved within the country.

Covering the key areas of life, namely health, socio-economics and social networks, SHARE includes a great variety of information: health variables, physical measures and biomarkers, psychological variables, economic variables, and social support variables as well as social network information. While the regular waves of SHARE, such as Waves 1, 2 and 4, deal with the respondents' current living conditions, Wave 3 (SHARELIFE) was conducted as a retrospective survey in order to collect information about the respondents' life histories.
The interviewers used computer assisted personal interviewing (CAPI) to collect most of the data in all waves. In addition self-administered questionnaires (drop-off) were handed out in Wave 1, 2 and 4 after completion of the CAPI. If respondents deceased, EOL interviews were conducted face-to-face (CAPI) or by telephone (CATI) with a proxy, collecting the

information regarding the respondent's last year of life. Proxy interviews were also used when respondents were not able to do an interview, for example due to health reasons.

Even though SHARE is a panel survey with a stable core questionnaire over time, innovative research questions, physical measurements or modules have been incorporated in each wave. For example, in Wave 2, two physical measurements – peak flow and chair stand – were added (see next section for details). In Wave 4 a completely new module – the social networks module based on a name-generator approach – has been implemented to learn more about the social connectedness of respondents. It is one of the key variables in this paper.

In SHARELIFE, retrospective data with respect to childhood living circumstances, partners, children, accommodation, employment, socio-economic and health conditions were collected with the help of a "Life History Calendar" similar to the one applied in ELSA. The combination of the SHARELIFE with SHARE and ELSA data thus gives a detailed picture of the current status of individuals in Europe with a view across their entire life courses. In this paper, the life histories are essential to construct the employment history.

From the first wave on, SHARE combined self-reports on health with physical performance measurements. Dried blood spots have been collected in Germany during Wave 4. In this paper, we use grip strength as a fairly objective measure of physical health.

Survey data can cover a wide range of topics. However, the information provided by respondents is often incomplete or inaccurate. Administrative data on the other hand are much more complete and accurate since they are process-generated. SHARE thus cooperates with the German Pension Fund (DRV) and has linked the German survey data with administrative data held by the DRV in a pilot study in the third wave of SHARE. We have used the administrative data for this paper to check the validity of the self-reported employment histories in Germany and found a very close match (Malter and Börsch-Supan, 2013).

The core variables in this paper are based on wave 4 of SHARE. Explanatory and auxiliary variables, however, are taken from all waves including the life histories. We restrict our analyses on retired individuals and use two working samples: first, all individuals who are retired and for which the retirement date could be ascertained (some 25,000 individuals), and second all individuals who retired in the "window of early retirement", i.e. between the applicable statutory early retirement age in each country and age 70 (some 19,000 individuals). The second sample excludes individuals who retired very early, some of them receiving disability benefits, many of them homemakers with a very short labor force history.

3. The triangle of early retirement, mental health, and social networks

Figures 1 and 2 visualize the main story behind this paper. Figure 1 shows the decline of cognition by age, separately for early and normal retirees. For early retirees, cognition is lower, corresponding to about 1.5 years of aging.

Insert Figure 1: Cognition by age and retirement pathway

Source: Own calculations from SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Figure 2 shows the number of friends and colleagues in the social network. While the relation more noisy than in Figure 1, it exhibits the same pattern: the number of friends and colleagues in the social network also declines with age, and it is lower for early retirees.

Insert Figure 2: Number of friends and colleagues by age and retirement pathway

Source: Own calculations from SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

The main questions of this paper are: Do these relations uphold when the influence of other variables and potential reverse causality are accounted for? And are the two relations connected to each other?

Figure 3 computes the correlations in the triangle of early retirement, mental health, and social networks shown and introduces the main variables in this paper. Each domain is characterized by a set of variables. Individuals are categorized as retired either when they self-report as "retired" or when they receive an old-age pension. We measure the time elapsed since the earlier of the two events has taken place. This variable is of particular interest since it best describes the "dose" of retirement exposure which may have triggered a "response" in terms of social networks and mental health, using the parlance of epidemiology. For both status and time elapsed, we distinguish three retirement pathways: normal retirement at or after the pensionable age as defined by the OECD (2011) ("NORMret" and "NORMtime"), retirement due to receipt of disability insurance (DI) benefits at an age before this pensionable age ("DIret" and "DItime"), and early retirement for all other labour force exits before the pensionable age that are not related to receiving disability benefits ("EARLYret" and "EARLYtime").

Mental health is measured by five variables: the number of words recalled from a list of ten - both immediately ("ImmRecall") and delayed (after about 30 minutes)

("DelRecall") - and a composite indicator of numeracy ("Numeracy"). We add a 12- item composite scale (CASP-12) designed to measure the quality of life in (early) old age, adapted by SHARE from the original 19-item scale (Hyde et al. 2003) and a depression scale targeted at mild or severe depression symptoms—the EURO-D (Prince et al. 1999).

Finally, social networks, the key domain in this paper, are characterised by their size (number of individuals mentioned as close confidants) and their composition, focusing on non-family members including friends and colleagues. More precisely, the variable "Size" counts all members of the social network, "Colleagues" the number of colleagues in the network, "Friends" the number of friends, "FrndsCollgs" their combination, "Helpers" the number of formal helpers, and "NonFam" the number of non-family members mentioned in the name generator without including formal helpers.

Figure 3 reports the correlations among these variables, based on our working sample which includes all individuals who have retired by Wave 4 and are below age 80. Asterisks mark statistically significant relationships between the variables (at 1 %).

Insert Figure 3: Correlations in the triangle of early retirement, mental health, and social networks

Source: Own calculations from SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

The correlations in Figure 3 show that the time since retirement is significantly related to all mental health variables: it affects cognition and well-being negatively and increases the measure of depressive symptoms. Moreover, the time elapsed after an early retirement has stronger associations with worsening mental health than the time elapsed since normal retirement although individuals retiring early are almost always younger than those retiring at the pensionable age. Time elapsed since retirement is also correlated with smaller social networks, both overall and concerning colleagues, friends and other non-family members. Again, this time effect is stronger for early retirees than normal retirees. Correlations with the number of formal helpers have, as expected, exactly the opposite pattern. Finally, the association between social networks and mental health is highly significant. Larger social networks are strongly associated with better cognitive abilities, higher subjective well-being (CASP-12) and less depression (EURO-D).

4. Controlling for other determinants

The correlations depicted may have many reasons. An underlying common cause could be physical health. Individuals with worse physical health tend to retire earlier. They may have mobility problems and therefore less ability to maintain their social network. Suffering from bad physical health is likely to reduce well-being and increase depression, and to reduce mental health and cognition either directly (biologically) or indirectly (psychologically).

Demographic variables such as age, gender, and marital status also affect all three variables. Retirement rules are age and gender specific in all SHARE countries; age, gender, and marital status are significant factors influencing morbidity; and they are associated with the size and closeness of social networks. Also education is likely to modify all the observed associations.

