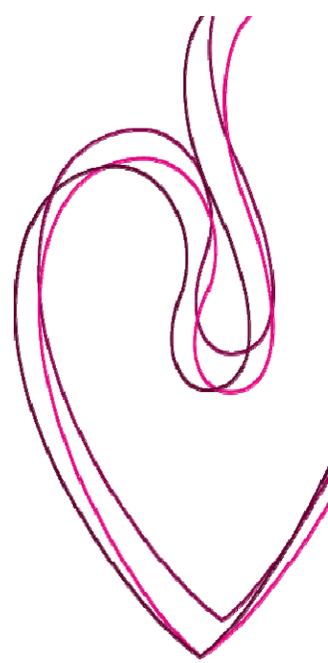


Interventions Aimed at Children and Youth in a Scandinavian Welfare State - and Their Impacts

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- We present a framework for *interpreting, assessing, and comparing* short run impacts of interventions aimed at children and youth



Background / motivation

- Scandinavian welfare states do not deliver in terms of equal opportunities – but income equality is high – how and why is that?
- Landersø & Heckman (2016)
 - Intergenerational mobility in education is similar in US & DK
 - Process of skill formation is quite similar in U.S. and DK
 - Income equality is due to taxes and income transfers
- Implication: The welfare state does not improve (very much) on outcomes for disadvantaged children



Background / motivation

Welfare state does not improve (very much) on outcomes for disadvantaged children. WHY?

- Heckman & Landersø:
 - Lacking incentives to undertake education
 - Information problem, time preference, non-cognitive skills in adolescence
 - Neighborhood sorting – social norms?
- Institutional/organizational features of youth education systems – they nearly all try, but dropout rates are large
- We don't –yet - know what works



The context: The Scandinavian welfare state

Aims

1. Equality of opportunity *and* income

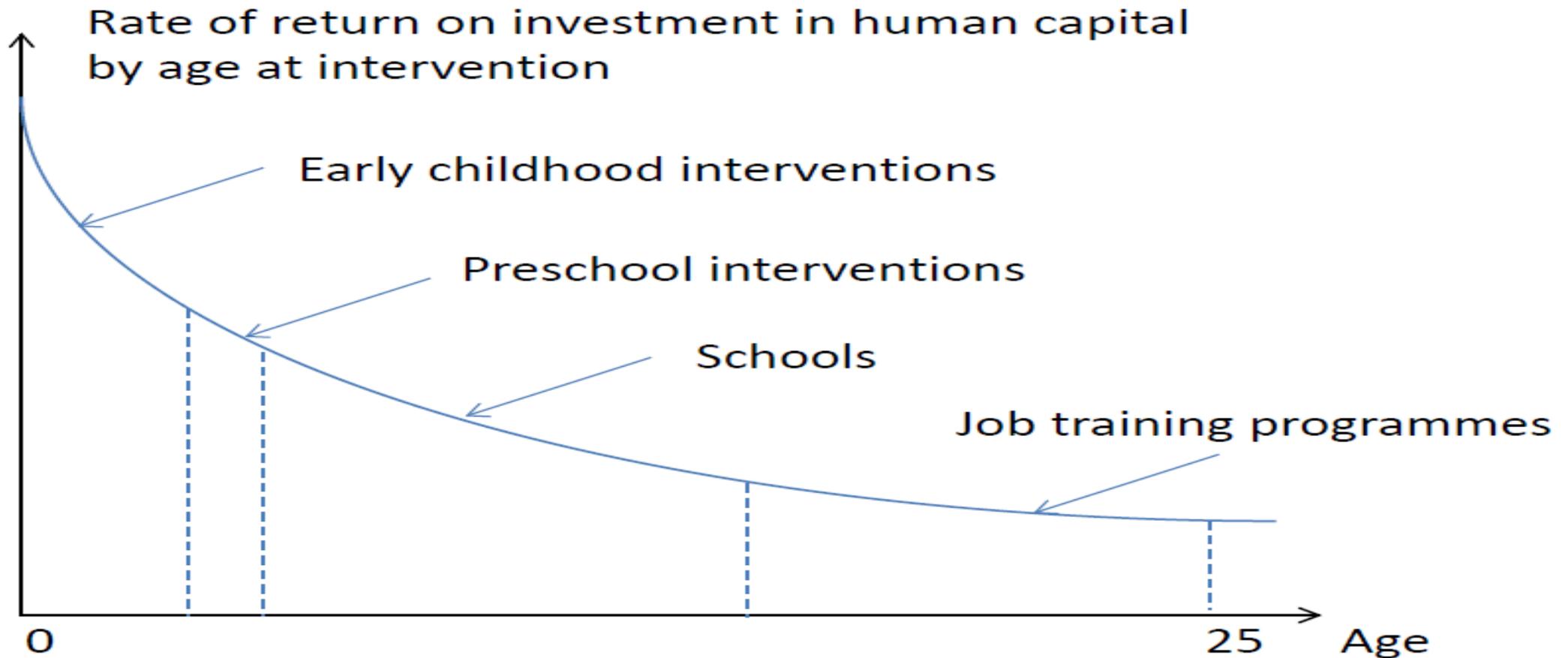
Means:

1. Investments in : nurseries, kindergartens, free public schools, free education and generous study grants, free public health care for all, targeted interventions for disadvantaged families etc.
2. Progressive taxation & income transfers

