Research Module in Management and Applied Economics

Fall/Winter Term 2020

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Origin, Malleability and Development of Personality and Preferences over the Life Course

Stability of Preferences across Domains

Evidence from Dohmen, Falk, Huffman, Sunde, Schupp and Wagner, JEEA, 2011

	General	Car driving	Financial matters	Sports/ leisure	Career	Health
Mean	4.420	2.927	2.406	3.486	3.605	2.934
Standard Deviation	2.379	2.535	2.225	2.613	2.708	2.465
Mean (men)	4.909	3.523	2.882	3.961	4.039	3.318
Mean (women)	3.967	2.346	1.963	3.044	3.190	2.580
General	1.0000					
Car driving	0.4891	1.0000				
Financial matters	0.5036	0.5190	1.0000			
Sports/leisure	0.5595	0.5426	0.4992	1.0000		
Career	0.6088	0.5070	0.4978	0.6033	1.0000	
Health	0.4768	0.5041	0.4564	0.5205	0.5311	1.0000
Observations	21,877	20,6	21,687	21,57	19,898	21,864

Relevant Literature

- Einav, Liran, Amy Finkelstein, Iuliana Pascu, and Mark R. Cullen. 2012. "How General Are Risk Preferences? Choices under Uncertainty in Different Domains." *American Economic Review*, 102(6): 2606-38.

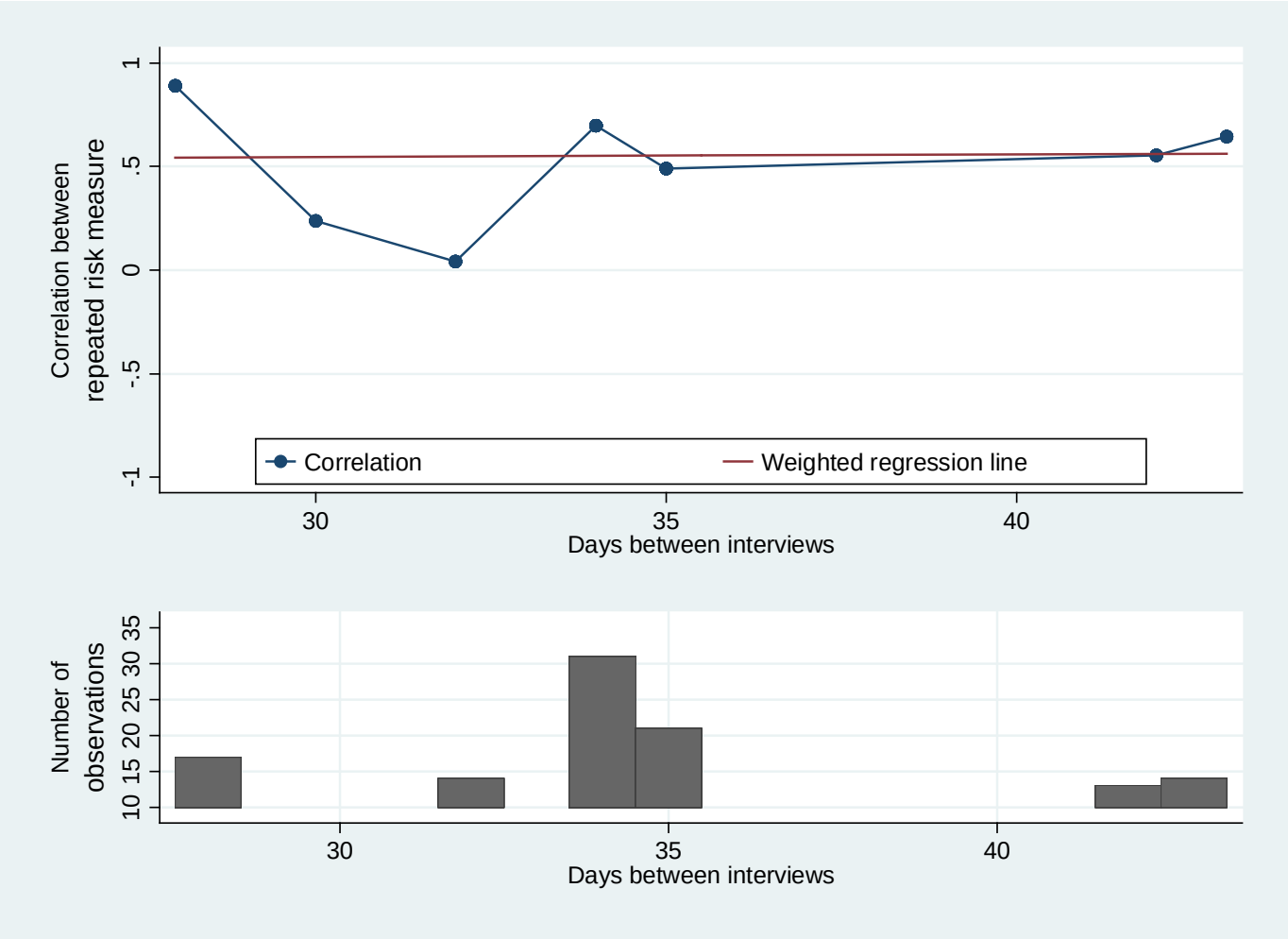
Stability over Time

Stability of Risk Preferences

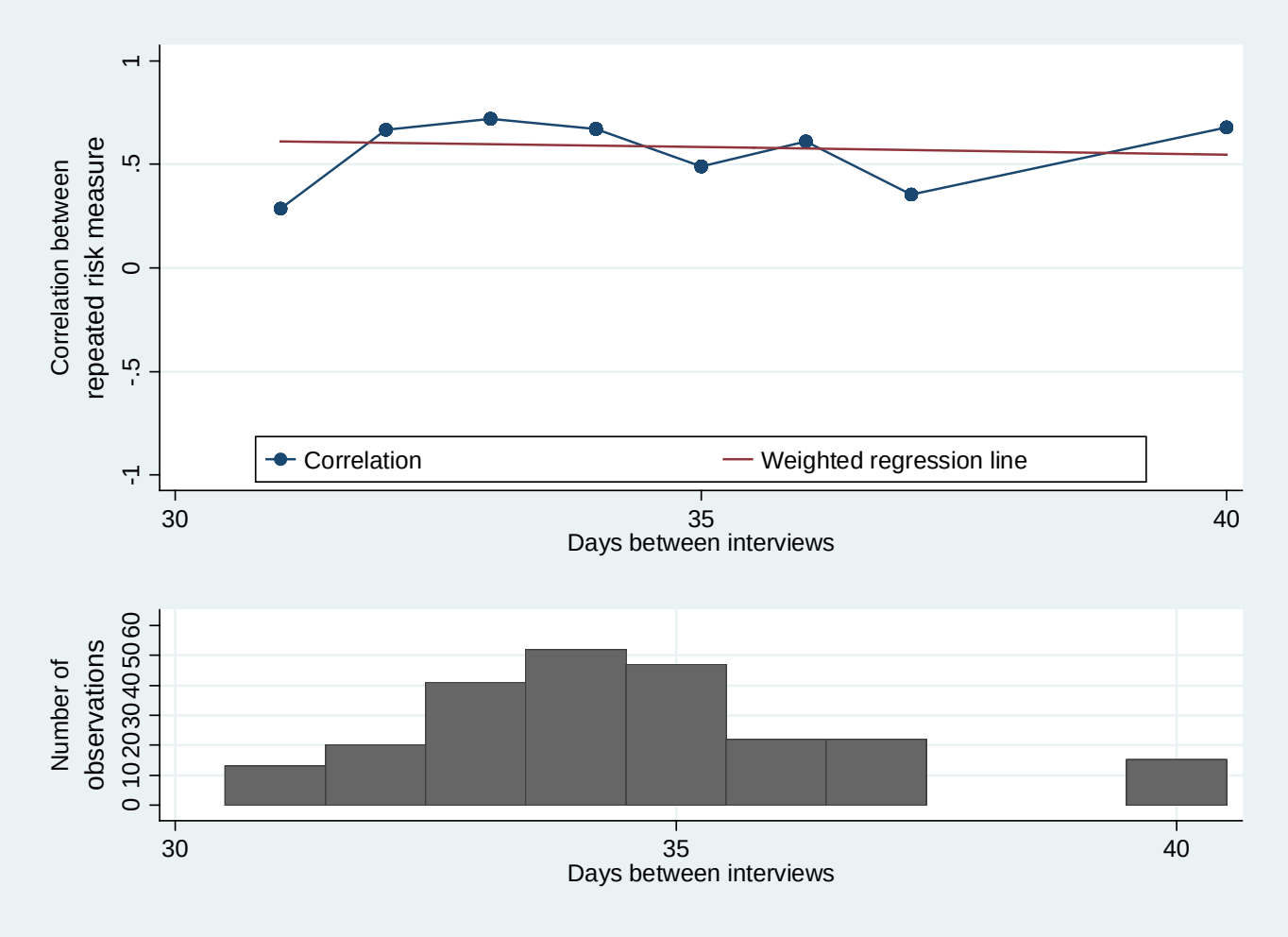
Measurement Issues

- Test-Retest correlation: 2 samples
  - Correlation of 0.62 and 0.6 after 5 weeks (same order of magnitude as for life satisfaction question in SOEP)
  - Caveat: mode effects
- Stability vs. Measurement error over longer horizon
  - Correlation of 0.5
  - Stable over period of 1.5 to 2.5 years
  - Little scope for persistent changes in risk attitudes
- Comparison to experimental measure
  - Anderson et al (2007): correlation of 0.5
  - Our own experimental data: correlation of about 0.5
- Context-specific measures