Given all the above, the following regression analyses control for these background variables. Health is characterised by functional abilities (basic activities of daily living, denoted by "adl", and the global activity limitation indicator developed by van Oyen et al. 2006, denoted by "gali"), the presence of one or more chronic illnesses ("longill"), and the objective measure of grip strength ("maxgrip") measured in kilogram. We do not correct for subjective health ("How do you rate your health") as this is highly correlated with well-being once objective health is controlled for.

Insert Table 1: The influence of retirement on cognition

Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Table 1 reproduces the findings quoted in the introduction to this chapter that retirement affects cognition, even when holding other potential determinants constant. Noteworthy is the difference that emerges between retirement status and the time elapsed since retirement. Cognition is mainly affected by the time elapsed, while well-being and depression differs by the type of retirement. For those who receive disability benefits it is this fact which carries the effect, while in early retirement, the effect depends on the time elapsed. While we are aware that such a regression may possibly reflect reverse causality, the literature cited in the introduction contains fairly convincing arguments that this relationship is actually causal. Table 30.2 shows that part of the explanation may be social networks.

Insert Table 2: The influence of retirement and social networks on cognition

Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Adding the social network variables to the earlier regression increases the fit of the regression and reduces the coefficients of the early retirement variables. The social network variables have significant effects on cognition: network size in general and the number of friends in particular significantly increase cognition, while the number of helpers is associated with lower cognition. The latter effect is most likely one of reverse causation.

Indeed, as Table 3 shows, early retirement has a direct effect on the total size of the social network, and also on the number of friends, colleagues, and other non-family members in the social network.

Insert Table 3: The influence of retirement on social networks

Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Of note in Table 3 is the weak influence of retirement due to the receipt of disability insurance. Disability actually is a reason for more formal help, increasing rather than decreasing network size. This is shown in Table 4 which relates the number of formal helpers and other non-family network members to disability retirement. Note that disability status, health and time since receiving disability benefits are highly collinear.

Insert Table 4: The influence of disability retirement on the number of formal helpers in the social network

Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Finally, we tested the robustness of these results against unobserved effects in specific countries at specific times. First, we found large differences in all three domains across the SHARE countries. The Northern countries are healthier, while the social networks in the Southern countries are larger. We note, furthermore, that retirement rules are very different across countries. These differences may reflect cultural and historical differences common to

the three domains and might thus cause the significant correlations in Tables 1 through 4 without a genuine relationship actually at work. Similarly, calendar time effects may have created spurious correlations, especially since the field work in Wave 4 stretched over almost 1.5 years, a time with violent ups and downs due to the financial, economic and debt crises. Moreover, time effects may also reflect interviewer effects since different interviewers were in the field at different times of the survey. We therefore re-estimated all the above regressions with country and time fixed effects. Results change only very little.

5. Accounting for reverse causality and common unobservable factors

As pointed out in the introduction, the regressions in section 4 suffer potentially from endogeneity bias. While it appears far-fetched that the size of the social network precipitates the decision to retire early, weak cognitive abilities may certainly do. We therefore use instruments which capture retirement regulations similar to the approaches taken by Bonsang, Adam, Perelman et al. (2010), Rohwedder & Willis (2010), and Mazzonna & Peracchi (2012). More precisely, we instrument the time after early retirement by the difference of the individual's age and the statutory eligibility age for early retirement, and the time after normal retirement by the difference of the individual's age and the statutory eligibility age for normal retirement, both based on the information about pensionable ages provided by the OECD (2011).

There is a good reason to also be careful with the exogeneity of the number of friends and colleagues in the social network. While it is unlikely that the size and intensity of social networks cause early retirement, cognition and social network size and intensity may be caused by similar unobserved variables. Unobserved health and psychological characteristics may reduce cognition and cause an increasing distance to friends and colleagues as these individuals age. We therefore exploit regional variables drawn from external sources which describe social capital to instrument for the size and intensity of individual social networks. Specifically, we use the regionally aggregated means of "trust in other people" by NUTS-1 regions from the European Social Survey (ESS), wave 2 (2004), which is available for all involved SHARE countries, and the logarithm of population density (2010) which is available by NUTS-1 regions from Eurostat.

Tables 5 through 7 report on the first stage regressions and show the predictive power of the instruments for the potentially endogenous variables. The regressions also include country dummies and interactions of the country dummies with age. All regressions in this section are

based on the smaller sample which excludes very early retirees and use as cognition measure the sum of the scores from the immediate and the delayed word recall. All F-tests are highly significant. The policy variables are highly significant for the time since retirement, while the social capital variables are highly significant for the number of friends and colleagues in the social networks.

Insert Tables 5 through 7 about here: First stage results

Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Our main results are in Tables 8 through 10. Table 8 confirms our findings from Figure 2 and Table 2 in this instrumental variable regression. The number of friends and colleagues in the social network declines with the time since retirement, holding age (and age squared) constant. This effect is larger for the early retirees as compared to the normal retirees. Note that both effects are highly significant in the full specification.

Insert Table 8: The effect of (early) retirement on the number of friends and colleagues in the social network

Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Table 9 shows the effects for the time since retirement on cognition, corresponding to Figure 1 and Table 1, but taking account of potential endogeneity. It has the same pattern: cognition declines with time spent in retirement, and this effect is larger for early than normal retirees. Both effects are highly significant in the full specification.

Insert Table 9: The effect of (early) retirement on cognition

Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Table 10 adds the number of friends and colleagues in the social network to the IV-regression in Table 9. It is significant in all specifications and reduces the coefficients of the retirement

duration variables by about 30% in the full specification. We conclude that the part of the nexus between retirement and cognition works through the shrinkage of social networks, here the declining number of non-family members, namely friends and colleagues.

Insert Table 10: The effect of (early) retirement and the number of friends and colleagues in the social network on cognition

Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Tables 11 through 14 explore the robustness of this result. Tables 11 and 12 employ alternative social network variables. In Table 11, we replace the size by the intensity of the contacts to friends and colleagues. We obtain very similar results, although the significance levels are lower. The same holds if we use the distance as an indicator for the quality of the social network (Table 12).

Insert Table 11 and 12: The effect of (early) retirement and indicators of the quality of the social network on cognition

Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Tables 13 and 14 finally employ interactions between the size and the quality of the social network. We obtain results very similar to Tables 10 through 12, confirming the robustness of our findings.

Insert Table 13 and 14: The effect of (early) retirement and interaction of size and quality of the social network on cognition

Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

6. Conclusions

Is early retirement bliss? Evidence from earlier studies has placed this assumption in doubt. Early retirement may actually be a mixed blessing because cognition declines. Moreover, the effect of early retirement on subjective well-being seems to be negative and short-lived rather than long lasting and positive.