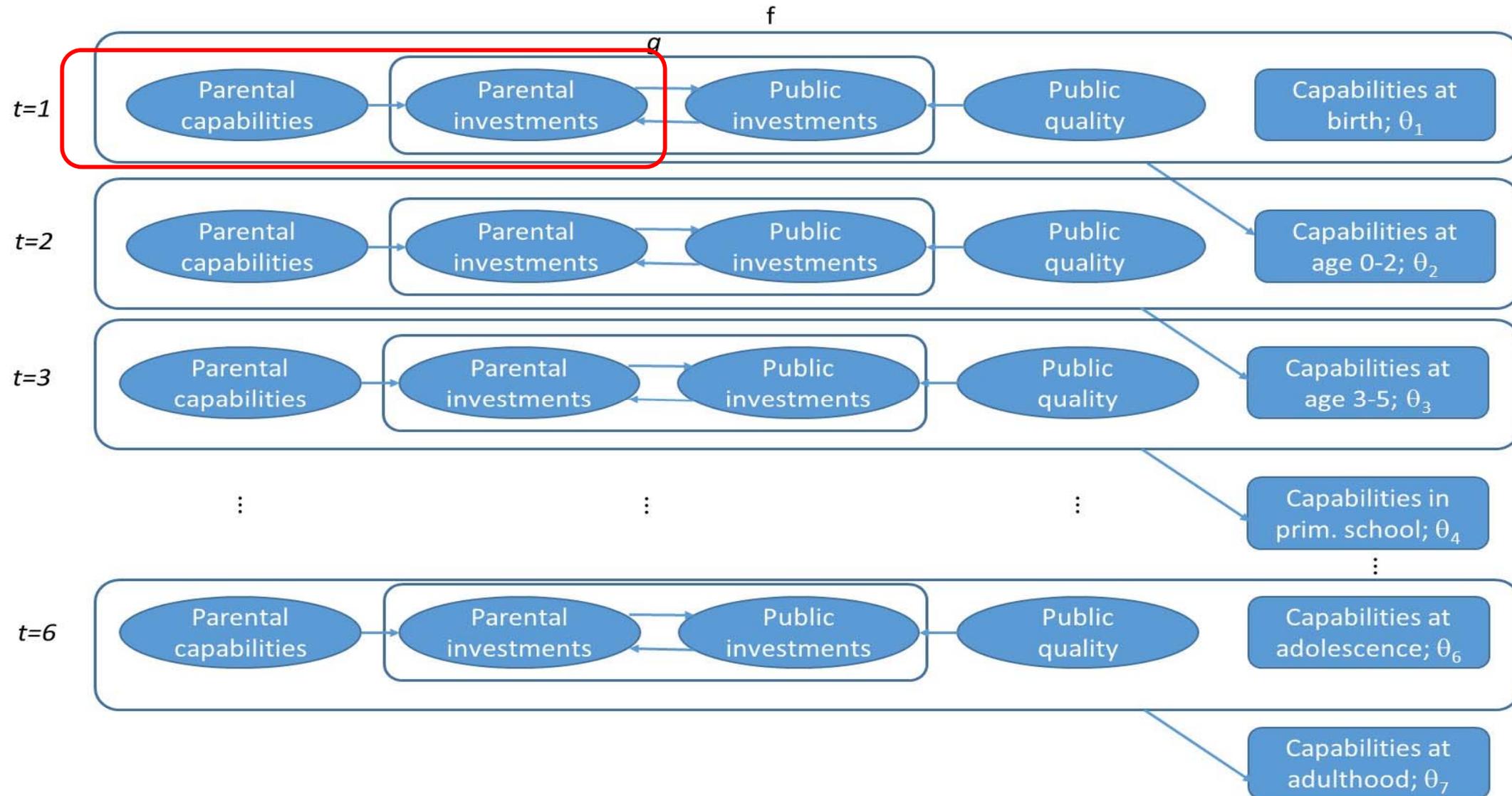
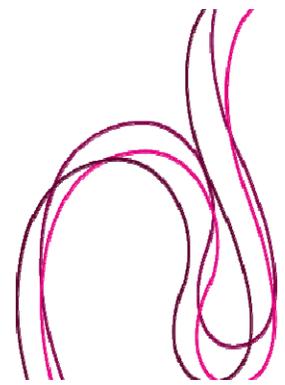


Theory/literature

Heckman curve, types of skills, types of complementarities, critical periods etc.



A model of skill formation in the Scandinavian welfare state



A model of skill formation in the Scandinavian welfare state

$$\theta_{k,t+1} = f_{k,t}(\theta_t, g(I_{k,t}^p, I_{k,t}^g), \theta_p, \theta_{gt})$$

- $\theta_{k,t+1}$: level of skill k at age $t+1$
- θ_t : vector of skills at age t
- $g(I_{k,t}^p, I_{k,t}^g)$: parental and govt investment in child at age t
- θ_p : parental skills
- θ_{gt} : quality of govt interventions at time t



A model of skill formation in the Scandinavian welfare state

The short run impact of a public intervention:

$$\delta_{1kt} = \frac{\partial \theta_{k,t+1}}{\partial I_{k,t}^g}$$

or

$$\delta_{2kt} = \frac{\partial \theta_{k,t+1}}{\partial \theta_{gt}}$$

(longer term impacts would be derivatives of δ_{k7} wrt the relevant investment/quality aspect)



A model of skill formation in the Scandinavian welfare state

public and private investments would be complementary if

$$\frac{\partial^2 \theta_{k,t+1}}{\partial I_{k,t}^p \partial I_{k,t}^g} > 0$$

and substitutes otherwise

Our long-term aim: to estimate the parameters of the skill formation model (reduced form as well as structurally)



