Cognitive ability and labour force participation of people aged 50+ in the selected European countries

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Cognitive decline is often seen as one of the main aspects of aging. The ageing of population in many countries enforces structural changes resulting in a longer period of economic activity. Therefore, understanding the causes and factors that can prevent a cognitive decline becomes even more important nowadays. The SHARE data allows to analyze a set of measures on cognitive abilities. On the country level we observe large differences between the average cognitive abilities. Countries with higher employment rates perform better on the cognitive test and in these countries cognitive decline is also slower. Additionally, level of education explains a big part of the variability in the cognitive results, however, even after accounting for differences in the education structure, the differences in cognitive scores between countries still persist. On the individual level the positive relation between active lifestyle and the cognitive ability should be emphasized.

1. Introduction

The level of cognitive ability, i.e. the ability to receive the information from the environment, to process them and use, is an individual characteristic and changes in the life cycle. The deterioration of the cognitive abilities, together with the deterioration of health, is one of the main aspects of ageing.

The deterioration of the cognitive abilities may have a form of mild cognitive disorders or more severe form of dementia, which includes also the Alzheimer disease. The World Health Organization estimates that there are around 35.6 million people around the world who suffer dementia and the overall dementia costs amounts to 604 billion dollars which corresponds to 1% of the aggregated worldwide GDP (WHO 2012). A big increase in the number of people suffering from dementia is forecasted. However, dementia does not need to be an indispensable part of human ageing. Therefore, it is important to understand the causes and factors that can prevent a cognitive decline, both from the medical, psychological, sociological and economic points of view. The ageing of population enforces many structural changes. In many countries the retirement age has been raised which means a longer period of economic activity. Therefore, maintaining good cognitive skills becomes even more important nowadays.

Different analyses point various factors that may hinder cognitive ageing. Medical research stresses that diabetes, hypertension, obesity, smoking, cardiovascular risk, i.e. typical health risk factors, should be avoided. Further, survey data analysis point that there is a positive correlation between the cognitive abilities and physical activity (Aichberger et al. 2010), economic activity (Adam et al. 2006, Mazzona and Peracchi 2012), social activity (Christelis and Dobrescu 2012), affluence (McArdle et al. 2010) and grandparenting (Arpino and Bordone 2012). The education is shown to play a significant role in shaping the cognitive abilities in all these analyses.

The purpose of this paper is the analysis of cognitive skills in selected European countries applying the measures available in SHARE. On country level we aim at verifying if differences in socio-demographic structure could explain the variation between countries. On the individual level we analyze the relation between cognitive ability and different type of activities. A special attention is devoted to the relation between the economic activity, active lifestyle and the cognitive abilities.

2. Data

We use the data from wave 4 (2011-2012) of the Survey of Health, Aging and Retirement in Europe (SHARE). 16 countries participated in wave 4: Austria, Belgium, Czech Republic, Denmark, Estonia, France, Germany, Hungary, Italy, the Netherlands, Poland, Portugal, Slovenia, Spain, Sweden and Switzerland. We limited our analysis to 6 countries representing different regions of Europe, from Mediterranean (Spain) and Western Europe (France, Germany), through Central Europe (Czech Republic, Poland) to Scandinavia (Sweden).

The measures of cognitive ability in SHARE are simple tests based on the *Telephone Interview of Cognitive Status-Modified* (TICS-M) which shows a significant consistency with the medical diagnosis on the cognitive distortions (de Jager et al. 2003). There are six types of items measuring cognitive abilities in SHARE:

- general orientation (naming the day of the month, day of the week and the year)
- immediate recall (recalling as many words as possible out of ten words immediately after they are read by the interviewer)
- delayed recall (recalling as many words as possible out of ten words around five minutes after they are read by the interviewer and preceded directly by few SHARE background questionnaire items)
- verbal fluency (naming as many animals as possible in one minute)
- numeracy (applying numerical skills to daily life problems, e.g. calculating the prices after sales)
- serial subtraction (subtracting sequentially 7 starting with "100-7" operation).

General orientation and numeracy items are administered to each respondent only once when they participate in the survey for the first time. Therefore in this paper we concentrate on four other measures available for all respondents in wave 4.

3. Results

The cross-country differences in the cognitive tests results are significant in all cognitive domains. The best results are observed in Scandinavian countries (Denmark, Sweden) but also in Czech Republic, Germany and Switzerland. Poland together with Southern European countries (Spain, Italy and Portugal) are characterized by the lowest average scores. Table 1 shows detailed results for the 6 selected countries.