This paper has explored one mechanism that may explain why early retirement contains negative effects: the erosion of social networks after retirement. Social isolation, in turn, diminishes the day-to-day challenges that keep people mentally fit and well because, ultimately, human beings are social entities. We find evidence that retirement in general, and early retirement in particular, reduces the size of the social network, and in particular the number of friends and other non-family contacts in the interpersonal milieu (and not only the number of immediate colleagues).

Our findings are robust and take account of the potential endogeneity of cognition and common unobservables in cognition and social network size and quality. The instruments seem to work well. An even better identification strategy would be to exploit variation in social networks over time. While SHARE contains some indicators of social isolation in earlier waves, the sample sizes of these prototypical earlier waves were much smaller and this strategy failed due to too few observations. Since SHARE will include the social network measures again in Wave 6, such analyses will be part of our future work.

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Figures and Tables

Figure 1: Cognition by age and retirement pathway

Source: Own calculations from SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

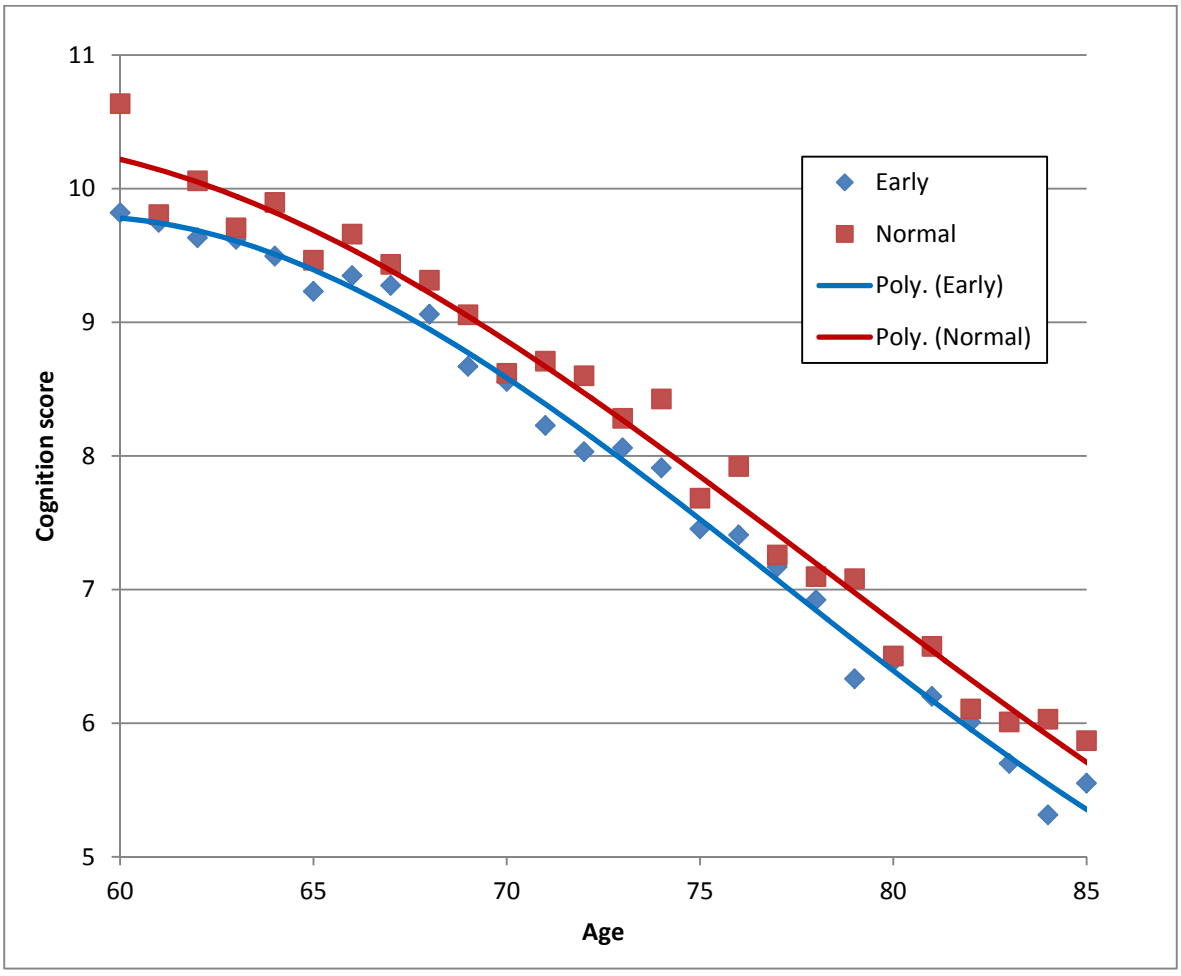


Figure 2: Number of friends and colleagues by age and retirement pathway

Source: Own calculations from SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