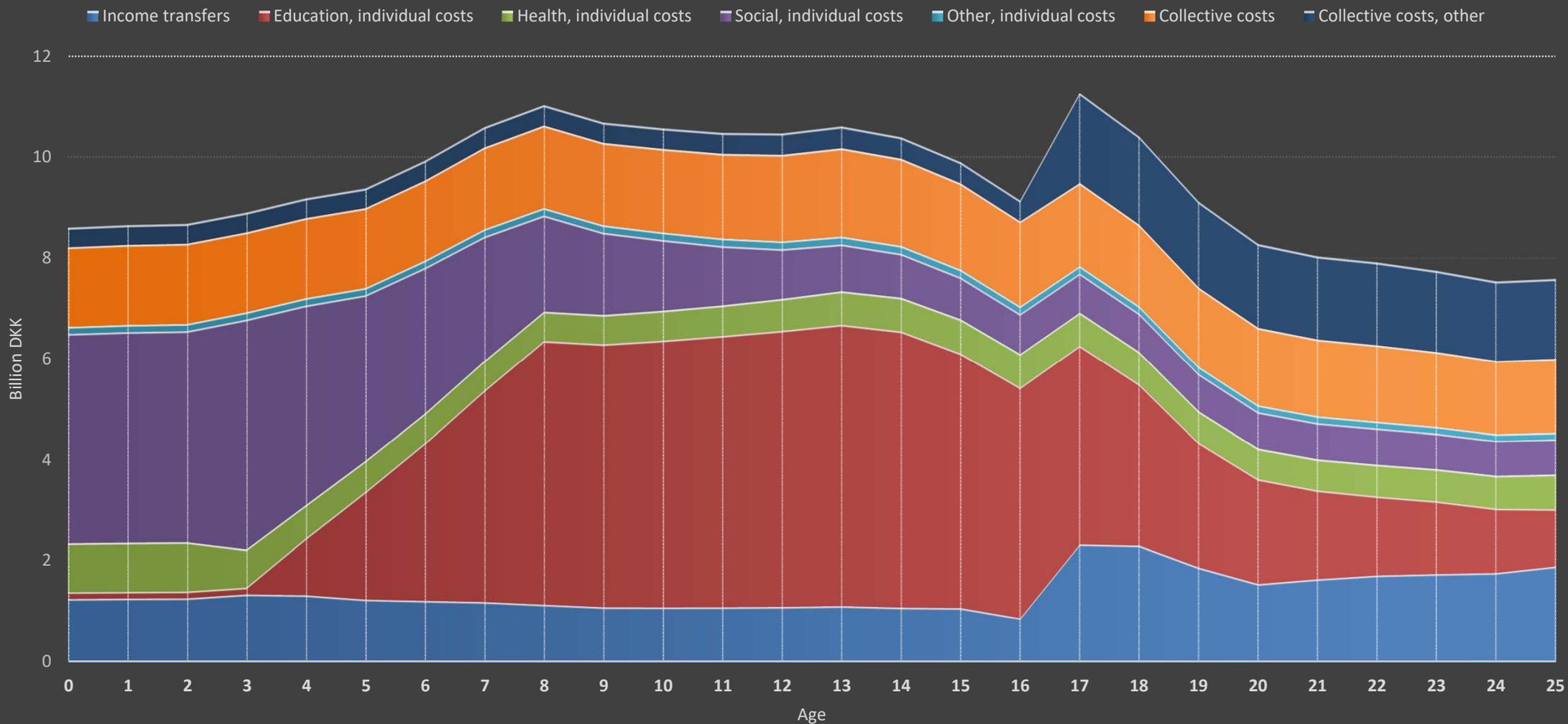
The context: Homogeneity

- We offer *comparable short run results* from intervention studies, exploiting several dimensions of homogeneity:
 - Cultural (DK, Scandinavian welfare state)
 - Methodological (RCTs and other solid methods for causal inference)
 - Data (admin registers + survey data) – outcomes and controls
 - Costs (are collected for all interventions)



The context: Scandinavian welfare state

Public expenditures by type and age



The context: TrygFonden's Centre for Child Research



The context: TrygFonden's Centre for Child Research

Interdisciplinary research centre at AU

- **Grant** from TrygFonden (DKK 60mill). Additional funding of similar size. 6 year period, extendable to 10 years.
- Provides **scientific evidence** on what works
- Psychologists, political scientists, economists, sociologists, criminologists, education researchers, anthropologists, **65 researchers affiliated**
- **35+ randomised controlled trials (RCTs)** of interventions aimed at children and youth
 - plus other projects and effect studies



Descriptives

Our population sample – all children resident in DK since 1960

- Differences appear early in both cognitive and non-cognitive skills, related to parental background
- And gaps increase during childhood



Descriptives

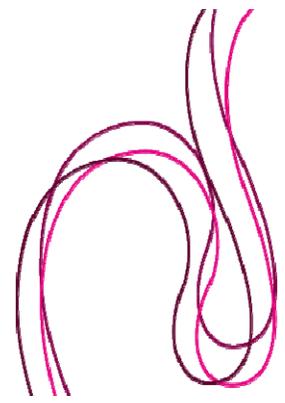
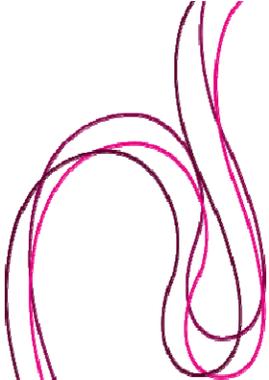


