



UNIVERSITY OF
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Lasting Effects of Quality of Schooling: New Evidence from Combining PISA and PIAAC

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Questions

- Are there long-term effects of quality of education on knowledge and skills?
- Can cross-sectional comparisons of age cohorts be used to study long-term effects of education?



Long-term effects of quality and quantity of education

- A study of six European countries found that longer compulsory schooling causally improved cognitive performance up to four decades later (Schneeweis, Skirbekk and Winter-Ebmer, 2014).
- A Swedish study of class size in primary school found effects on completed education, wages, and earnings at adult age (Freriksson, Öckert & Osterbeek, 2013).
- If there are long-lasting changes in quality of schooling over time, these can be expected to be reflected in age cohort differences in levels of skills in the adult population.

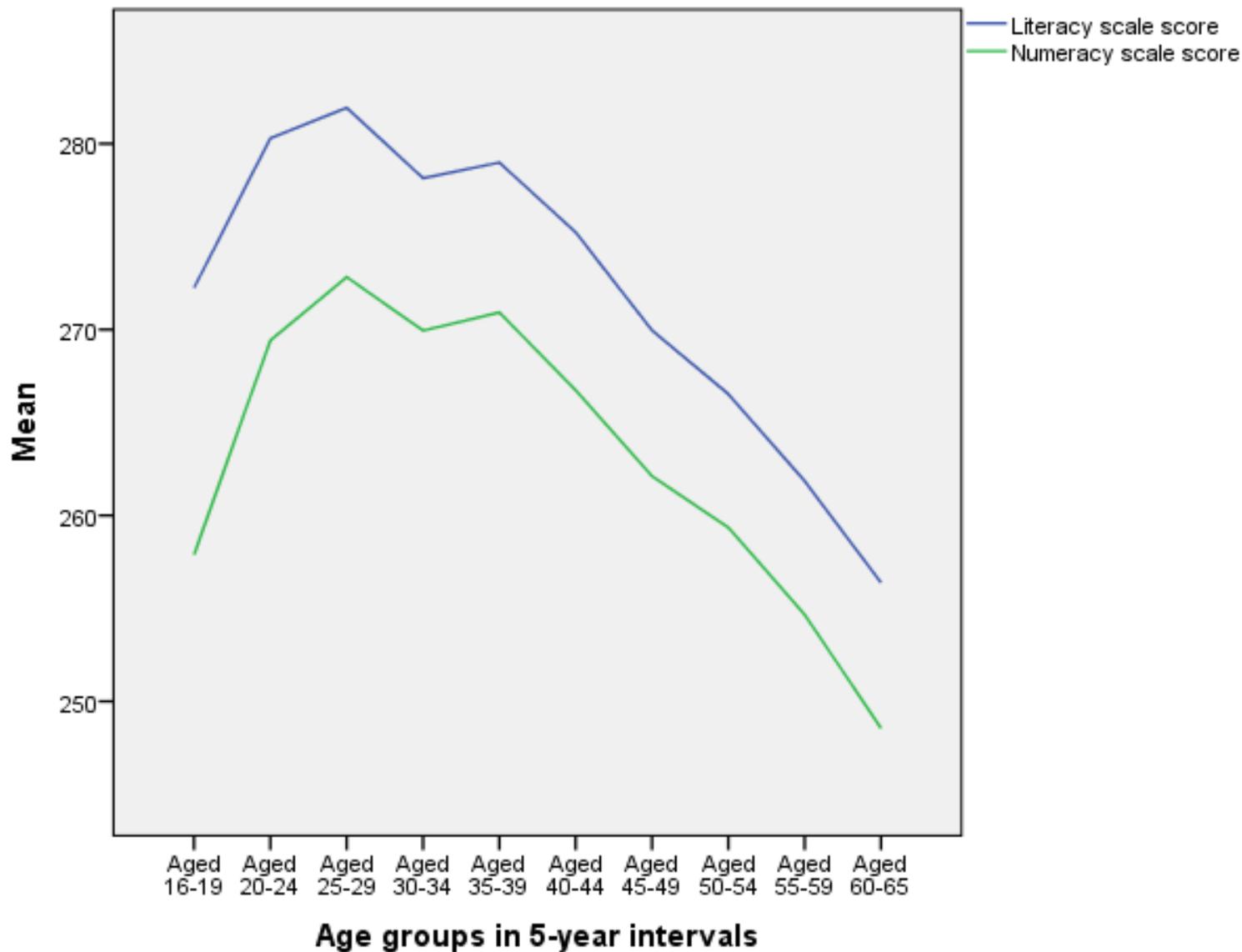


Program for the International Assessment of Adult Competencies (PIAAC)