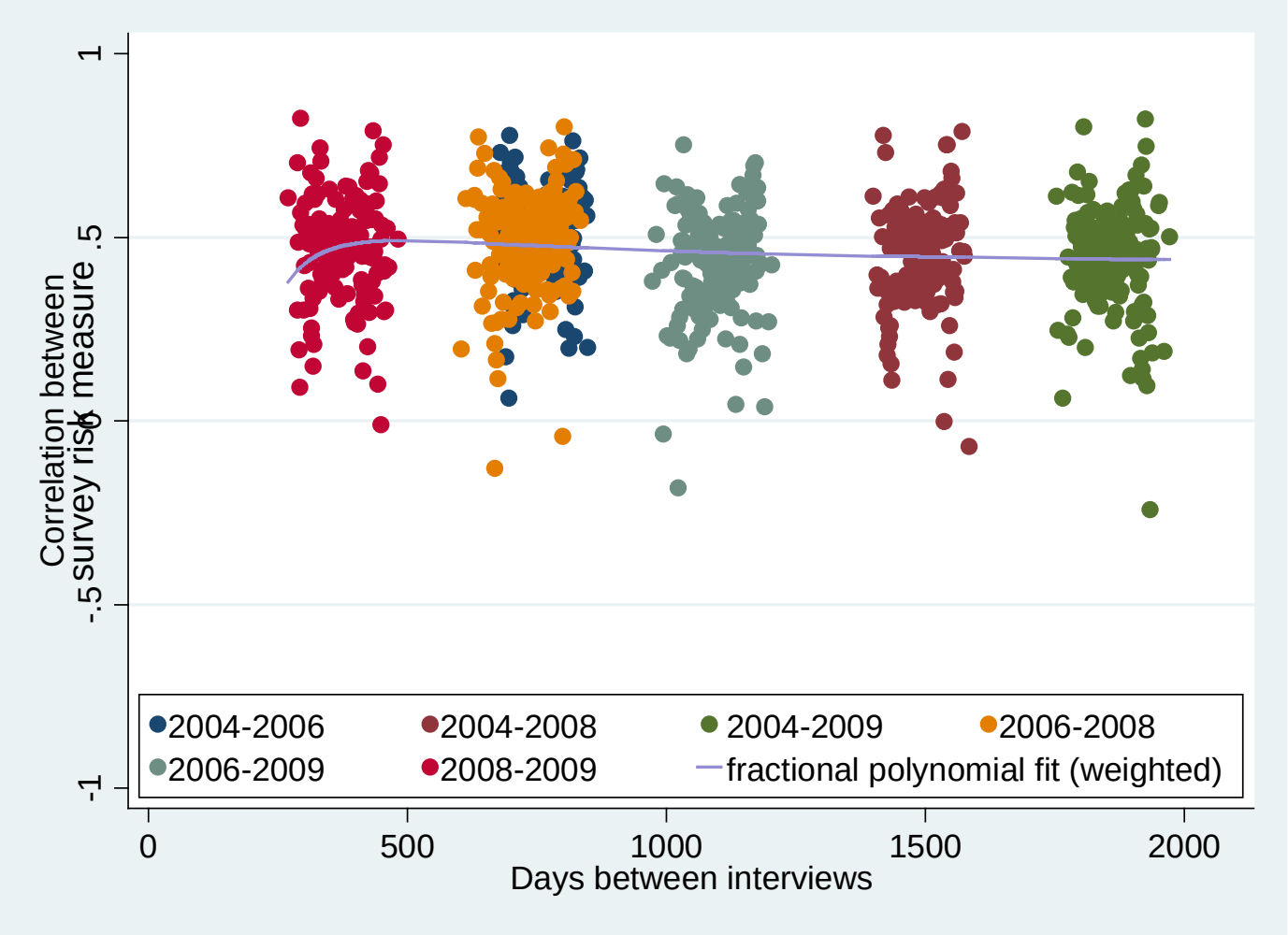
Test-retest 2005



Test-retest 2006



Correlation in Risk Attitudes over Time

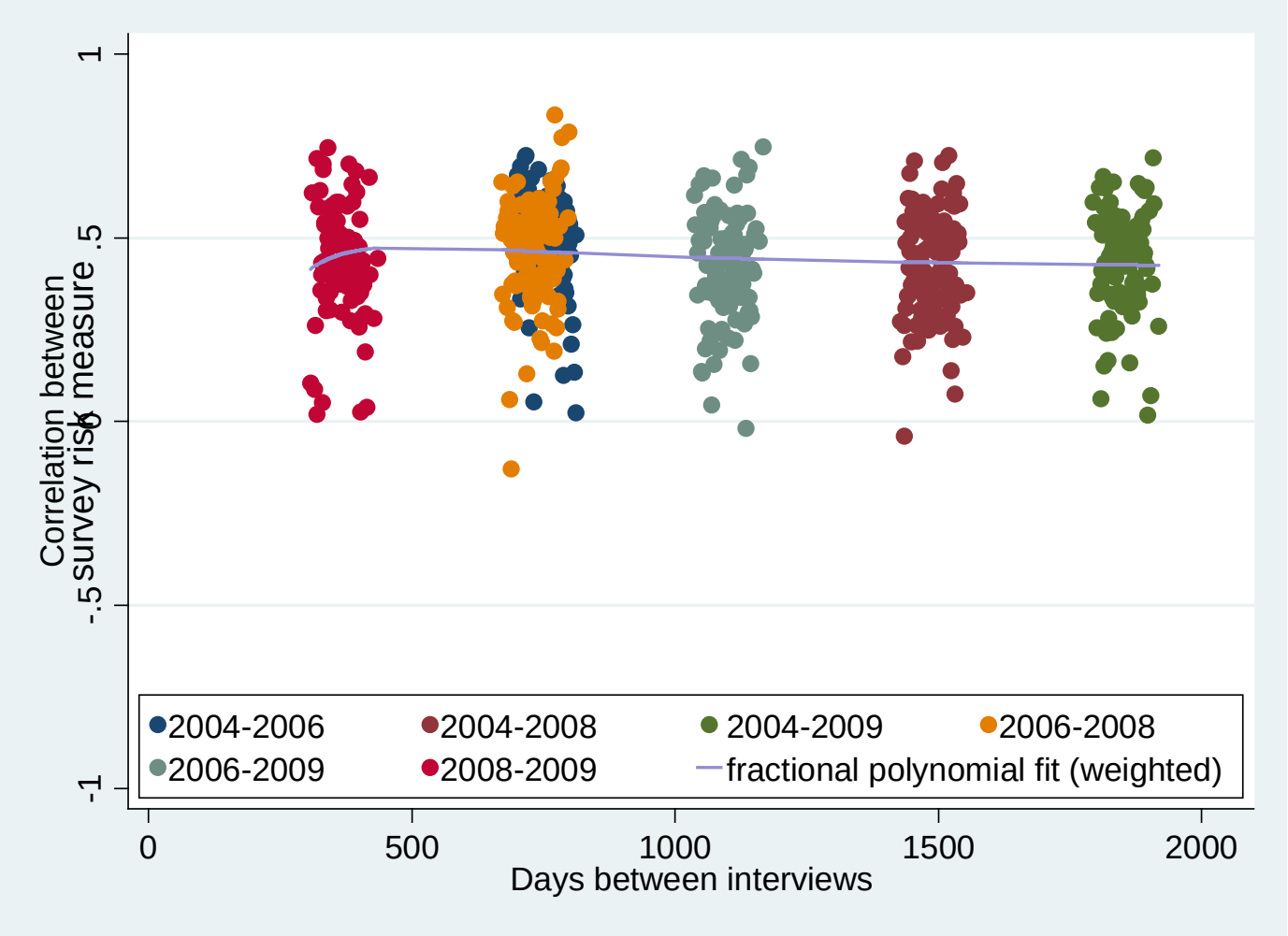


Sample: SOEP, all respondents

Correlations are based on at least 20 observations

correlograms

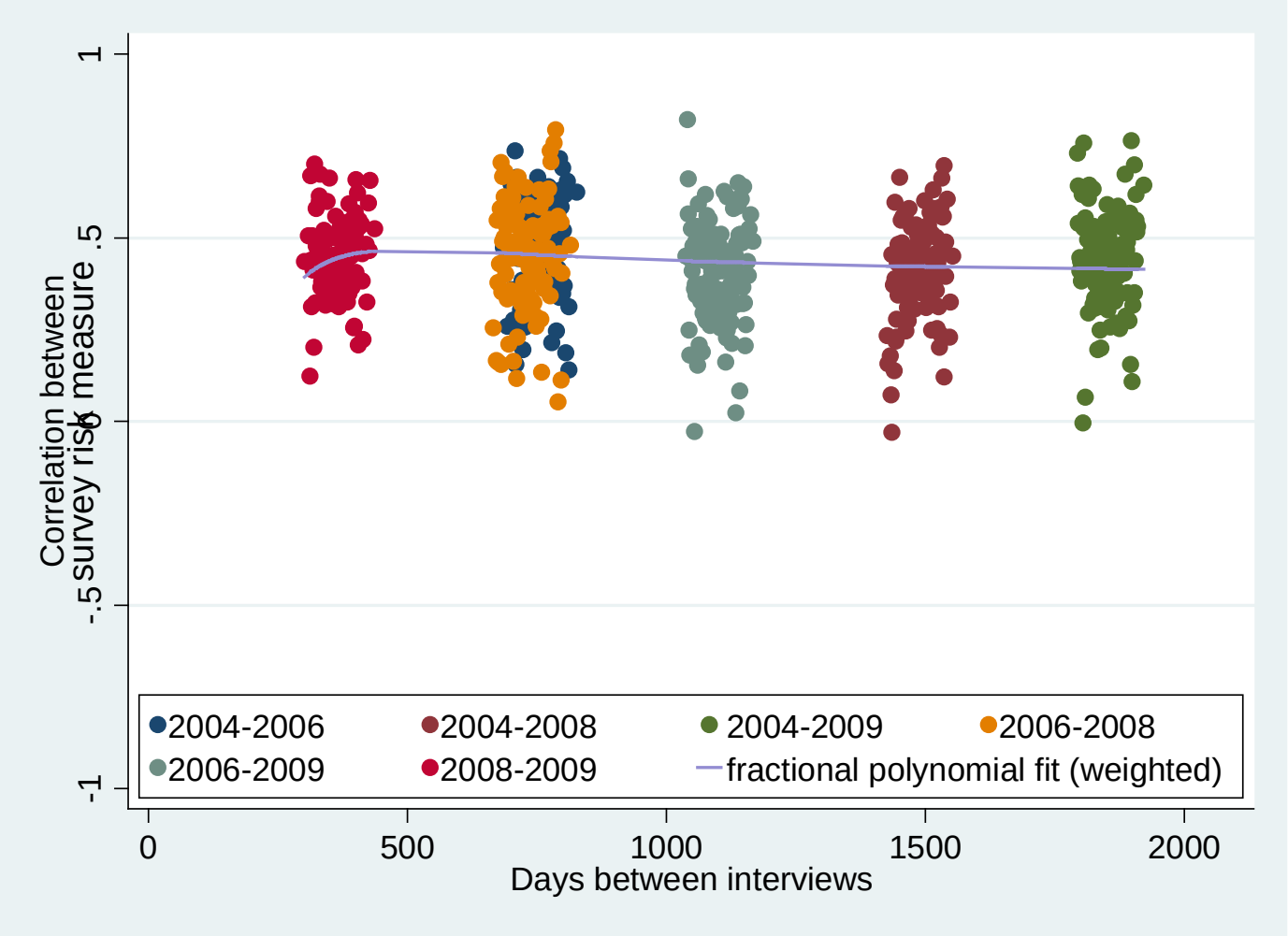
Correlation in Risk Attitudes over Time



Sample:
SOEP,
Men