Table **. Spearman's rank correlation coefficients, children aged 3-5 years

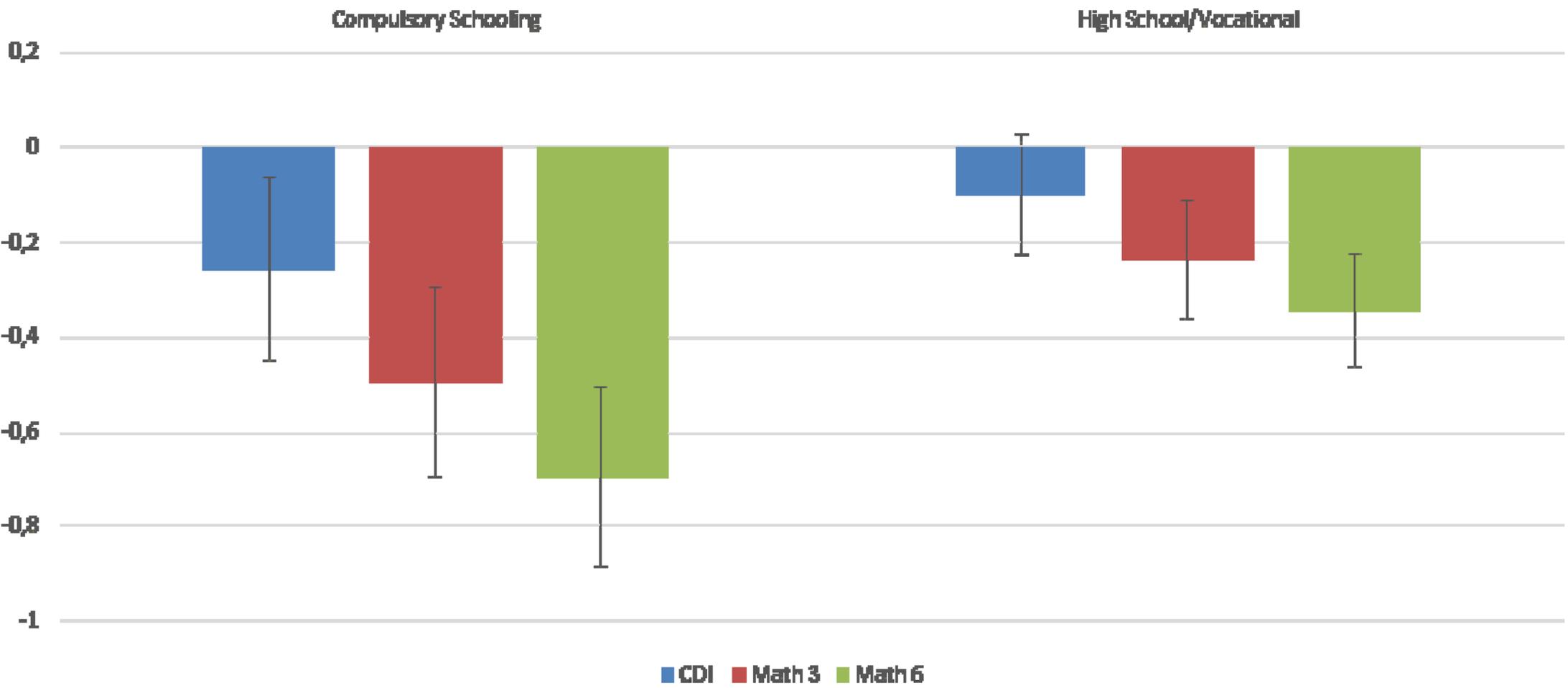
	Empa- thy	Self regula- tion & Co- operation	Geo- metry	Nume- racy	Voca- bulary	Receptive language ability	Rhyme	Atten- tion to text
Empathy	1.00							
Self regulation & Cooperation	0.76	1.00						
Geometry	0.16	0.18	1.00					
Numeracy	0.24	0.26	0.43	1.00				
Vocabulary	0.27	0.26	0.33	0.43	1.00			
Receptive language ability	0.24	0.21	0.34	0.39	0.58	1.00		
Rhyme	0.18	0.20	0.23	0.38	0.41	0.37	1.00	
Attention to text	0.21	0.24	0.30	0.42	0.49	0.44	0.36	1.00

Note: Skill measures are standardized to z-scores by age measured in months. All coefficients are significant at level 0.001 after Bonferroni adjustment for multiple significance testing. The pairwise correlation coefficients are calculated using all available data.

Descriptives



Average CDI and Math Scores by Mother's Education



The distribution of skills and backgrounds

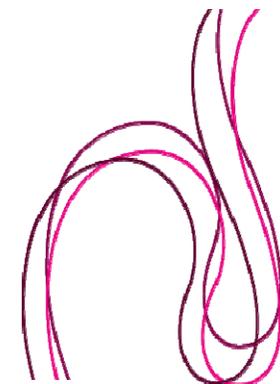
Gaps appear very early

They do not decline, neither in nurseries, in kindergartens or in schools (Beuchert & Nandrup, 2014; Dimova & Rosholm, forthcoming).

If anything, they tend to increase, especially in mathematics and especially for boys.



Completed interventions with results (centre opened in april 2013)



<u>INTERVENTION</u> <u>METHOD</u>	<u>INSTITUTION</u>	
• Nursery intervention (lang. and early math)	Nurseries	RCT
• LEAP (language in daily activities)	Kindergarten	RCT
• SPELL (manualized language in small groups)	Kindergarten	RCT
• 'Suitcase' (language for bilingual children)	Kindergarten+home	RCT
• Chess & mathematics	Schools, grade 1-3	D-i-D
• READ (reading intervention)	Schools, grade 1-2	RCT
• Two-teacher (lang. + math)	Schools, grade 6	RCT
• 'Mothertongue' teaching (extra lectures)	Schools, grade 4	RCT
• Bridging (on-site educ. prep.)	Youth on welfare	PSM
• Mentor (educ.)	Youth on welfare	RCT



Effect comparisons

Impacts measured on cognitive outcomes or educational outcomes

- Language tests in nurseries/kindergartens
- Compulsory language tests in school
- Educational attainment for youth

These effects are not immediately comparable. How do we then compare impacts?