- OECD Survey on adult skills (PISA for adults)
- 24 countries with data collected 2011/2012
- Representative samples of age groups 16 to 65 years
- Minimum sample of 5000 per country (i.e., 100 persons for each age group)
- Individual interviews, with computer administration of tests and questionnaires
- Tests of literacy, numeracy and problem-solving



Literacy and numeracy performance as a function of age





Age and cohort effects

Observed age-group differences may be due to age effects (growth, maturation, decay) and/or to cohort effects (i.e., circumstances and events that are unique to an age cohort)

- Age:
 - Performance on problem-solving tasks with new content increases up to about 25 years of age, and then it starts to decline
 - Performance on tasks involving acquired knowledge and skills increases throughout life, except for old age
- Cohort:
 - Mass media
 - Demographic factors, including migration
 - Nutrition and health care
 - Quantity and quality of education



Age and cohorts effects for PIAAC

(Levels, M & van der Velden, R. (2013). Use-it-or-lose-it? Explaining age-related differences in key information processing skills. Keynote presentation)

- For younger age groups (16 – 40) all differences were accounted for by education and experience
- For older age groups (41 – 65) there was a small remaining age-effect after control for education and experience (a loss of 0.5 points per year)
- Thus, much of what we perceive to be age effects is in reality cohort effects.
- However, each cohort is influenced by many factors, and we want to see if one of them is quality of education.



Are changes in PISA results reflected in cohort differences?

- Of the countries participating in PIAAC, 20 also participated in PISA 2000 – 2012
- The 15-year old students participating in PISA 2000 were 27 years old when PIAAC was conducted; the students participating in PISA 2003 were 24 years old when PIAAC was conducted, and so on
- For some countries PISA results have improved since 2000; for other countries results have declined; and for others still results have been stable or irregular
- Such changes might be possible to track as performance differences between PIAAC age cohorts



Estimating trends in PISA results

- Countries: Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Great Britain/North Ireland, Ireland, Italy, Japan, Korea, the Netherlands, Norway, Poland, Russia, Spain, Sweden and the United States
- Five rounds of PISA with altogether 786 292 students. Of these, 8.3 percent were excluded because they were not born in the country of test, leaving 721 215 students
- OLS regression analyses were used to estimate trends in country level achievement between 2000 and 2012 from the five mean estimates for each country.



Estimating PIAAC age group differences

- For PIAAC the focus was on the two age cohorts 16 – 19 years and 25 – 29 years.
- The sample included 24 541 persons in these two age cohorts, of which 11.1 percent were excluded, leaving an N of 21 813.
- Means of the literacy and numeracy scores for the age groups 16 – 19 years and 25 – 29 years were estimated for each of the 20 countries. Differences were then computed by subtracting the mean for the older age group from the mean for the younger age group.