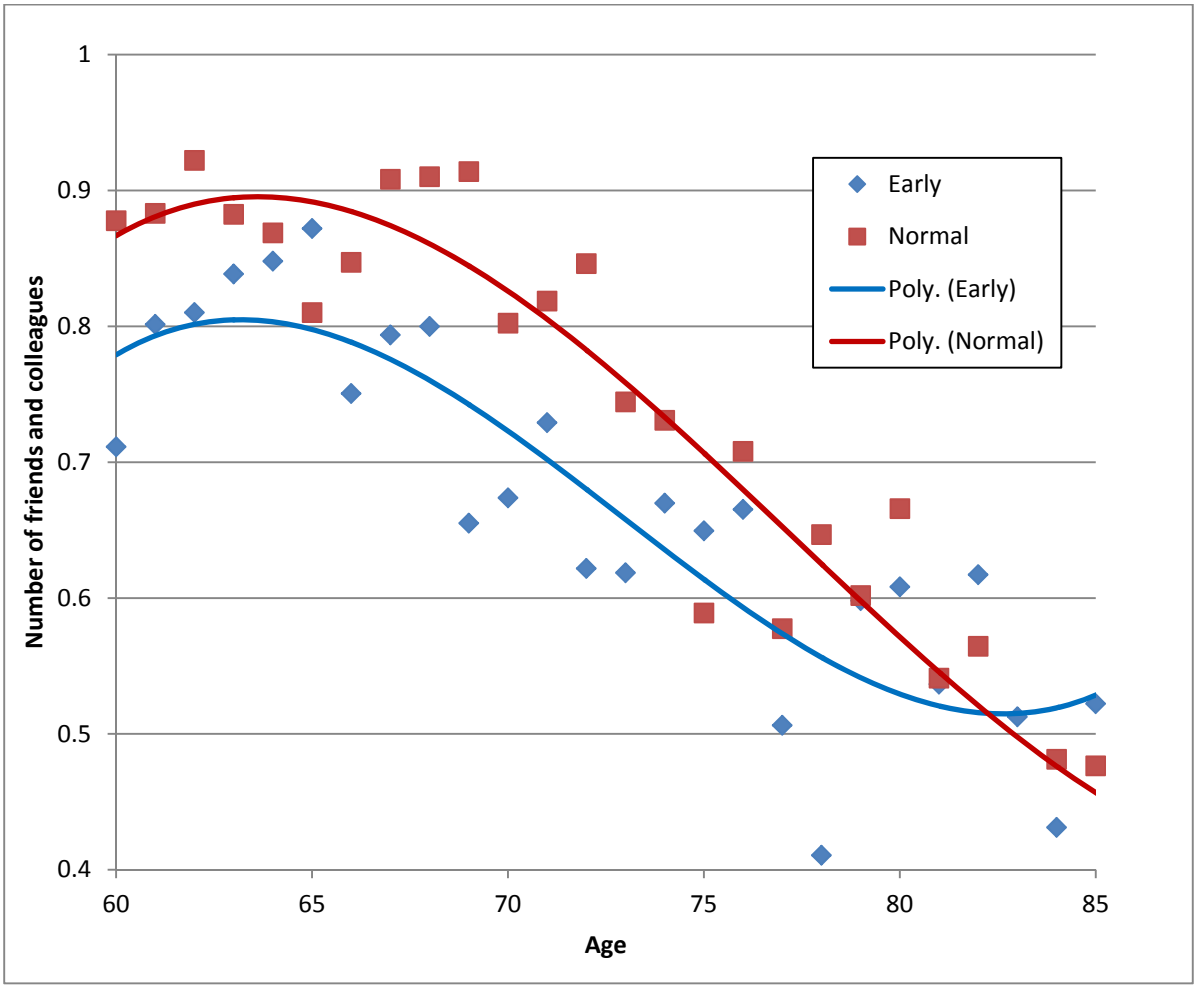
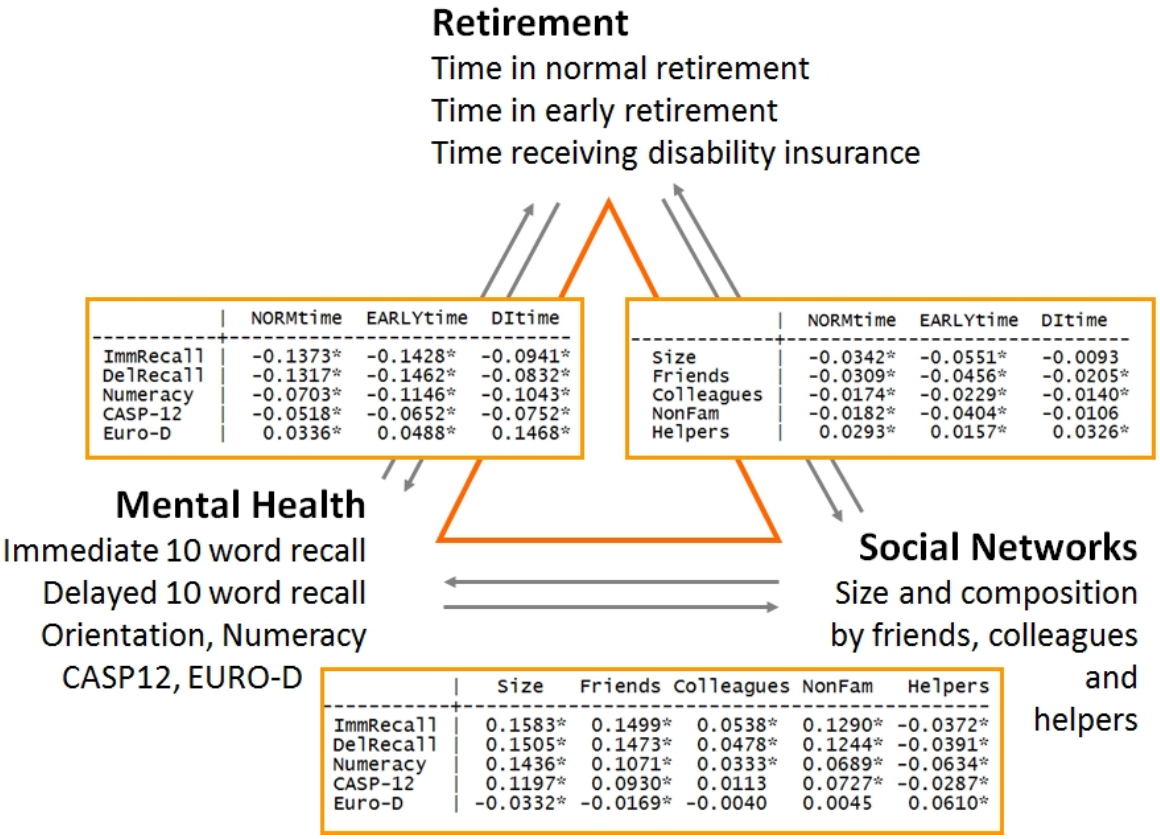


Figure 3: Correlations in the triangle of early retirement, mental health, and social networks

Source: Own calculations from SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1



	NORMtime	EARLYtime	DItime
ImmRecall	-0.1373*	-0.1428*	-0.0941*
DelRecall	-0.1317*	-0.1462*	-0.0832*
Numeracy	-0.0703*	-0.1146*	-0.1043*
CASP-12	-0.0518*	-0.0652*	-0.0752*
Euro-D	0.0336*	0.0488*	0.1468*

	NORMtime	EARLYtime	DItime
Size	-0.0342*	-0.0551*	-0.0093
Friends	-0.0309*	-0.0456*	-0.0205*
Colleagues	-0.0174*	-0.0229*	-0.0140*
NonFam	-0.0182*	-0.0404*	-0.0106
Helpers	0.0293*	0.0157*	0.0326*

	Size	Friends	Colleagues	NonFam	Helpers
ImmRecall	0.1583*	0.1499*	0.0538*	0.1290*	-0.0372*
DelRecall	0.1505*	0.1473*	0.0478*	0.1244*	-0.0391*
Numeracy	0.1436*	0.1071*	0.0333*	0.0689*	-0.0634*
CASP-12	0.1197*	0.0930*	0.0113	0.0727*	-0.0287*
Euro-D	-0.0332*	-0.0169*	-0.0040	0.0045	0.0610*