Effect comparisons

Standardize effect sizes (standard deviation units):

$$d = \delta / s$$

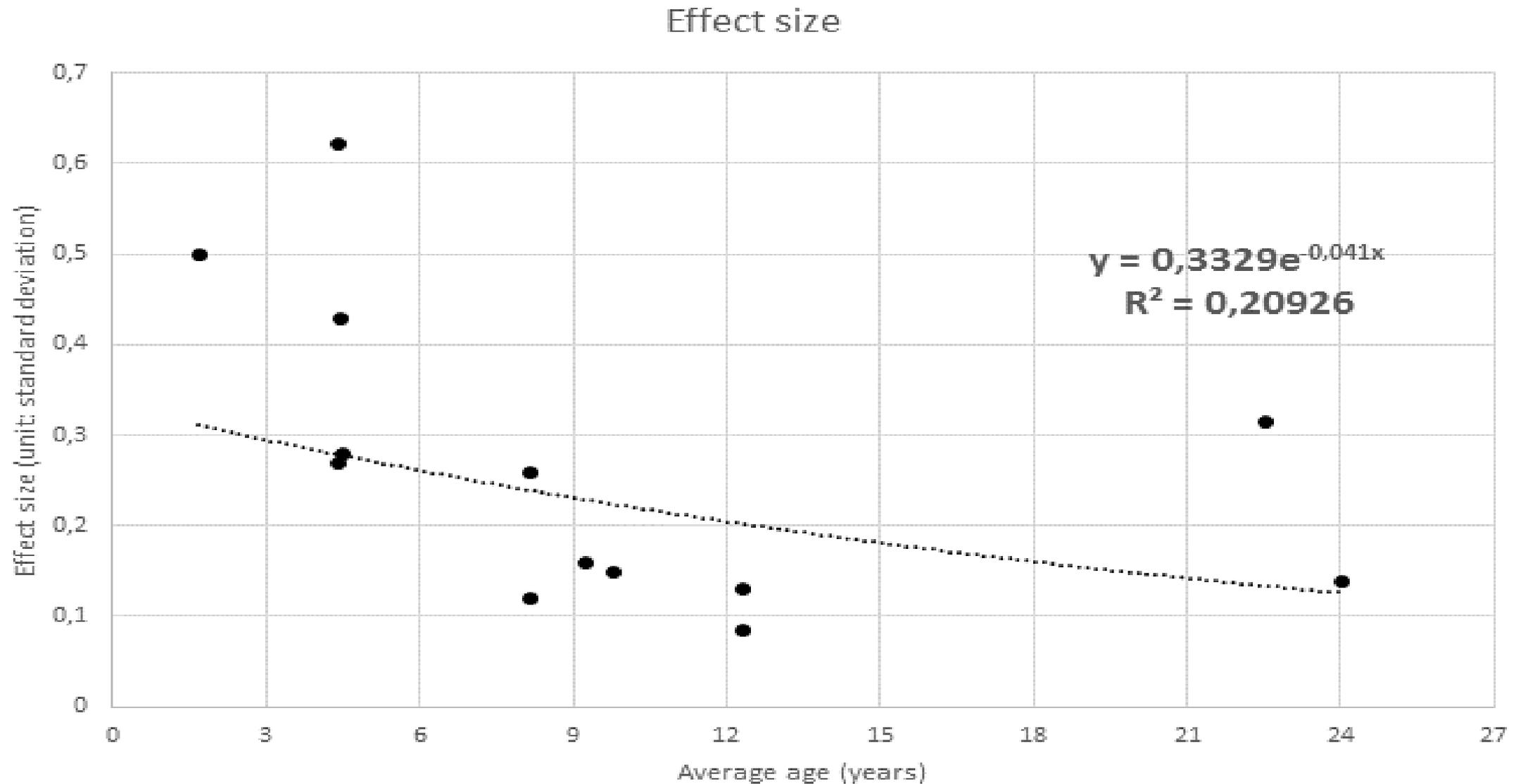
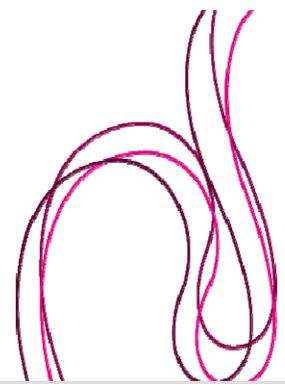
where s is standard deviation in e.g. control group outcome.

d is informative on how much an intervention moves someone in the distribution of outcomes:

For example, if $d=0.4$, someone initially at the median would move to 66th percentile