Correlations are based on at least 20 observations

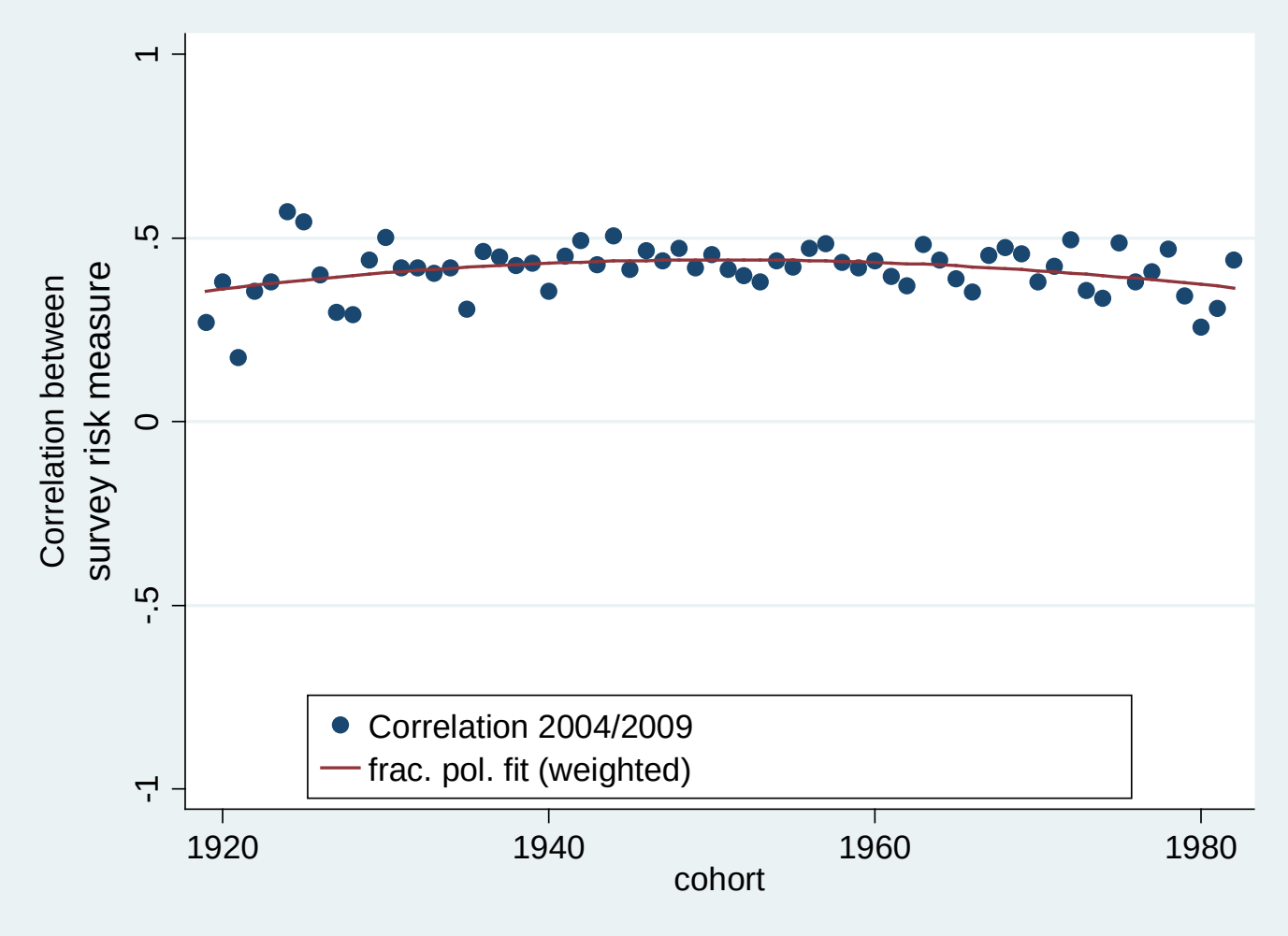
Correlation in Risk Attitudes over Time



Sample:
SOEP,
Women

Correlations are based on at least 20 observations

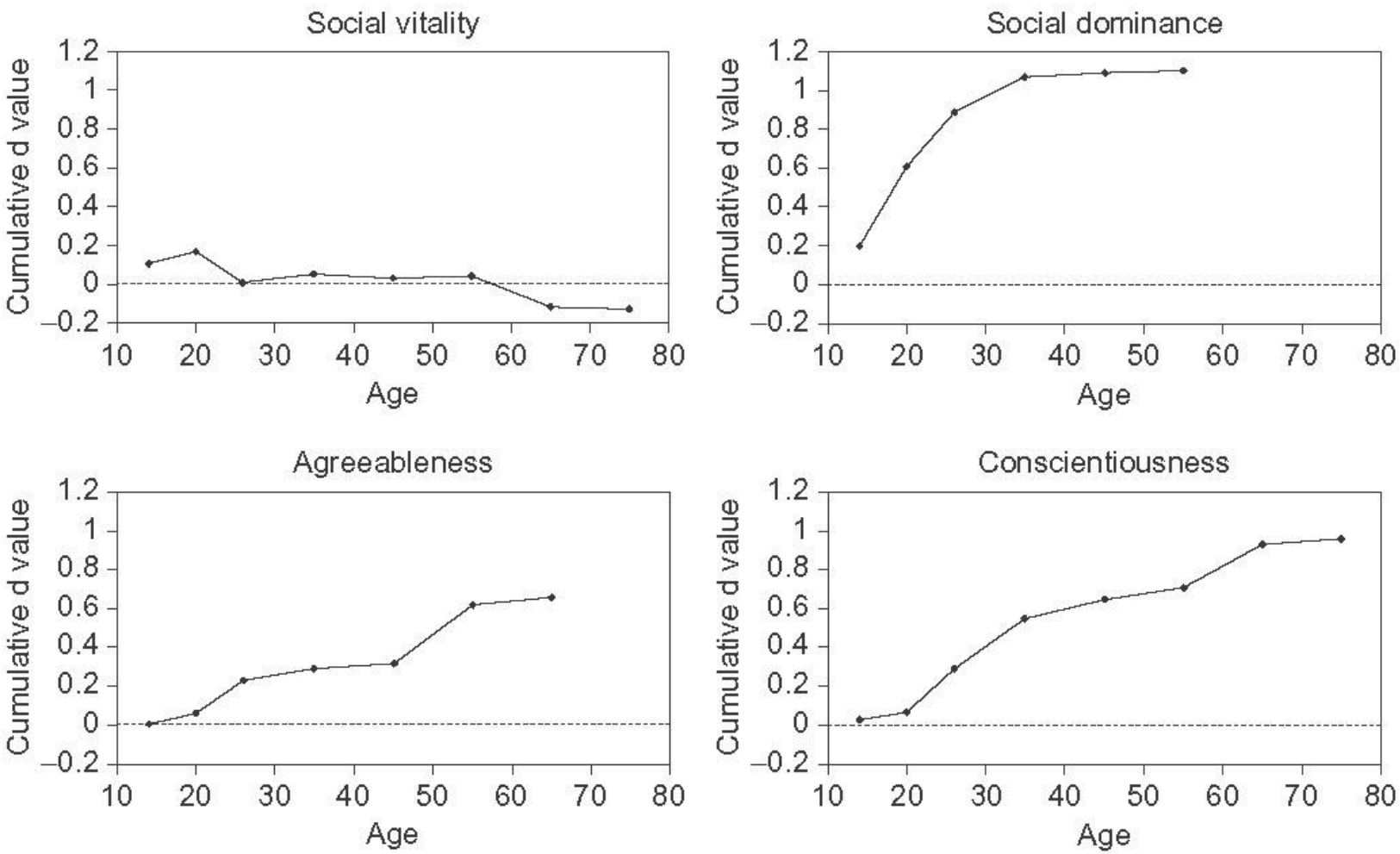
Correlation in Risk Attitude over 5-year Interval



Sample:
SOEP,
Wave 2004
and 2009
All
respondents
born between
1918 and
1983
with non-
missing
observations