Table 1: The influence of retirement on cognition

	Immediate Recall	**Delayed Recall**	**Numeracy**	**CASP-12**	**EURO-D**
Early retirement (dummy)	0.041	0.100**	0.068***	0.152*	-0.095**
	(-0.032)	(-0.04)	(-0.026)	(-0.082)	(-0.04)
Years since early retirement	-0.012***	-0.019***	-0.010***	-0.026***	0.013***
	(-0.002)	(-0.003)	(-0.002)	(-0.005)	(-0.003)
Disability retirement (dummy)	-0.098**	0.075	-0.027	-0.510***	0.437***
	(-0.045)	(-0.057)	(-0.04)	(-0.124)	(-0.062)
Years since disability retirement	0.009***	-0.018***	0.010***	-0.003	0.005
	(-0.003)	(-0.003)	(-0.002)	(-0.008)	(-0.004)
Female (dummy)	0.756***	0.866***	0.143***	0.820***	0.178***
	(-0.029)	(-0.035)	(-0.024)	(-0.077)	(-0.038)
Age (years)	-0.037***	-0.040***	0.002	-0.025***	-0.017***
	(-0.002)	(-0.003)	(-0.002)	(-0.005)	(-0.003)
Couple (couple)	0.110***	0.049*	0.092***	0.786***	-0.227***
	(-0.023)	(-0.028)	(-0.019)	(-0.06)	(-0.031)
Years of education	0.098***	0.113***	0.059***	0.082***	-0.038***
	(-0.002)	(-0.003)	(-0.002)	(-0.006)	(-0.003)
Grip strength	0.023***	0.026***	0.019***	0.033***	-0.033***
	(-0.001)	(-0.002)	(-0.001)	(-0.004)	(-0.002)
Longterm illness (dummy)	-0.070***	-0.136***	-0.107***	-0.462***	0.528***
	(-0.023)	(-0.029)	(-0.019)	(-0.06)	(-0.029)
ADL (0-6)	-0.163***	-0.176***	-0.100***	-0.427***	0.540***
	(-0.018)	(-0.019)	(-0.013)	(-0.048)	(-0.026)
GALI (dummy)	-0.127***	-0.179***	-0.038**	0.097	0.600***
	(-0.023)	(-0.029)	(-0.019)	(-0.061)	(-0.03)
Constant	5.649***	4.247***	2.342***	20.300***	4.389***
	(-0.174)	(-0.215)	(-0.141)	(-0.456)	(-0.232)
Observations	25,591	25,598	15,988	25,666	25,463
Adjusted R^2	0.16	0.14	0.13	0.05	0.20

***, **, *: Significant at 1%, 5%, 10%, respectively. Robust standard errors in parentheses.
Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Table 2: The influence of retirement and social networks on cognition

	Immediate Recall	**Delayed Recall**	**Numeracy**	**CASP-12**	**EURO-D**
Early retirement (dummy)	0.032	0.090**	0.062**	0.106	-0.110***
	(-0.032)	(-0.041)	(-0.027)	(-0.083)	(-0.041)
Years since early retirement	-0.011***	-0.018***	-0.009***	-0.022***	0.014***
	(-0.002)	(-0.003)	(-0.002)	(-0.005)	(-0.003)
Disability retirement (dummy)	-0.0908**	0.0853	-0.0364	-0.531***	0.405***
	(-0.046)	(-0.058)	(-0.04)	(-0.125)	(-0.063)
Years since disability retirement	-0.009***	-0.018***	-0.008***	-0.001	0.006
	(-0.003)	-0.003	-0.002	-0.008	-0.004
No. of persons in social network	0.063***	0.085***	0.044***	0.184***	-0.038***
	(-0.008)	(-0.009)	(-0.006)	(-0.019)	(-0.009)
No. of colleagues in social network	0.065	0.048	-0.052	-0.072	0.090*
	(-0.041)	(-0.054)	(-0.033)	(-0.106)	(-0.05)
No. of friends in social network	0.100***	0.127***	0.039***	0.224***	0.050***
	(-0.012)	-0.016	-0.011	-0.031	-0.016
No. of formal helpers in social network	-0.066***	-0.107***	-0.124***	-0.175**	0.159***
	(-0.025)	(-0.033)	(-0.021)	(-0.068)	(-0.035)
Female (dummy)	0.696***	0.793***	0.114***	0.685***	0.199***
	(-0.029)	(-0.036)	(-0.024)	(-0.078)	(-0.039)
Age (years)	-0.037***	-0.040***	-0.002	-0.025***	-0.018***
	(-0.002)	(-0.003)	(-0.002)	(-0.005)	(-0.003)
Couple (couple)	0.123***	0.056*	0.078***	0.757***	-0.174***
	(-0.024)	(-0.03)	(-0.02)	(-0.061)	(-0.032)
Years of education	0.093***	0.108***	0.057***	0.073***	-0.038***
	(-0.002)	(-0.003)	(-0.002)	(-0.006)	(-0.003)
Grip strength	0.0222***	0.0244***	0.0185***	0.0316***	-0.0324***
	(-0.001)	(-0.002)	(-0.001)	(-0.004)	(-0.002)
Longterm illness (dummy)	-0.080***	-0.158***	-0.116***	-0.489***	0.523***
	(-0.023)	(-0.029)	(-0.019)	(-0.06)	(-0.029)

ADL (0-6)	-0.161***	-0.178***	-0.097***	-0.407***	0.535***
	(-0.018)	(-0.02)	(-0.013)	(-0.049)	(-0.027)
GALI (dummy)	-0.121***	-0.171***	-0.034*	0.112*	0.599***
	(-0.024)	(-0.029)	(-0.019)	(-0.061)	(-0.030)
Constant	5.548***	4.132***	2.280***	19.990***	4.397***
	(-0.177)	(-0.218)	(-0.143)	(-0.460)	(-0.237)
Observations	24,753	24,759	15,456	24,824	24,638
Adjusted R^2	0.17	0.15	0.14	0.05	0.20

***, **, *: Significant at 1%, 5%, 10%, respectively. Robust standard errors in parentheses.
Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1.

Table 3: The influence of retirement on social networks

	Number of social network persons				
	Total	**Colleagues**	**Friends**	**Friends and colleagues**	**All without family and formal help**
Early retirement (dummy)	0.103***	0.017***	0.015	0.032	0.020
	(-0.033)	(-0.005)	(-0.019)	(-0.019)	(-0.021)
Years since early retirement	-0.014***	-0.001***	-0.005***	-0.006***	-0.006***
	(-0.002)	(0.000)	(-0.001)	(-0.001)	(-0.001)
Disability retirement (dummy)	0.070	-0.013*	0.043*	0.030	0.041
	(-0.046)	(-0.007)	(-0.025)	(-0.026)	(-0.029)
Years since disability retirement	-0.005*	0.000	-0.005***	-0.004***	-0.004**
	(-0.003)	(0.000)	(-0.002)	(-0.002)	(-0.002)
Female (dummy)	0.482***	0.003	0.136***	0.139***	0.135***
	(-0.028)	(-0.004)	(-0.016)	(-0.016)	(-0.018)
Age (years)	0.002	-0.001*	-0.003***	-0.004***	-0.003**
	(-0.002)	(0.000)	(-0.001)	(-0.001)	(-0.001)
Couple (couple)	0.181***	-0.020***	-0.284***	-0.304***	-0.429***
	(-0.023)	(-0.004)	(-0.014)	(-0.014)	(-0.016)
Years of education	0.025***	0.004***	0.022***	0.025***	0.024***
	(-0.002)	(0.000)	(-0.001)	(-0.001)	(-0.002)
Grip strength	0.003**	0.000	0.000	0.000	0.000
	(-0.001)	(0.000)	(-0.001)	(-0.001)	(-0.001)
Longterm illness (dummy)	0.129***	0.015***	-0.002	0.013	0.008
	(-0.023)	(-0.004)	(-0.013)	(-0.013)	(-0.015)
ADL (0-6)	-0.007	0.001	-0.010	-0.009	0.000
	(-0.015)	(-0.002)	(-0.008)	(-0.008)	(-0.009)
GALI (dummy)	-0.054**	-0.006*	-0.056***	-0.062***	-0.049***
	(-0.023)	(-0.004)	(-0.013)	(-0.014)	(-0.015)
Constant	1.574***	0.042*	0.636***	0.678***	0.852***
	(-0.172)	(-0.025)	(-0.095)	(-0.098)	(-0.109)
Observations	25,715	25,715	25,715	25,715	24,852
Adjusted R^2	0.03	0.01	0.04	0.05	0.06