Results, effect sizes by age



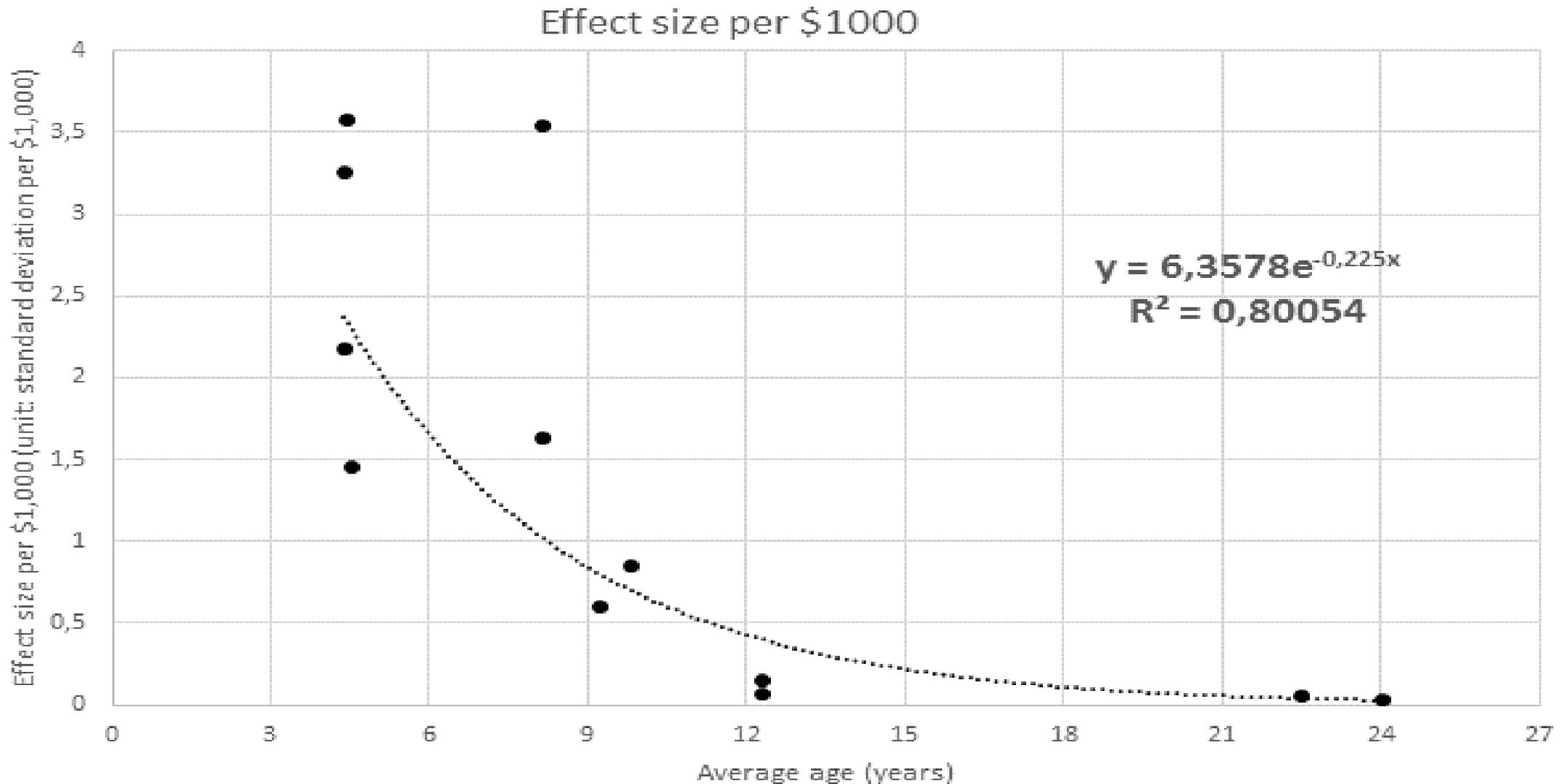
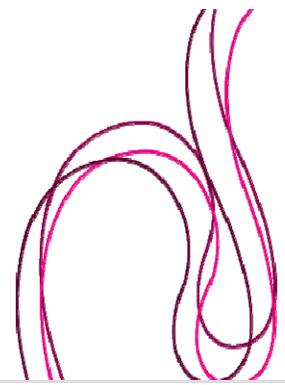
Making results more comparable

STEP 1: Normalize with costs per participant

- Calculate effect size per \$1000 invested (per person)