Stability of Personality Traits

Cumulative Mean-Level Changes in Personality across the Life Cycle



Cumulative Mean-Level Changes in Personality across the Life Cycle

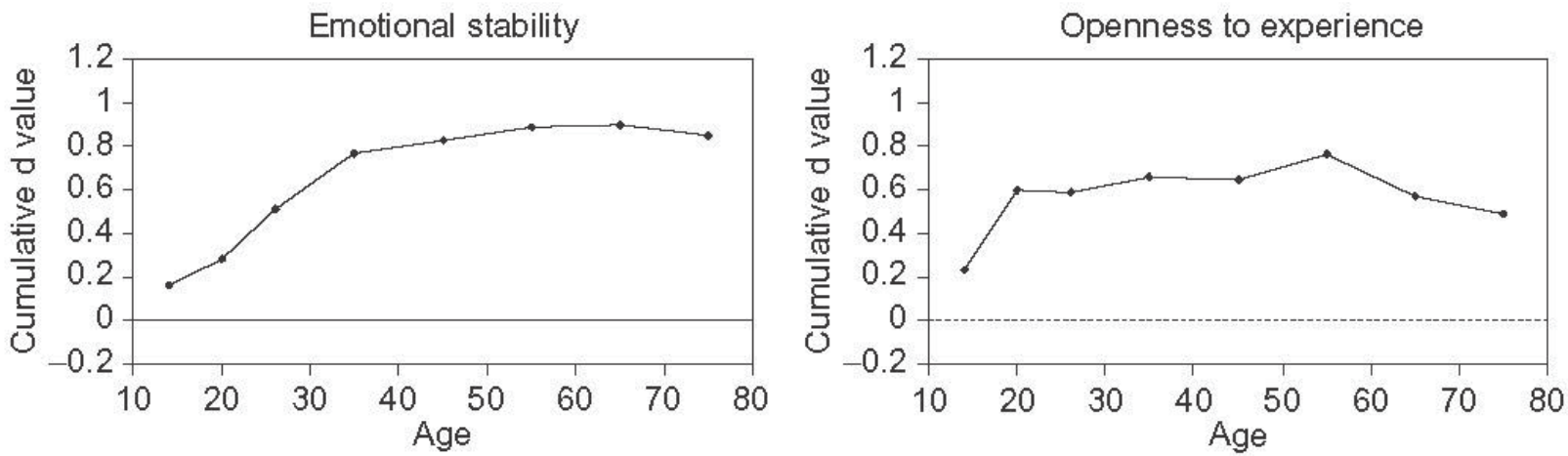
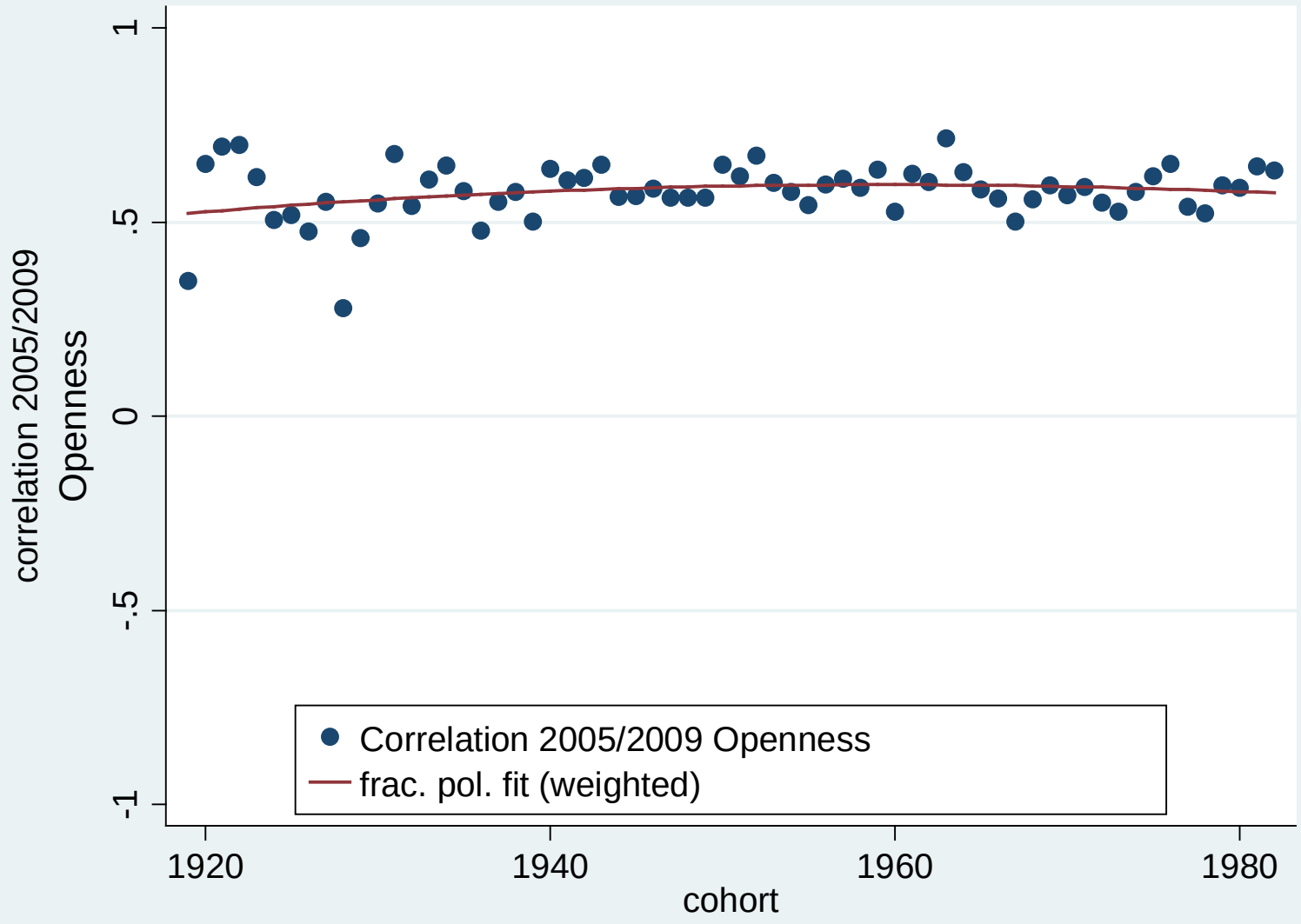


Figure 1.22 Cumulative Mean-Level Changes in Personality across the Life Cycle.

Note: Social vitality and social dominance are aspects of Big Five Extraversion. Cumulative d values represent total lifetime change in units of standard deviations ("effect sizes").
Source: Figure taken from Roberts, Walton, and Viechtbauer (2006) and Roberts and Mroczek (2008). Reprinted with permission of the authors.

Longitudinal Evidence on Stability of Personality Traits from SOEP

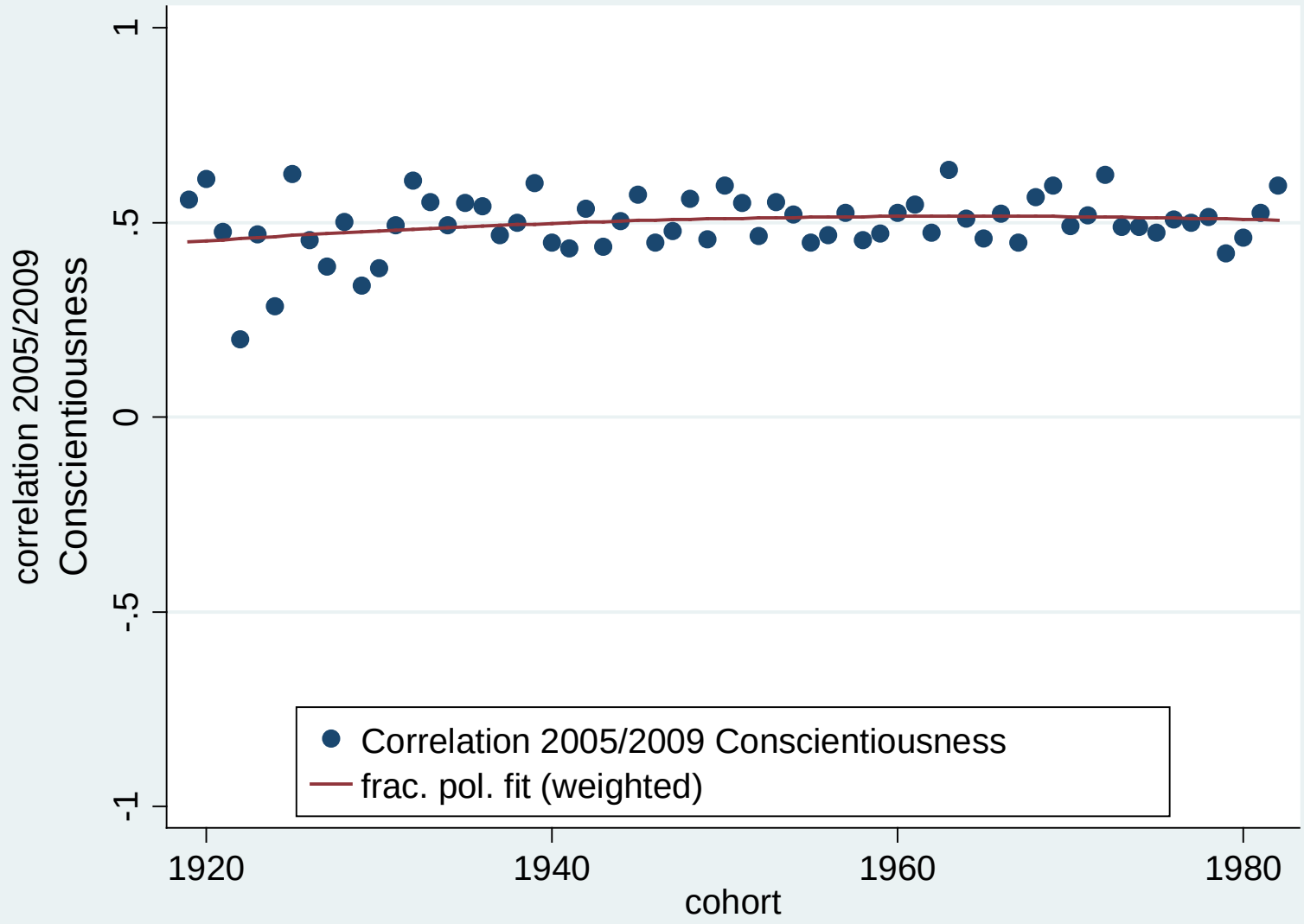
Correlation in Openness over 4-year Interval



Sample: SOEP, Wave 2005 and 2009

All respondents born between 1918 and 1983 with non-missing observations

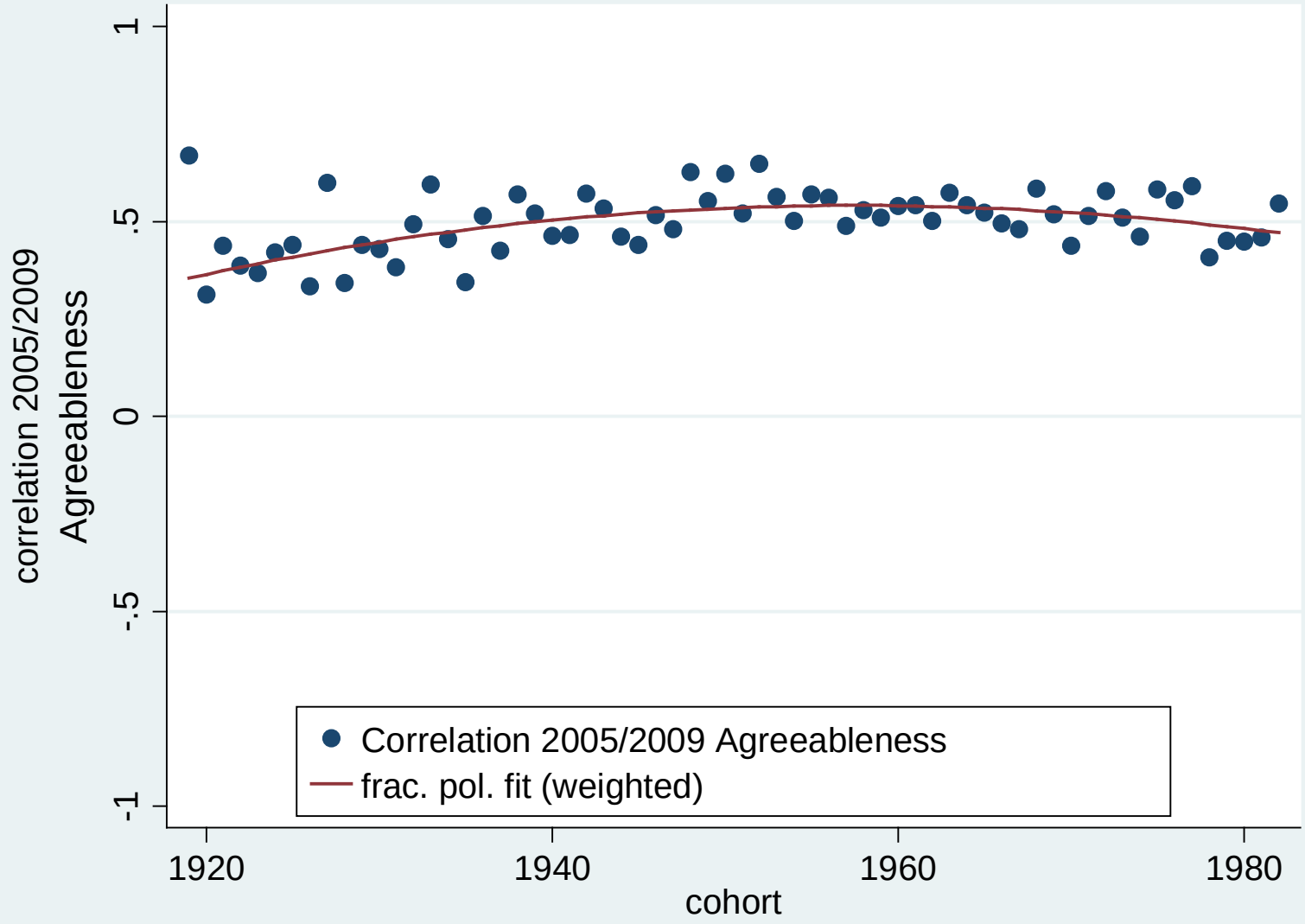
Correlation in Conscientiousness over 4-year Interval