***, **, *: Significant at 1%, 5%, 10%, respectively. Robust standard errors in parentheses.
Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Table 4: The influence of disability retirement on the number of formal helpers in the social network

	No. of formal helpers and other non-family members in the social network					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Disability retirement (dummy)	0.042***	0.044***	0.032***	0.036***	0.032***	0.032**
	(0.007)	(0.007)	(0.008)	(0.013)	(0.008)	(0.013)
Years since disability retirement				0.000		0.001
				(0.001)		(0.001)
+ Demographics	No	yes	yes	yes	yes	yes
+ Health	No	no	yes	yes	yes	yes
+ Country/time FE	No	no	no	no	yes	yes
Observations	26,977	26,574	24,852	24,852	24,681	24,681
Adjusted R^2	0.002	0.015	0.017	0.017	0.026	0.026

***, **, *: Significant at 1%, 5%, 10%, respectively. Robust standard errors in parentheses.
Note: Other non-family members without including colleagues, friends and ex-spouses/ partners. Variables controlling for demographics, health, education, time and country included but not shown.
Source: SHARE Wave 1-2 release 2.5.0, Wave 3 release 1, Wave 4 release 1

Table 5: First stage: Time elapsed since early retirement

	(1) ERdist	(2) ERdist	(3) ERdist	(4) ERdist
LERdist	0.740***	0.608***	0.581***	0.367***
	(0.037)	(0.044)	(0.045)	(0.045)
LNRdist	-0.506***	-0.424***	-0.391***	0.004
	(0.038)	(0.046)	(0.048)	(0.047)
agg_trust_~2	0.418	0.432	0.454*	0.375
	(0.270)	(0.271)	(0.276)	(0.267)
lpden	-0.250***	-0.220**	-0.214**	-0.182**
	(0.089)	(0.089)	(0.090)	(0.088)
female		-0.012	-0.144	-0.615***
		(0.113)	(0.165)	(0.164)
age		0.902***	1.001***	1.349***
		(0.158)	(0.168)	(0.167)
age_q		-0.006***	-0.006***	-0.010***
		(0.001)	(0.001)	(0.001)
couple		0.607***	0.618***	0.567***
		(0.117)	(0.119)	(0.118)
edu_years		-0.052***	-0.052***	-0.051***
		(0.012)	(0.013)	(0.013)
maxgrip			-0.013*	-0.013*
			(0.007)	(0.007)
longill			-0.045	0.009
			(0.119)	(0.117)
adl			0.094	0.021
			(0.110)	(0.109)
iadl			-0.017	0.038
			(0.093)	(0.091)
gali			-0.083	-0.086
			(0.119)	(0.117)
N	19944	19944	18531	18531
F	300.787	255.826	199.315	231.266
Fp	0.000	0.000	0.000	0.000

Standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01
Regression also includes country dummies and age-interactions with country dummies

F test of excluded instruments:

F(4,19924)=310.77	F(4,19919)=51.73	F(4,18501)=46.21	F(4,18488)=41.49
Prob>F=0.0000	Prob>F=0.0000	Prob>F=0.0000	Prob>F=0.0000

Angrist-Pischke multivariate F test of excluded instruments

F(2,19924)=303.82	F(2,19919)=18.05	F(2,18501)=20.17	F(2,18488)=21.21
Prob>F=0.0000	Prob>F=0.0000	Prob>F=0.0000	Prob>F=0.0000

Table 6: First stage: Time elapsed since normal retirement

	(1) NRdist	(2) NRdist	(3) NRdist	(4) NRdist
LERdist	-0.769***	-0.928***	-0.876***	-0.684***
	(0.082)	(0.125)	(0.127)	(0.142)
LNRdist	1.421***	0.964***	0.938***	0.504***
	(0.080)	(0.064)	(0.065)	(0.068)
agg_trust_~2	-0.328	-0.207	-0.127	-0.040
	(0.258)	(0.245)	(0.250)	(0.241)
lpden	0.099	0.049	0.056	0.026
	(0.102)	(0.096)	(0.099)	(0.096)
female		0.990***	1.003***	1.626***
		(0.319)	(0.352)	(0.369)
age		-0.207	-0.253	-0.684***
		(0.223)	(0.233)	(0.221)
age_q		0.006***	0.006***	0.009***
		(0.001)	(0.001)	(0.001)
couple		-0.553***	-0.555***	-0.502***
		(0.111)	(0.112)	(0.110)
edu_years		-0.001	0.002	-0.004
		(0.011)	(0.011)	(0.011)
maxgrip			0.008	0.009
			(0.006)	(0.006)
longill			0.103	0.037
			(0.105)	(0.102)
adl			-0.080	0.012
			(0.106)	(0.103)
iadl			0.149*	0.073
			(0.089)	(0.085)
gali			0.080	0.102
			(0.105)	(0.102)
N	19944	19944	18531	18531
F	762.791	743.866	588.702	596.536
Fp	0.000	0.000	0.000	0.000

Standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01
Regression also includes country dummies and age-interactions with country dummies

F test of excluded instruments:

F(4,19924)=2192.68	F(4,19919)=79.10	F(4,18501)=70.35	F(4,18488)=20.08
Prob>F=0.0000	Prob>F=0.0000	Prob>F=0.0000	Prob>F=0.0000

Angrist-Pischke multivariate F test of excluded instruments:

F(2,19924)=586.17	F(2,19919)=10.35	F(2,18501)=11.89	F(2,18488)=26.85
Prob>F=0.0000	Prob>F=0.0000	Prob>F=0.0000	Prob>F=0.0000