Table 1. Average cognitive test scores for selected countries.

	Immediate recall		**Delayed recall**		**Verbal fluency**		**Serial subtraction**	
	Avg.	S.D.	Avg.	S.D.	Avg.	S.D.	% of correct answers	S.D.
Czech Rep.	5.6	1.8	3.9	2.1	23.3	8.3	67.9	0.5
France	5.2	1.9	3.9	2.2	18.8	6.8	50.9	0.5
Germany	5.5	1.7	4.2	2.1	21.1	7.2	69.0	0.5
Poland	**4.6**	**1.9**	**3.0**	**2.1**	**16.9**	**7.2**	**50.4**	**0.5**
Spain	4.3	1.9	2.7	2.0	14.8	6.3	29.4	0.5
Sweden	5.4	1.7	4.4	2.1	22.9	7.3	65.4	0.5
SHARE 16	**5.1**	**1.9**	**3.7**	**2.2**	**18.3**	**7.5**	**54.5**	**0.5**

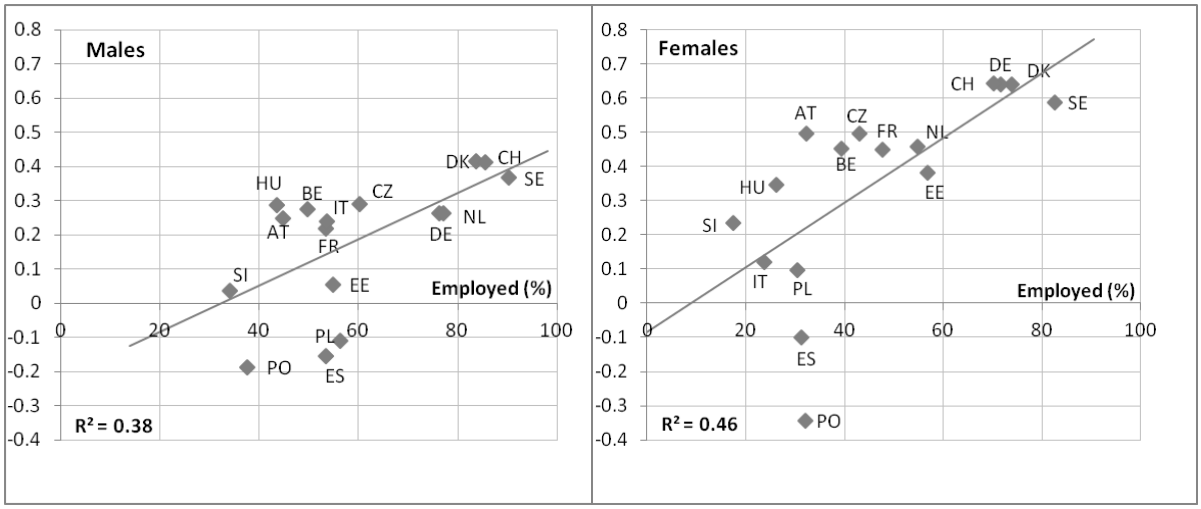
Note: The results of the immediate and delayed recall tests are measured on the scale 0-10. The results of the verbal fluency test were not bounded from above. Source: SHARE wave 4 data.

The cross-country differences not only concern the averages but also the cognitive age profiles, i.e. the differences in the cognitive abilities between age groups. Naturally, greater cognitive decline is generally observed for older age groups. However, there are large differences between countries in the shape of age profiles: the cognitive abilities (immediate recall) of people aged 55 - 65 years are stable in Czech Republic, while in Spain a significant decline in this group is observed. Moreover, the differences across countries observed for younger cohorts tend to increase for older cohorts.

Analyzing other socio-demographic factors we observe that sex does not differentiate the cognitive results to a big extent, but the level of education explains a big part of the variability in the cognitive results. Potentially, unfavourable age and education structure could account for the worse results in some countries. For instance, Poland is still characterized by the younger population than most of the analyzed countries in terms of percentages of older age groups both in the total population and in the population covered by SHARE (people aged 50 years and more). On the other hand, the share of people with higher levels of education in the population covered is smaller in Poland than in most of the Western European countries. However, when these differences are eliminated by imposing the Polish age and education structure on the six countries analyzed, the differences in cognitive scores between countries still persist. These simulations show that there have to be other factors explaining the variability of cognitive scores between countries.

The insight into the relation between the economic activity and cognitive skills shows a strong correlation between these two concepts. This is illustrated by the plot below for the age group 55-64 years, i.e. the range of age covering in most cases the retirement age or age when people acquire right for early retirement. This relation is very strong for both males and females. The increase in the employment rate is associated with greater increase in cognitive abilities for females.