Sample: SOEP, Wave 2005 and 2009

All respondents born between 1918 and 1983 with non-missing observations

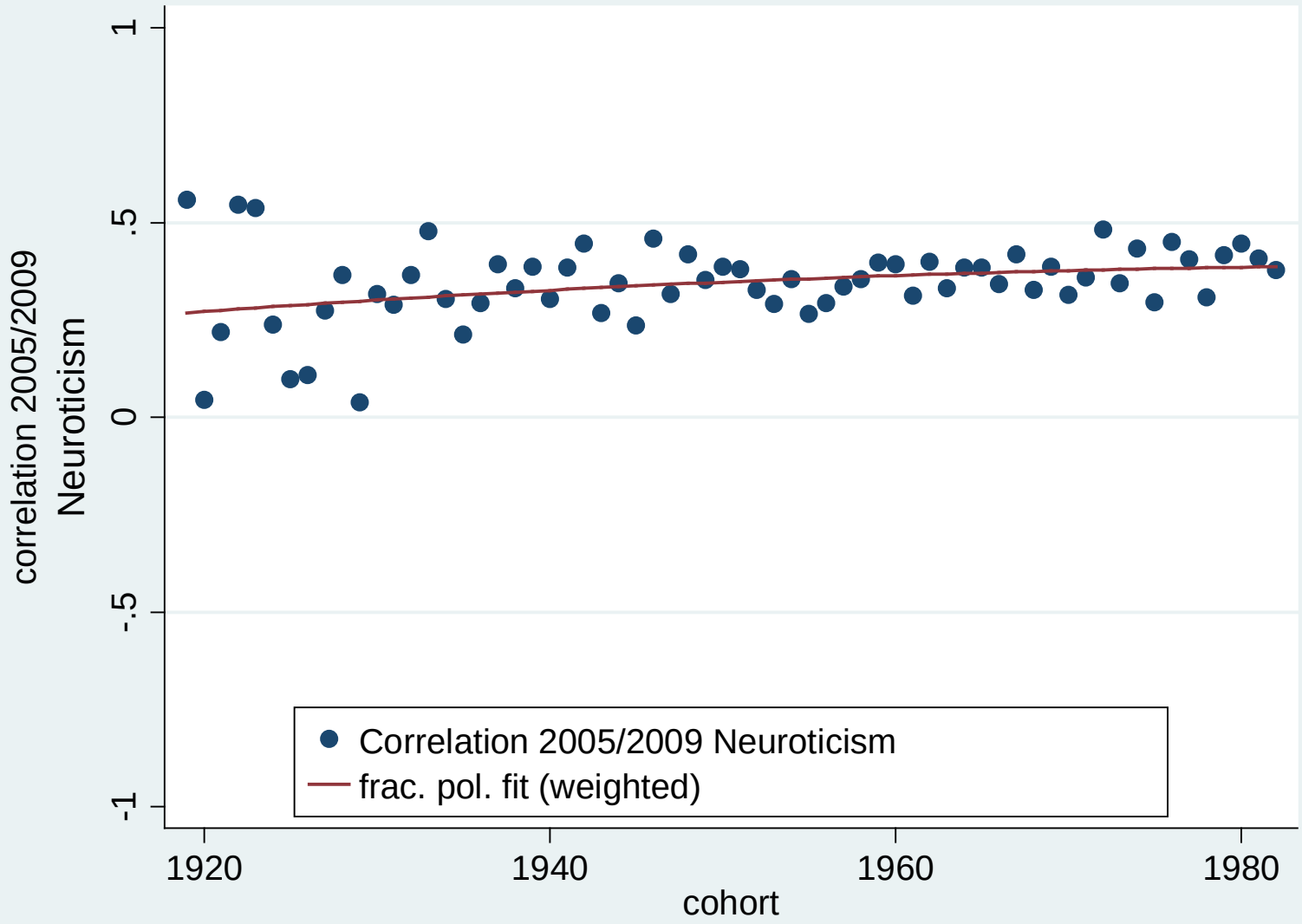
Correlation in Agreeableness over 4-year Interval



Sample: SOEP, Wave 2005 and 2009

All respondents born between 1918 and 1983 with non-missing observations

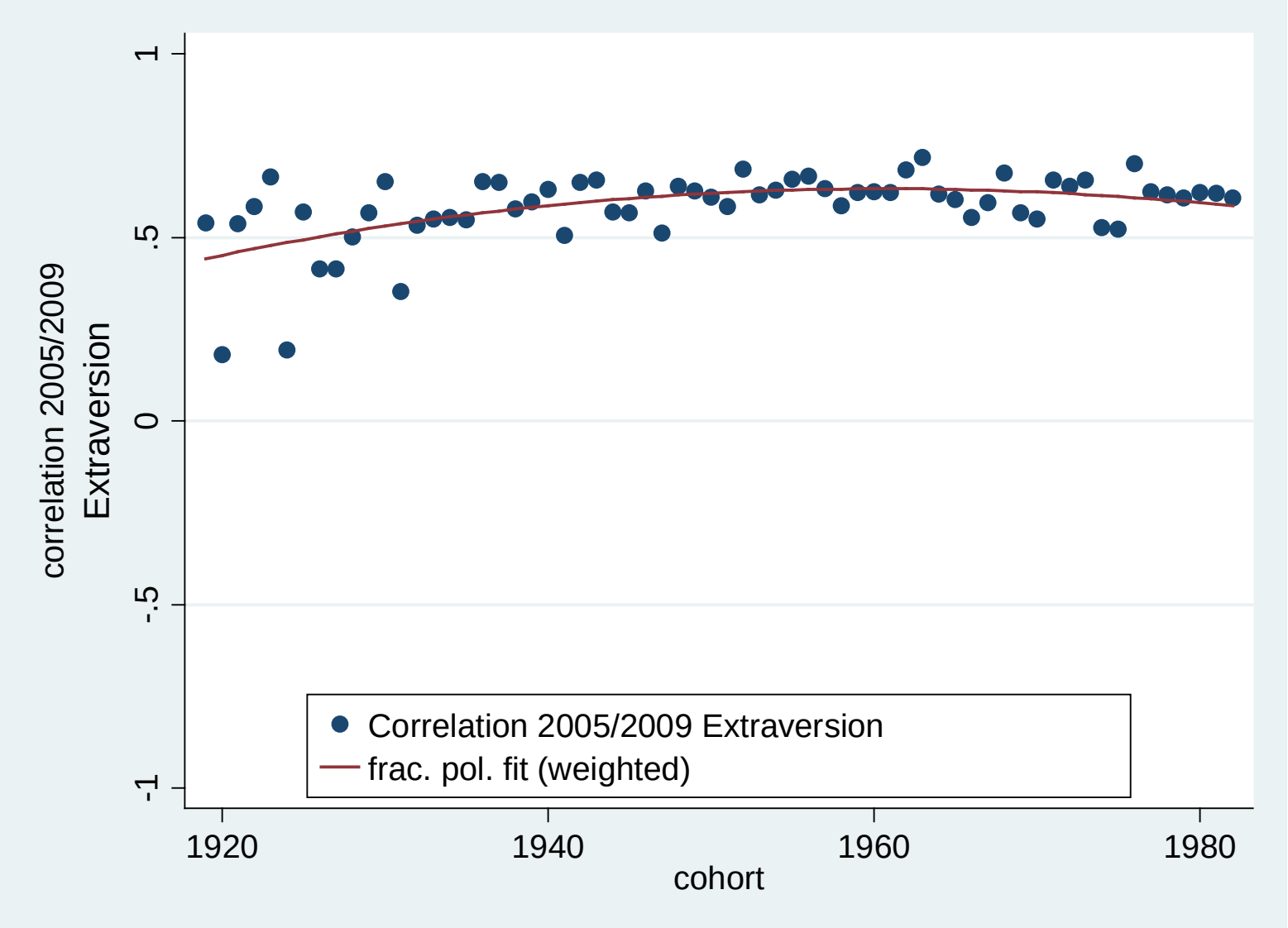
Correlation in Neuroticism over 4-year Interval