Table 7: First stage: Size of social network (friends and (ex-)colleagues

	(1) sn_fc	(2) sn_fc	(3) sn_fc	(4) sn_fc
agg_trust_~2	0.167***	0.166***	0.144***	0.138***
	(0.052)	(0.051)	(0.054)	(0.054)
lpden	0.082***	0.056***	0.061***	0.062***
	(0.019)	(0.018)	(0.019)	(0.019)
LERdist	-0.001	0.016**	0.015*	0.011
	(0.008)	(0.008)	(0.008)	(0.009)
LNRdist	-0.013*	-0.032***	-0.032***	-0.035***
	(0.008)	(0.009)	(0.009)	(0.010)
female		0.248***	0.244***	0.260***
		(0.024)	(0.032)	(0.032)
age		0.051***	0.040*	0.033
		(0.019)	(0.021)	(0.021)
age_q		-0.000***	-0.000**	-0.000
		(0.000)	(0.000)	(0.000)
couple		-0.406***	-0.422***	-0.420***
		(0.022)	(0.023)	(0.023)
edu_years		0.046***	0.047***	0.047***
		(0.003)	(0.003)	(0.003)
maxgrip			-0.001	-0.001
			(0.001)	(0.001)
longill			0.085***	0.084***
			(0.022)	(0.022)
adl			0.013	0.012
			(0.014)	(0.014)
iadl			-0.056***	-0.060***
			(0.011)	(0.011)
gali			-0.037*	-0.037*
			(0.022)	(0.022)
N	19944	19944	18531	18531
F	60.674	89.676	71.463	50.639
Fp	0.000	0.000	0.000	0.000

Standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01
Regression also includes country dummies and age-interactions with country dummies

F test of excluded instruments:

F(4,19924)=54.06	F(4,19919)=10.44	F(4,18501)=9.19	F(4,18488)=10.00
Prob>F=0.0000	Prob>F=0.0000	Prob>F=0.0000	Prob>F=0.0000

Angrist-Pischke multivariate F test of excluded instruments:

F(2,19924)=19.35	F(2,19919)=12.58	F(2,18501)=11.32	F(2,18488)=11.11
Prob>F=0.0000	Prob>F=0.0000	Prob>F=0.0000	Prob>F=0.0000

Table 8: Second stage IV-estimation:
The effect of (early) retirement
on the number of friends & (ex-)colleagues in the social network

	(1) sn_fc	(2) sn_fc	(3) sn_fc	(4) sn_fc
ERdist	-0.021***	-0.069	-0.065	-0.097***
	(0.007)	(0.046)	(0.045)	(0.037)
NRdist	-0.015***	-0.060**	-0.059**	-0.068***
	(0.003)	(0.025)	(0.024)	(0.021)
female		0.302***	0.292***	0.308***
		(0.049)	(0.049)	(0.044)
age		0.104**	0.092*	0.118**
		(0.051)	(0.056)	(0.059)
age_q		-0.000**	-0.000	-0.000
		(0.000)	(0.000)	(0.000)
couple		-0.392***	-0.413***	-0.398***
		(0.025)	(0.027)	(0.028)
edu_years		0.044***	0.044***	0.042***
		(0.004)	(0.004)	(0.003)
maxgrip			-0.001	-0.002
			(0.001)	(0.001)
longill			0.089***	0.087***
			(0.022)	(0.023)
adl			0.013	0.015
			(0.014)	(0.015)
iadl			-0.051***	-0.055***
			(0.011)	(0.012)
gali			-0.035	-0.035
			(0.022)	(0.023)
_cons	0.841***	-4.342*	-3.838	-5.208**
	(0.031)	(2.521)	(2.621)	(2.470)
N	20770	20770	19007	19007
F	69.429	95.598	74.487	47.815
Fp	0.000	0.000	0.000	0.000

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 9: Second stage IV-estimation:
The effect of (early) retirement on cognition

	(1) cogn	(2) cogn	(3) cogn	(4) cogn
ERdist	-0.255***	-0.218*	-0.214*	-0.259***
	(0.023)	(0.119)	(0.119)	(0.084)
NRdist	-0.166***	-0.173***	-0.180***	-0.172***
	(0.009)	(0.065)	(0.062)	(0.052)
female		1.020***	1.710***	1.710***
		(0.122)	(0.123)	(0.108)
age		0.279**	0.196	0.264*
		(0.132)	(0.145)	(0.135)
age_q		-0.002***	-0.001	-0.001*
		(0.001)	(0.001)	(0.001)
couple		0.218***	0.175***	0.205***
		(0.063)	(0.065)	(0.063)
edu_years		0.212***	0.197***	0.193***
		(0.009)	(0.009)	(0.008)
maxgrip			0.042***	0.041***
			(0.003)	(0.003)
longill			-0.114**	-0.119**
			(0.054)	(0.056)
adl			-0.016	-0.016
			(0.042)	(0.043)
iadl			-0.365***	-0.370***
			(0.035)	(0.036)
gali			-0.159***	-0.157***
			(0.055)	(0.056)
_cons	9.846***	-4.001	-3.613	-5.856
	(0.093)	(6.451)	(6.820)	(5.605)
N	20348	20348	18906	18906
F	252.401	318.501	265.404	169.087
Fp	0.000	0.000	0.000	0.000

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 10: Second stage IV-estimation:
The effect of (early) retirement and social networks on cognition

	(1) cogn	(2) cogn	(3) cogn	(4) cogn
ERdist	-0.218***	-0.149	-0.180*	-0.185**
	(0.027)	(0.099)	(0.104)	(0.088)
NRdist	-0.138***	-0.106	-0.136**	-0.120*
	(0.012)	(0.065)	(0.064)	(0.063)
sn_fc	1.919***	1.177**	1.067**	1.037**
	(0.473)	(0.507)	(0.512)	(0.516)
female		0.664***	1.420***	1.411***
		(0.194)	(0.192)	(0.193)
age		0.167	0.130	0.162
		(0.118)	(0.132)	(0.130)
age_q		-0.001**	-0.001	-0.001
		(0.001)	(0.001)	(0.001)
couple		0.692***	0.627***	0.624***
		(0.208)	(0.219)	(0.213)
edu_years		0.161***	0.147***	0.148***
		(0.023)	(0.024)	(0.023)
maxgrip			0.043***	0.043***
			(0.004)	(0.004)
longill			-0.212***	-0.210***
			(0.073)	(0.073)
adl			-0.028	-0.029
			(0.044)	(0.043)
iadl			-0.310***	-0.313***
			(0.044)	(0.045)
gali			-0.117*	-0.116*
			(0.062)	(0.062)
_cons	8.233***	0.572	-1.205	-1.589
	(0.412)	(5.587)	(6.077)	(5.480)
N	19944	19944	18531	18531
F	185.946	272.813	228.672	155.855
Fp	0.000	0.000	0.000	0.000

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 11: Second stage IV-estimation:
The effect of (early) retirement
and contact intensity with friends & (ex-)colleagues in the social network
on cognition