Figure 1. The employment rate and the immediate recall test results for people aged 55-64 years.



Source: SHARE wave 4 data.

The cognitive ageing has serious consequences not only for societies but also for individuals. It is worthwhile to identify the determinants of cognitive ability.

The analyses conducted aimed also at disentangling the effects of retirement and ageing on cognitive abilities. The regression results show that the length of the retirement is still a significant predictor of measured abilities, even when we control for age.

Finally, the correlation between the active life and cognitive ageing was analyzed. Social, intellectual and physical activities were included in the regression model together with a set of control variables (age, sex, education, self-assessed health status, symptoms of depression, living with a spouse). The effects of the analyzed variables on cognitive results (immediate recall, verbal fluency) are expressed in the years of cognitive decline, which are equivalent to the pure effect of ageing estimated in the model. Selected results for Poland and Germany are presented in the table 2 below. They show big positive effects of the active lifestyle on the cognitive results.

Table 2. The impact of selected characteristics on the cognitive tests results expressed in the years of cognitive decline, calculations for a 60-years old individual with 10 years of education.

	Poland		Germany	
	Immediate recall	Verbal fluency	Immediate recall	Verbal fluency
Education (in years)	8	3	5	3
Economic activity	-	-	11	10
Social activity	12	-	11	8
Intellectual activity	-	13	16	17
Intensive physical activity	-	-	12	-
Moderate physical activity	-	-	12	12
Depression	-14	-10	-15	-8
Living with a spouse/partner	9	-	-	-

Note: Based on OLS regressions estimation including controls for sex, age (quadratic) and self-assessed heath. "Years of cognitive decline" calculated for coefficient estimates significant at the 10% level. Source: SHARE wave 4 data.

4. Conclusions

According to our results, in countries with lower cognitive scores the cognitive decline observed in cross-section data is also faster. Looking at country level determinants of cognitive ability, differences in age and education structures do not explain large country differences in cognitive tests scores. There is, however, a strong correlation between the employment rate and average test score. On the individual level the importance of active lifestyle for delaying the cognitive decline should be emphasized. The analyses also make the point that often populations that are older (in terms of the median age or the share of older age groups) are cognitively younger. While the process of population ageing is difficult to revert, the process of cognitive ageing may be easier to handle. Since SHARE is a panel survey the next step should be a comparison of the achievements in the cognitive tests of the same respondents in consecutive waves. However, the initial analysis indicates that there may be a practice effect when many respondents, despite ageing, improve their results in the later assessment (after around 5 years) when exposed to the same type of test (similar results are discussed by e.g. Salthouse 2010). This raises some methodological concerns on how to measure the change in cognitive abilities in panel studies.

References

Adam, S., Bay, Ch., Bonsang, E., Germain, S. i Perelman, S. (2006). Occupational activities and cognitive reserve: a frontier approach applied to the Survey on Health, Ageing and Retirement in Europe (SHARE), CREPP Working Paper 2006/05.

Aichberger, M., Busch, M., Reischies, F., Stroehle, A., Heinz, A. i Rapp, M. (2010). Effect of physical inactivity on cognitive performance after 2.5 years of follow-up, GeroPsych, Vol. 23, no 1.

Arpino, B. i Bordone, V. (2012). Does Grandparenting Pay Off? The effect of childcare on grandparents' cognitive functioning, European Demographic Research Papers 4, Vienna Institute of Demography.

Christelis, D. i Dobrescu, L.I., (2012). The Impact of Social Activities on Cognitive Ageing: Evidence from Eleven European Countries. ARC Centre of Excellence in Population Ageing Research Working Paper 2012/07.

Jager, C., Budge, M. i Clarke, R. (2003). Utility of TICS-M for the assessment of cognitive function in older adults, International Journal of Geriatric Psychiatry, No. 18.

Mazzonna, F. i Peracchi, F. (2012). Ageing, cognitive abilities and retirement, *European Economic Review*, no. 56.

McArdle, J., Smith, J. i Willis, R. (2009). Cognition and economic outcomes in the health and retirement survey, IZA Discussion Paper No. 4269.

Salthouse, T. (2010). Selective review of cognitive aging, *Journal of International Neuropsychological Society*, No. 16.

WHO, (2012). *Dementia: a public health priority*. World Health Organization and Alzheimer's Disease International. http://www.who.int/mental_health/publications/dementia_report_2012/en/index.html.

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