Sample: SOEP, Wave 2005 and 2009

All respondents born between 1918 and 1983 with non-missing observations

Correlation in Extraversion over 4-year Interval



Sample: SOEP, Wave 2005 and 2009

All respondents born between 1918 and 1983 with non-missing observations

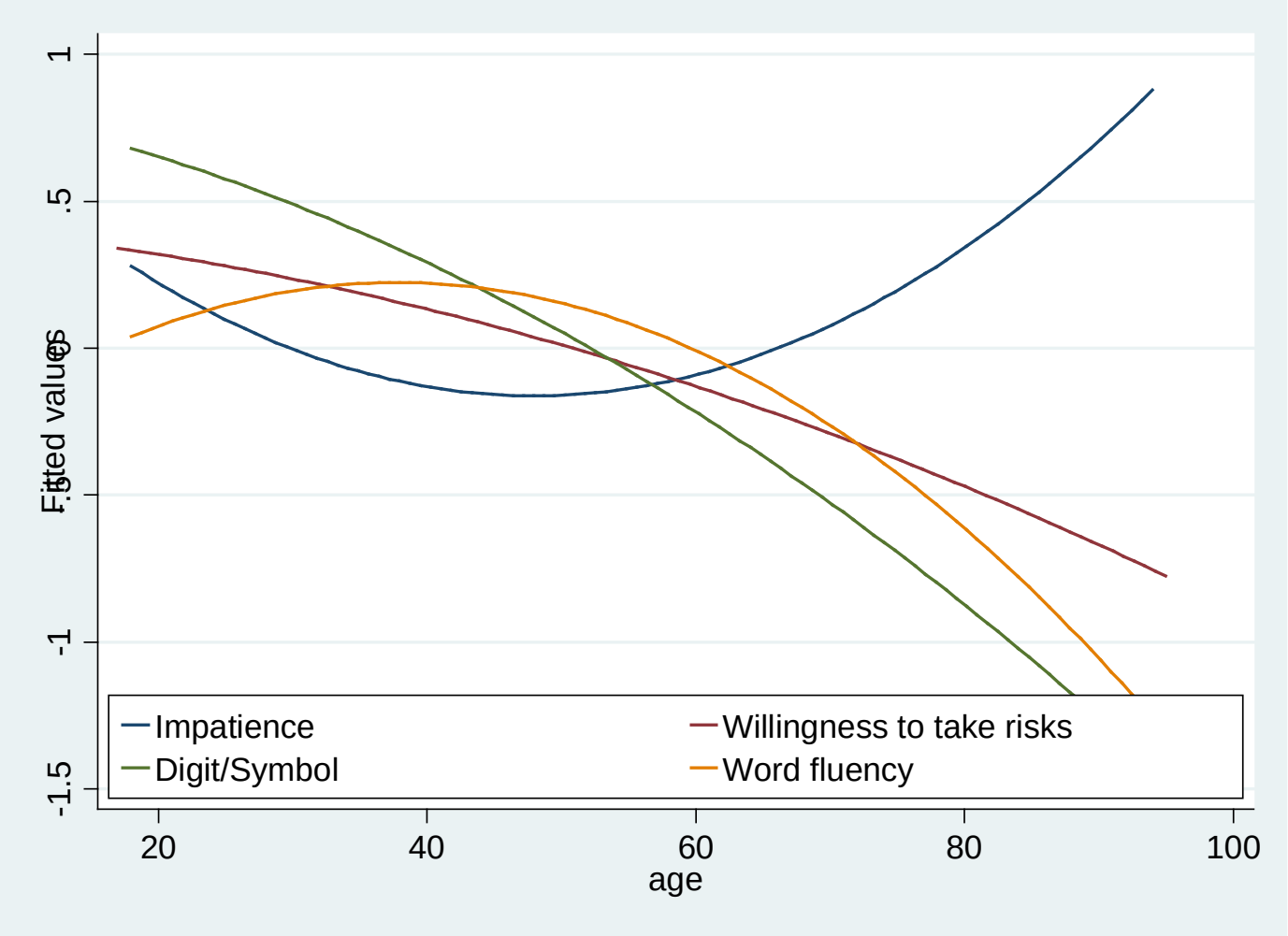
Relevant Literature

- Costa, P.T., McCrae, R.R., 1994. Set Like Plaster? Evidence for the Stability of Adult Personality. In: Heatherton, T.F., Weinberger, J.L., (Ed.), Can Personality Change? American Psychological Association, Washington, DC, pp. 21–40.
- Costa, P.T., McCrae, R.R., Siegler, I.C., 1999. Continuity and Change over the Adult Life Cycle: Per- sonality and Personality Disorders. In: Cloninger, C.R., (Ed.), Personality and Psychopathology. American Psychiatric Press, Washington, DC.
- McCrae, R.R., Costa, P.T., 1990. Personality in Adulthood. Guilford Press, New York.
- McCrae, R.R., Costa, P.T., 1994. The Stability of Personality: Observation and Evaluations. Curr Dir. Psychol. Sci. 3 (6), 173–175.
- McCrae, R.R., Costa, P.T., 1996. Toward a New Generation of Personality Theories: Theoretical Contexts for the Five-Factor Model. In: Wiggins, J.S. (Ed.), The Five-Factor Model of Personality: Theoretical Perspectives. Guilford Press, New York, pp. 51–87.
- McCrae, R.R., Costa, P.T., 2003. Personality in Adulthood: A Five-Factor Theory Perspective. Guilford Press, New York.

- Roberts, B.W., Mroczek, D., 2008. Personality Trait Change in Adulthood. Curr. Dir. Psychol. Sci.
- 17 (1), 31–35.
- Roberts, B.W., Walton, K.E., Viechtbauer, W., 2006. Patterns of Mean-Level Change in Personality Traits across the Life Course: A Meta-Analysis of Longitudinal Studies. Psychol. Bull. 132 (1), 1–25.

Changes over the Life-Cycle

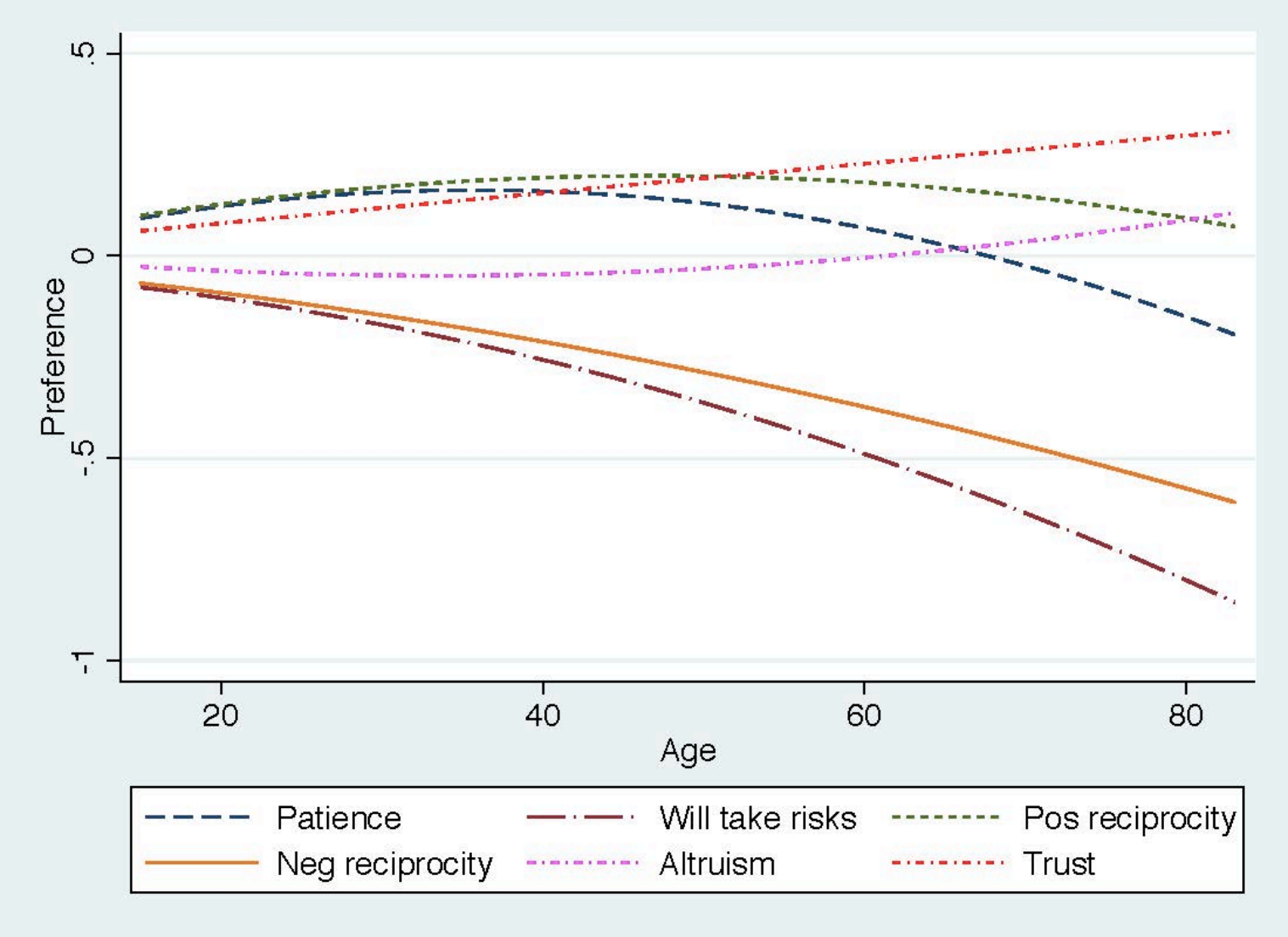
IQ, and measured Risk Attitudes and Impatience over the Life Course: Evidence from SOEP Data



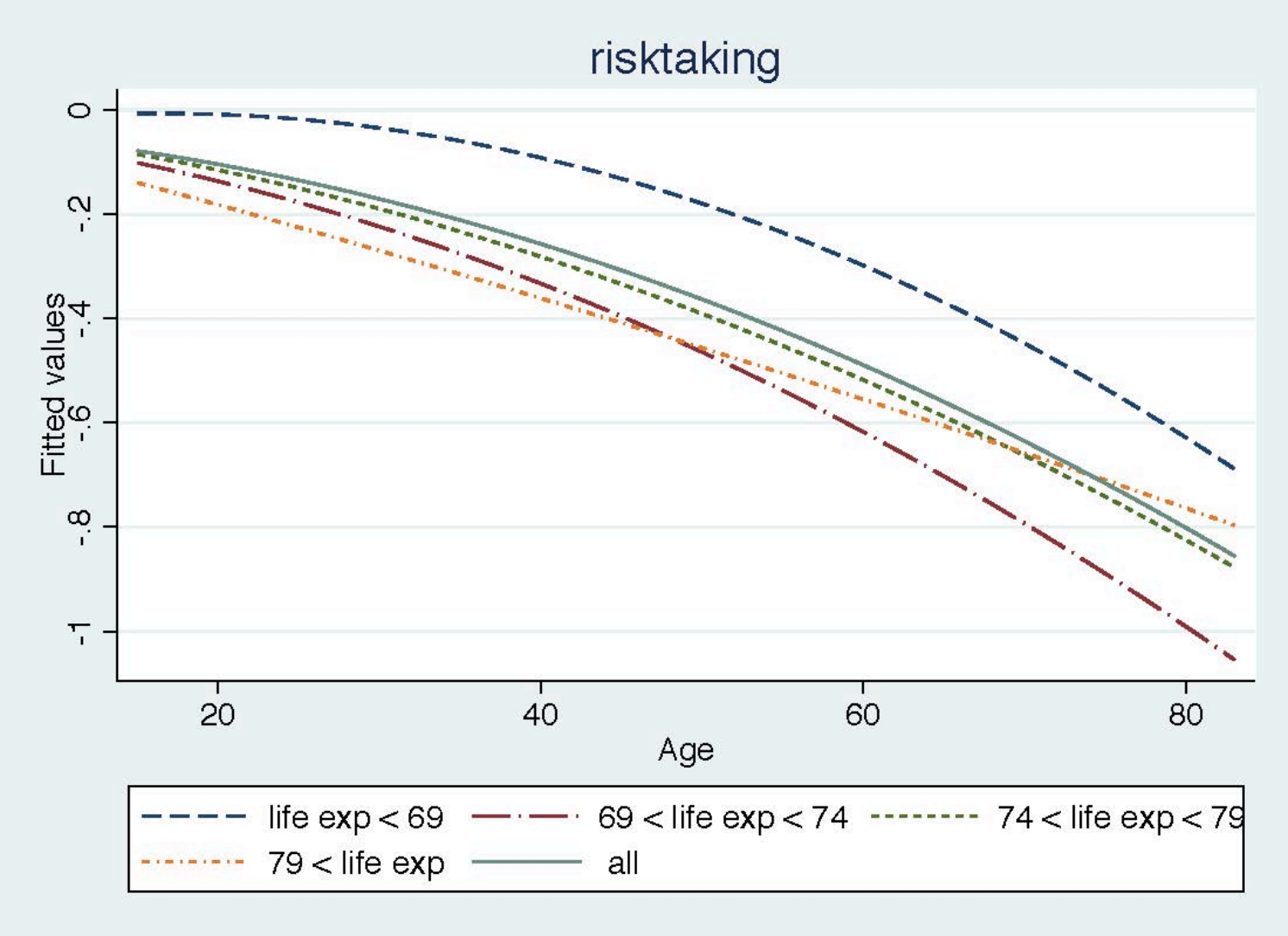
Sample:
SOEP,
Wave 2006
All
respondents
aged 17-95