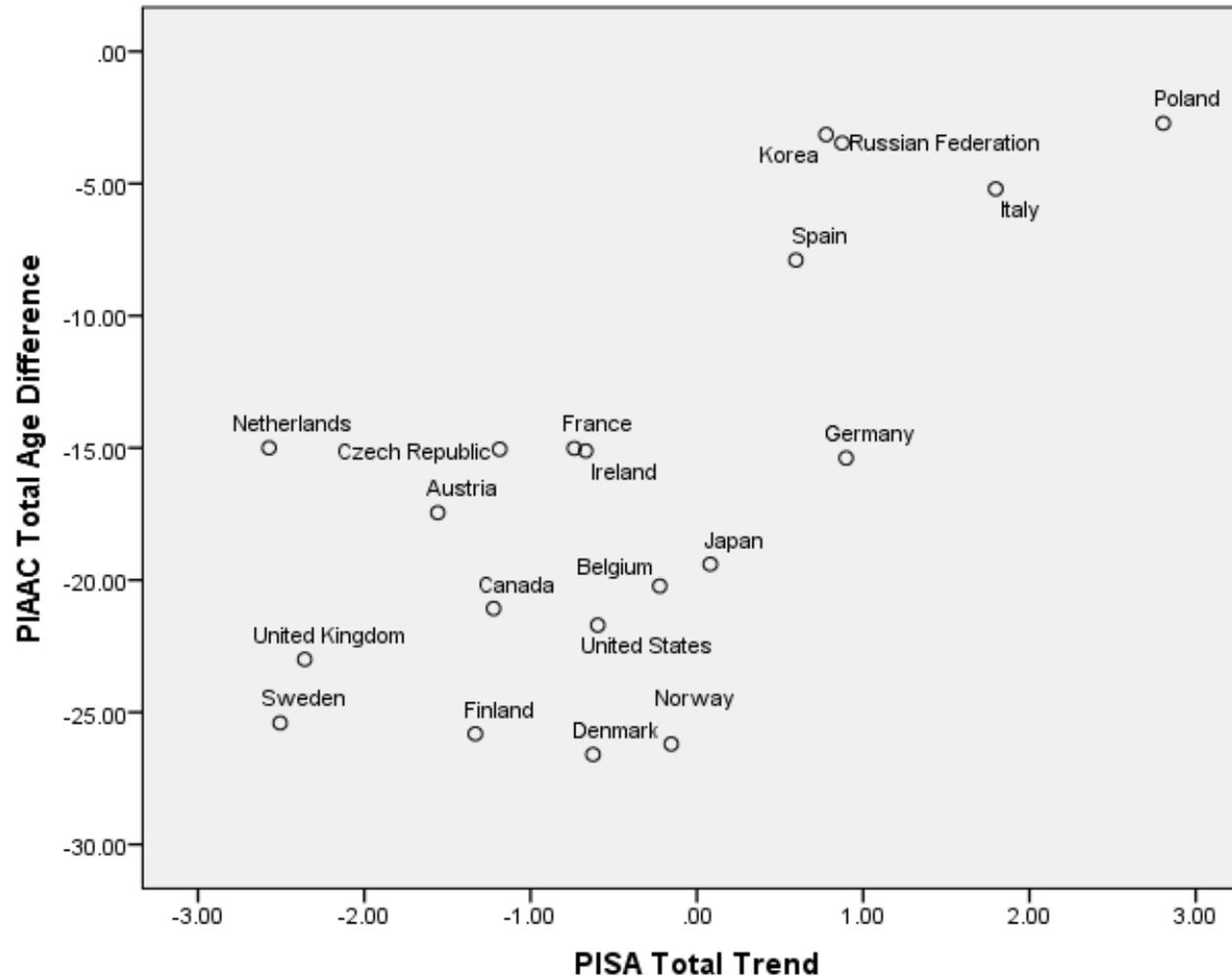


Control variables

- **Educational Qualifications (EdQualif):** Self-reported information from PIAAC participants about highest educational qualification in terms of ISCED levels. A difference score between the two age groups was computed.
- **Human Development Index (HDI):** A composite measuring three dimensions: (1) life expectancy at birth; (2) schooling, measured both as mean years of schooling received by persons aged 25 and older and expected years of schooling for a child at school entrance; and (3) gross national income per capita. A difference was computed between the HDI values for 2012 and 2000, which value was multiplied by 100.



PISA – PIAAC Total



Scatter plot of country values for the PISA Total Trend and the PIAAC Total Age Difference. The correlation between the two variables is .70.

Multiple regression analyses of PIAAC age group differences using PISA trend coefficients, HDI and EdQualif as independent variables.

	B	β	t-value	p-value	R^2_{adjusted}
<i>Dependent: PIAAC Total</i>					0.59
PISA Total	2.74	0.48	2.88	0.010	
HDI	2.31	0.44	2.66	0.017	
<i>Dependent: PIAAC Total</i>					0.47
PISA Total	3.24	0.55	2.81	0.013	
EdQualif	2.94	0.28	1.43	0.172	

Note. B is the unstandardized partial regression coefficient and β the standardized value. R^2_{adjusted} corrects for capitalization on chance due to small N.



Conclusions

- The PISA achievement trends at age 15 are reflected in differences in the level of performance between adjacent age-groups in PIAAC
- The level of achievement at the end of compulsory school thus is lasting up to at least age 27
- The results also show that the differences between age cohorts are affected by general societal development
- It is essential that the compulsory school offers high-quality learning opportunities, because effects are lasting



References

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