Preliminary results, effect sizes per \$1000 invested, by age



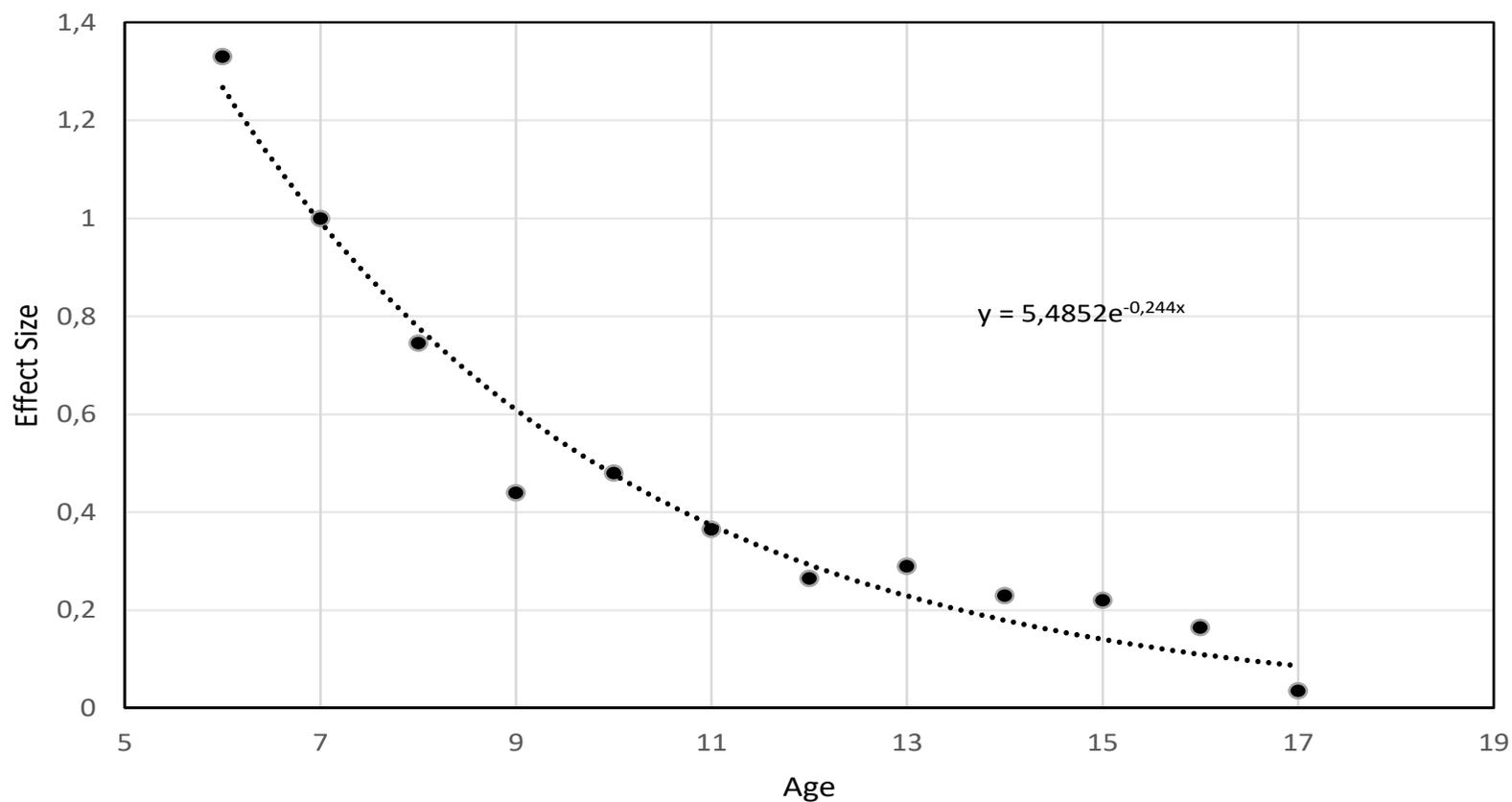
Making results more comparable

STEP 1: Normalize with costs per participant

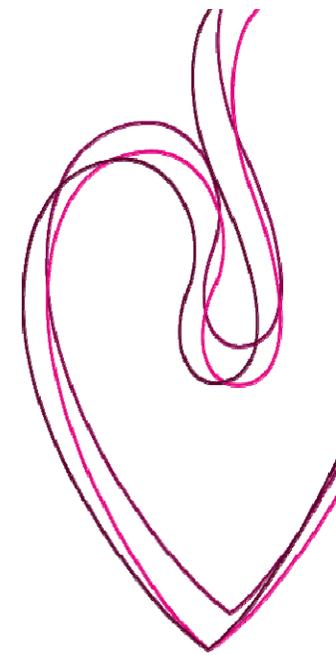
STEP 2: Normalize by age specific learning speed (should we be impressed?)



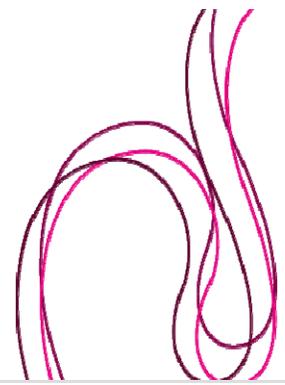
Typical annual learning growth



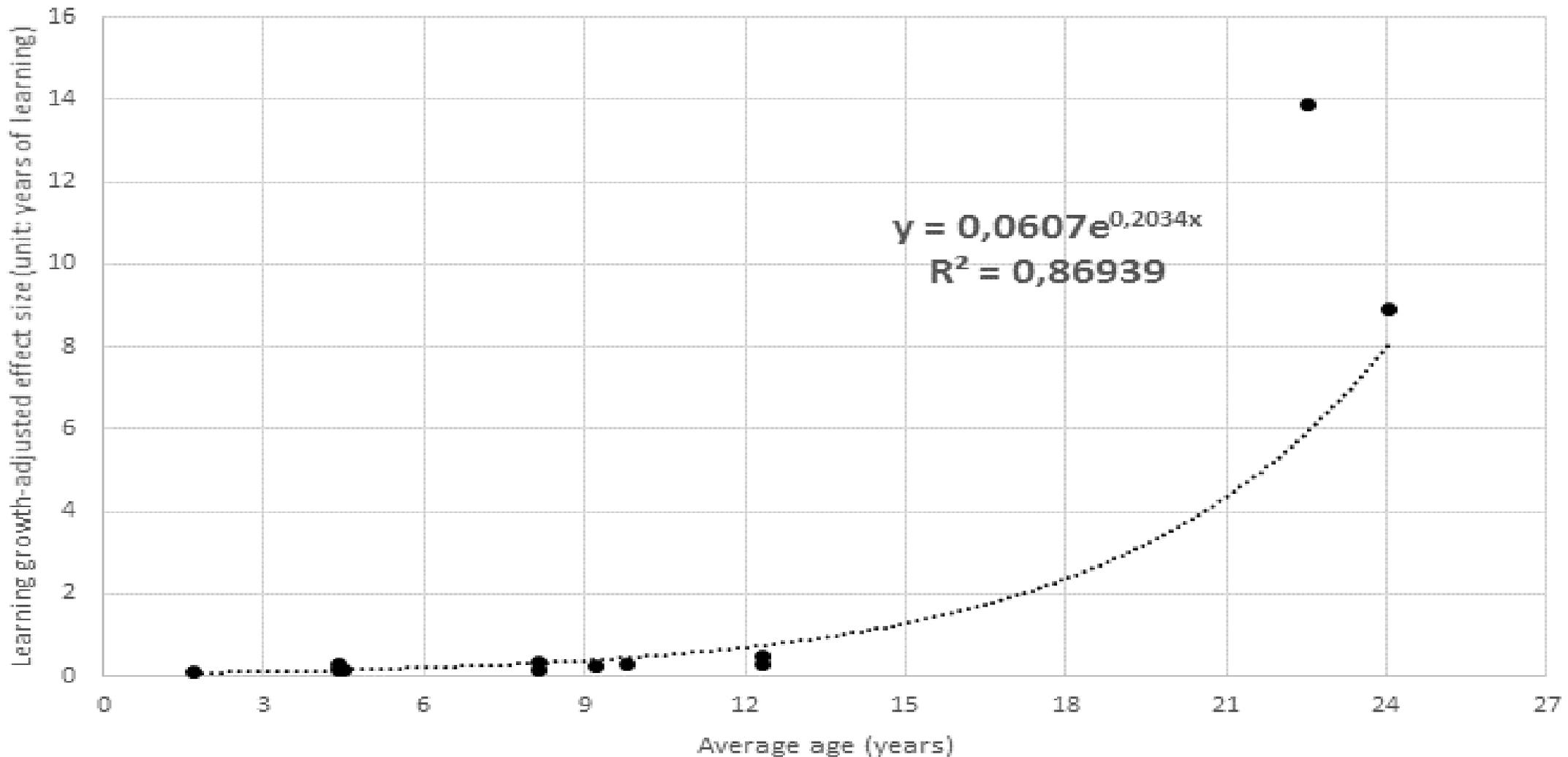
Source: Hill *et al.* 2008



Preliminary results, effect sizes measured in years of learning



Effect size measured in years of learning



Making results more comparable

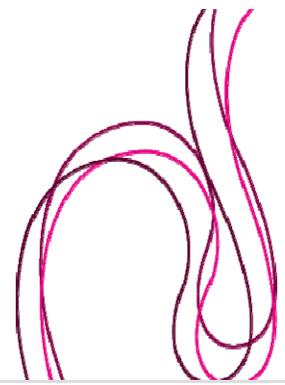
STEP 1: Normalize with costs per participant

STEP 2: Normalize by age specific learning speed (should we be impressed?)