Risk attitudes for age cohorts

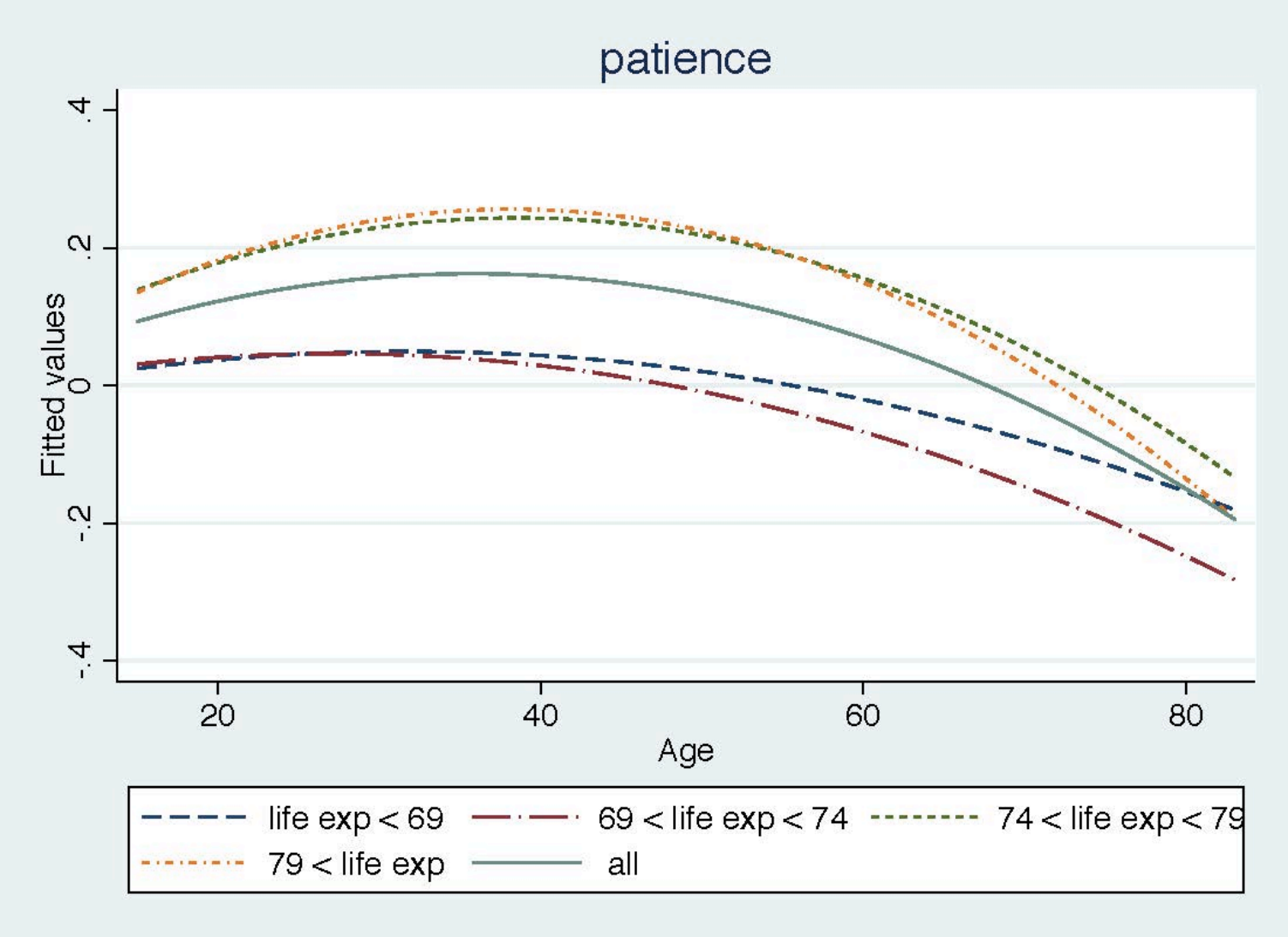
Preferences over the Life Course: Evidence from Gallup World Poll