	(1) cogn	(2) cogn	(3) cogn	(4) cogn
ERdist	-0.215***	-0.134	-0.167	-0.180*
	(0.030)	(0.103)	(0.107)	(0.092)
NRdist	-0.139***	-0.100	-0.131**	-0.120*
	(0.013)	(0.067)	(0.066)	(0.065)
sn_contact~q	0.633***	0.371**	0.334**	0.328*
	(0.165)	(0.166)	(0.170)	(0.172)
female		0.665***	1.424***	1.421***
		(0.198)	(0.197)	(0.196)
age		0.142	0.108	0.139
		(0.125)	(0.137)	(0.139)
age_q		-0.001**	-0.001	-0.001
		(0.001)	(0.001)	(0.001)
couple		0.753***	0.681***	0.685***
		(0.242)	(0.258)	(0.255)
edu_years		0.166***	0.153***	0.152***
		(0.022)	(0.023)	(0.022)
maxgrip			0.043***	0.043***
			(0.004)	(0.004)
longill			-0.206***	-0.206***
			(0.074)	(0.074)
adl			-0.023	-0.023
			(0.043)	(0.043)
iadl			-0.312***	-0.315***
			(0.044)	(0.045)
gali			-0.124**	-0.124**
			(0.061)	(0.062)
_cons	8.281***	1.591	-0.296	-0.776
	(0.424)	(5.862)	(6.260)	(5.839)
N	19944	19944	18531	18531
F	170.492	265.172	223.018	151.052
j	0.048	0.460	2.394	2.383
jp	0.827	0.498	0.122	0.123

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 12: Second stage IV-estimation:
The effect of (early) retirement and
the distance to friends & (ex-)colleagues in the social network
on cognition

	(1) cogn	(2) cogn	(3) cogn	(4) cogn
ERdist	-0.219***	-0.150	-0.178*	-0.177*
	(0.028)	(0.099)	(0.104)	(0.090)
NRdist	-0.135***	-0.107	-0.132**	-0.121*
	(0.012)	(0.065)	(0.065)	(0.063)
sn_distance	0.604***	0.400**	0.389**	0.380**
	(0.154)	(0.175)	(0.181)	(0.182)
female		0.697***	1.453***	1.446***
		(0.185)	(0.179)	(0.177)
age		0.174	0.127	0.146
		(0.118)	(0.132)	(0.135)
age_q		-0.001***	-0.001	-0.001
		(0.001)	(0.001)	(0.001)
couple		0.647***	0.618***	0.612***
		(0.192)	(0.210)	(0.201)
edu_years		0.151***	0.133***	0.134***
		(0.028)	(0.030)	(0.029)
maxgrip			0.045***	0.044***
			(0.004)	(0.004)
longill			-0.196***	-0.195***
			(0.069)	(0.069)
adl			-0.022	-0.022
			(0.044)	(0.044)
iadl			-0.320***	-0.320***
			(0.041)	(0.042)
gali			-0.131**	-0.130**
			(0.061)	(0.061)
_cons	8.486***	0.490	-0.982	-0.782
	(0.363)	(5.630)	(6.098)	(5.713)
N	19944	19944	18531	18531
F	188.529	261.769	216.740	149.263
j	0.025	0.056	1.434	1.519
jp	0.875	0.813	0.231	0.218

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 13: Second stage IV-estimation:
The effect of (early) retirement and
the number of friends & (ex-)colleagues in the social network,
interacted with the contact intensity
on cognition

	(1) cogn	(2) cogn	(3) cogn	(4) cogn
ERdist	-0.216***	-0.150	-0.182	-0.199**
	(0.033)	(0.108)	(0.111)	(0.094)
NRdist	-0.142***	-0.117*	-0.146**	-0.139**
	(0.013)	(0.067)	(0.066)	(0.064)
sn_fc_x_co~s	0.157***	0.090**	0.078*	0.077*
	(0.045)	(0.043)	(0.044)	(0.044)
female		0.752***	1.509***	1.510***
		(0.176)	(0.176)	(0.171)
age		0.172	0.135	0.164
		(0.127)	(0.139)	(0.143)
age_q		-0.001**	-0.001	-0.001
		(0.001)	(0.001)	(0.001)
couple		0.638***	0.565**	0.572***
		(0.205)	(0.222)	(0.218)
edu_years		0.167***	0.154***	0.153***
		(0.023)	(0.024)	(0.024)
maxgrip			0.043***	0.043***
			(0.004)	(0.004)
longill			-0.177***	-0.177***
			(0.068)	(0.069)
adl			-0.016	-0.016
			(0.043)	(0.043)
iadl			-0.327***	-0.329***
			(0.041)	(0.043)
gali			-0.132**	-0.131**
			(0.061)	(0.062)
_cons	8.638***	0.468	-1.283	-1.660
	(0.363)	(6.062)	(6.467)	(6.062)
N	19944	19944	18531	18531
F	161.092	250.813	213.993	145.033
j	0.226	0.578	2.656	2.642
jp	0.634	0.447	0.103	0.104

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 14: Second stage IV-estimation:
The effect of (early) retirement
And the number of friends & (ex-)colleagues in the social network
interacted with the distance to these friends & colleagues in the social network
on cognition

	(1) cogn	(2) cogn	(3) cogn	(4) cogn
ERdist	-0.219***	-0.183*	-0.208*	-0.216**
	(0.031)	(0.105)	(0.110)	(0.089)
NRdist	-0.141***	-0.136**	-0.161**	-0.150**
	(0.012)	(0.065)	(0.064)	(0.061)
sn_fc_x_di~e	0.146***	0.091**	0.086*	0.083*
	(0.040)	(0.042)	(0.044)	(0.044)
female		0.809***	1.558***	1.554***
		(0.158)	(0.156)	(0.150)
age		0.215*	0.168	0.191
		(0.122)	(0.138)	(0.138)
age_q		-0.001***	-0.001	-0.001
		(0.001)	(0.001)	(0.001)
couple		0.561***	0.524***	0.524***
		(0.165)	(0.185)	(0.177)
edu_years		0.156***	0.139***	0.139***
		(0.027)	(0.030)	(0.029)
maxgrip			0.044***	0.044***
			(0.004)	(0.004)
longill			-0.164**	-0.164**
			(0.065)	(0.066)
adl			-0.014	-0.014
			(0.044)	(0.044)
iadl			-0.332***	-0.332***
			(0.040)	(0.041)
gali			-0.148**	-0.146**
			(0.061)	(0.061)
_cons	8.797***	-1.427	-2.805	-2.706
	(0.307)	(5.907)	(6.449)	(5.831)
N	19944	19944	18531	18531
F	175.000	244.751	204.089	140.116
j	0.088	0.172	1.806	1.897
jp	0.767	0.678	0.179	0.168

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01