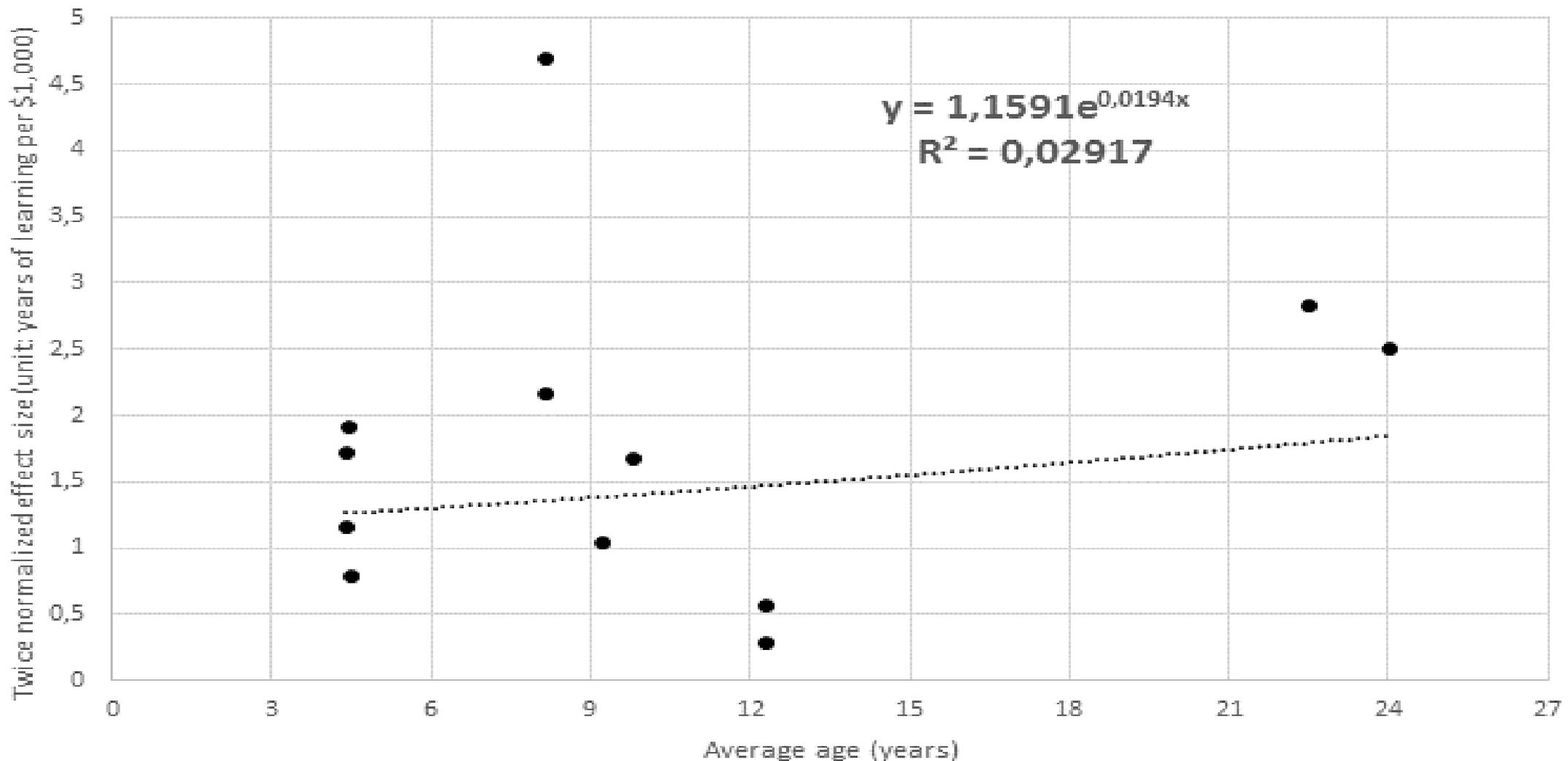
STEP 3: STEPS 1+2



Preliminary results, effect sizes measured in years of learning, per \$1000 invested



Effect size in years of learning per \$1,000 invested



Discussion

Most appropriate measure?

- Effect size / \$1000 (?)



What did we learn so far in terms of structural model parameters?

- Primary school investments (I_3^g): Low returns. Not terribly effective
- Primary school quality (θ_{g3}): Larger returns
- The quality of parents' time with their children (θ_{p2} and $\theta_{\pi3}$): Highly effective
- The quality of care givers' time with children: VERY effective, especially if less manualized
- Interaction parameters appear to differ across sub-populations; for some groups, public interventions increase parental involvement (complementarity), for other groups substitution



Conclusion & perspectives

- Very early occurrence of inequality in cognitive and non-cognitive skills. Differences do not disappear during childhood
- Looking at effect sizes per \$1000 by age-at-intervention, we find a strong negative relation

Supports Landersø & Heckman, who *"...sends a cautionary note to the many enthusiasts endorsing the Scandinavian welfare state"*

- The welfare state 'should' have eliminated potential for 'low hanging fruits', especially at the low end of the age distribution
 - Reflects that we do not yet use evidence as much as we ought to



Conclusion & perspectives

Is the lack of mobility in educational attainment due to early inequality or 'something' during adolescence?

We looked at short run impacts – what about the long run?

How can we reduce inequality on a large scale during early years?

- Document inequality, when and for whom it occurs and how it evolves
- Document role of cognitive and non-cognitive skills in dynamics of educational attainment