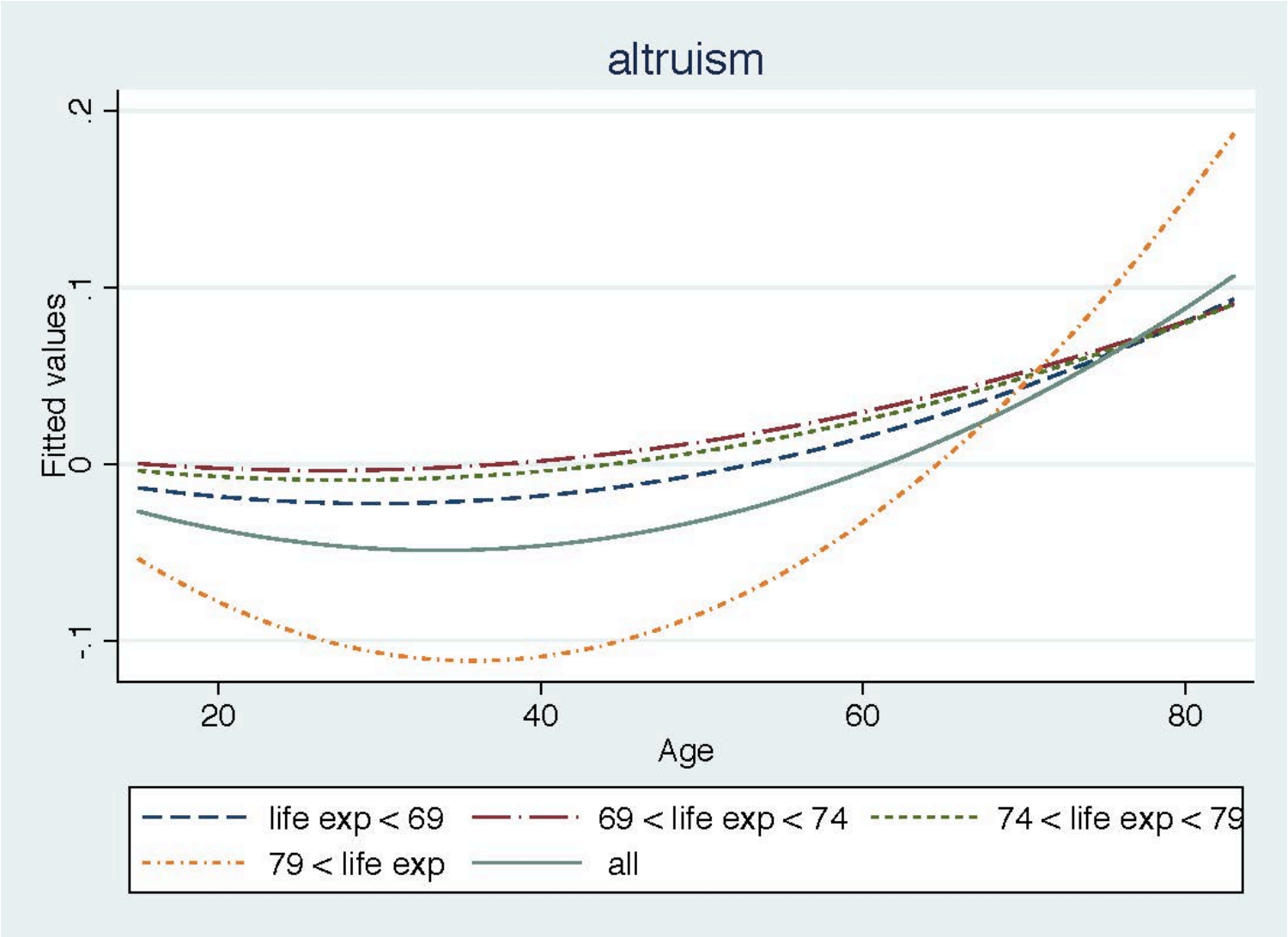
Risk Preferences over the Life Course



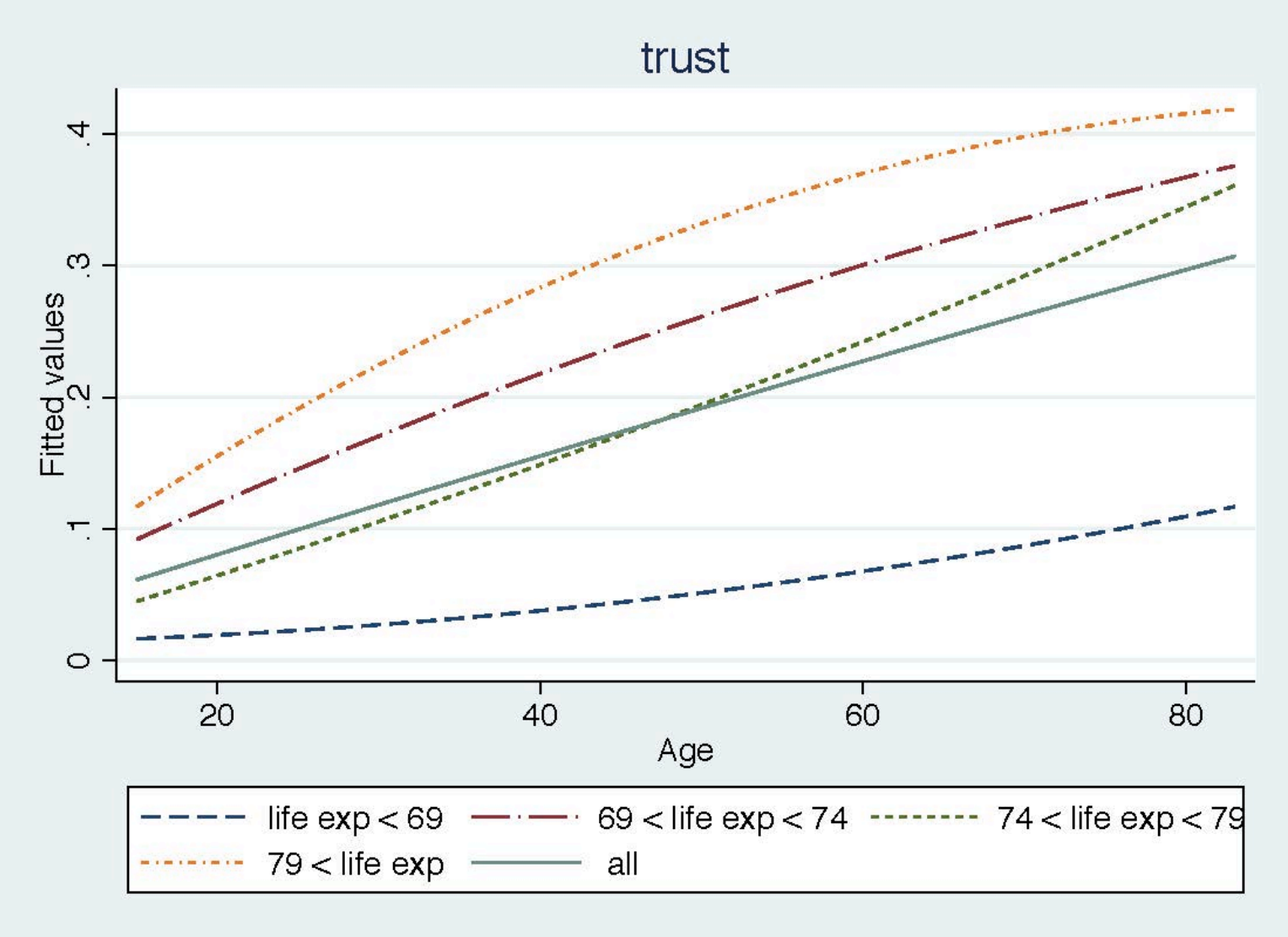
Patience over the Life Course



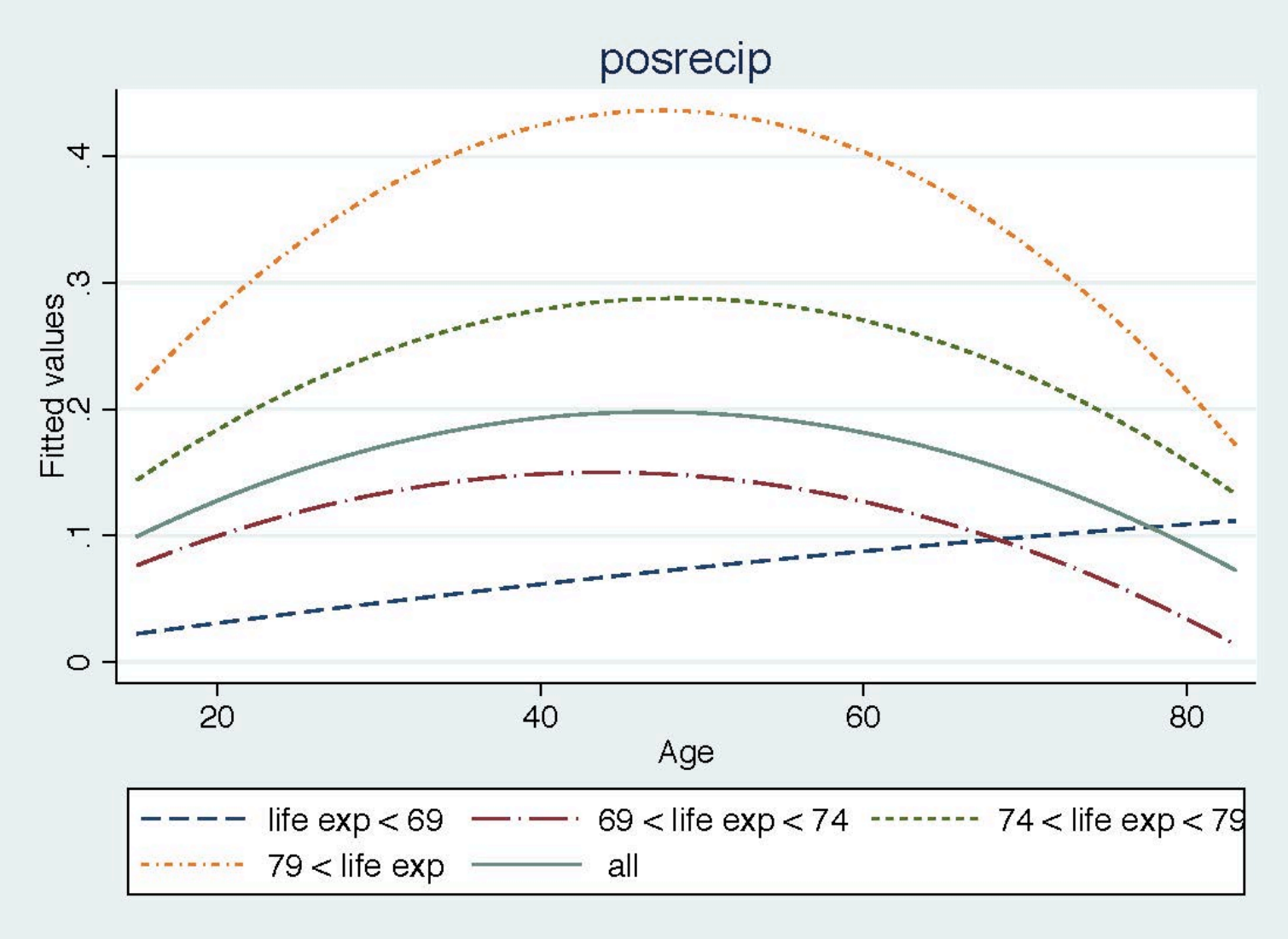
Altruism over the Life Course



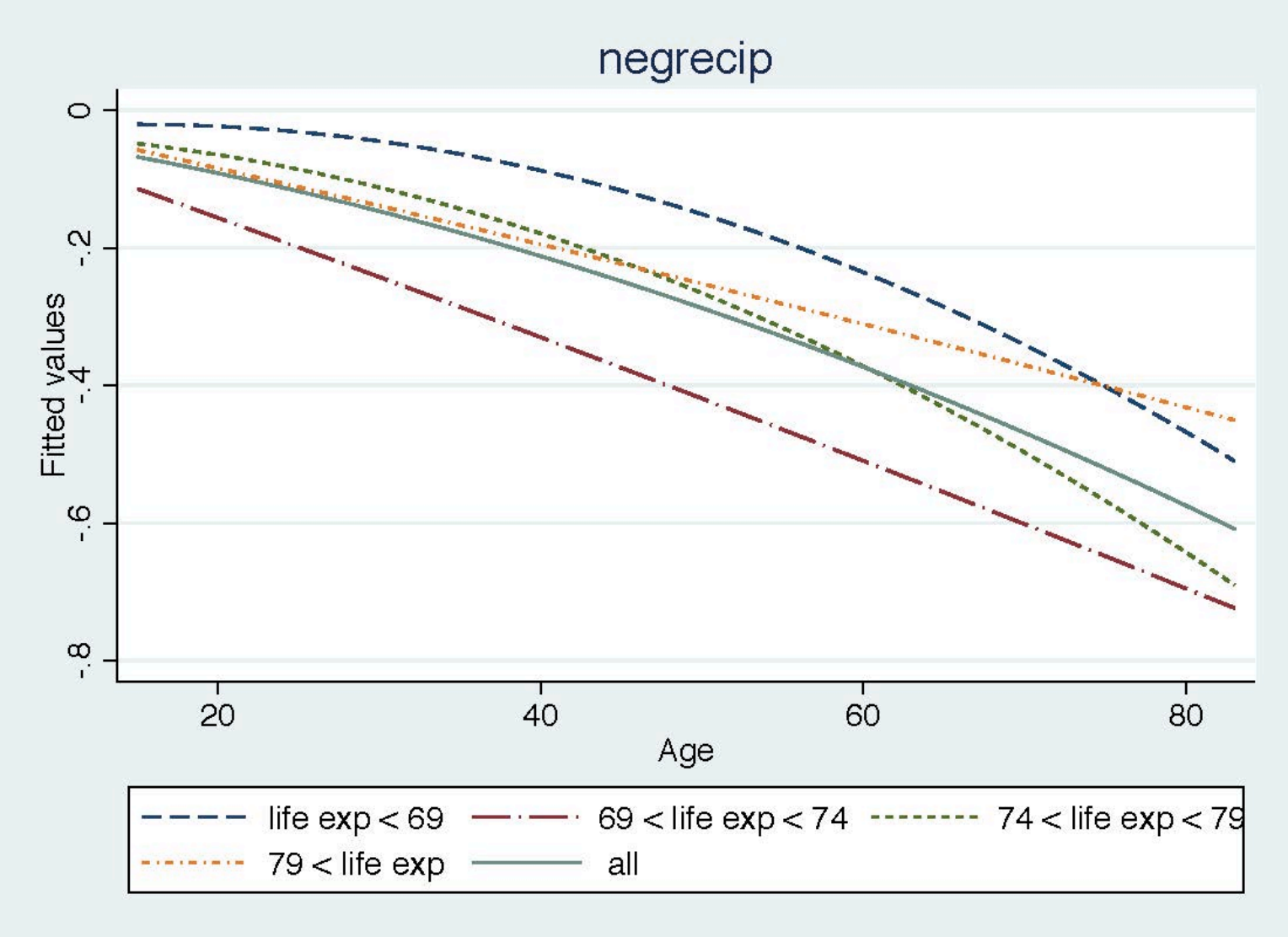
Trust over the Life Course



Positive Reciprocity over the Life Course



Negative Reciprocity over the Life Course



Are aging processes related? Evidence for ontogenetic processes?

Cognitive Aging and Risk Attitude

Eric Bonsang and Thomas Dohmen
ROA, Maastricht University, and Netspar

Introduction

- Systematic negative relationship between willingness to take risks and age in cross-sectional (Barsky et al. 1997; Dohmen et al., 2011a; Donkers et al., 2001; Kapteyn and Teppa, 2011) and longitudinal data (Sahm 2007).

- At the same time, risk attitude and cognitive skills have been found to be related (Beauchamp et al., 2011; Burks et al., 2009; Dohmen et al., 2011b).

- Performance on a wide variety of cognitive tasks systematically declines with age (Dixon et al., 2004), including processing speed (Salthouse, 1996) and working memory (Van der Linden et al., 1994).

Introduction

- Those three findings motivate the question of whether and to what extent the decline in willingness to take risks over the life-cycle can be explained by cognitive decline.

- Answering this question is important because:
  - It shed lights on the nature of the relationship between cognition and preferences. If life-cycle changes in risk attitudes can be traced to a decline in cognition, a necessary condition for a causal interpretation of the correlation between risk preferences and cognition is met.
  - When there is heterogeneity in life-cycle processes, such as cognitive decline, it is important to understand whether these processes drive the observed age effects, as it yields vital insights for economists and policy makers in many settings.

Introduction

- In this paper:
  - We empirically investigate how much of the age effect on the reported willingness to take risk is explained by cognitive decline.
  - Using the Survey of Health, Ageing, and Retirement in Europe (SHARE), we find a negative and significant relationship between the willingness to take risks and age when no measure of cognition is controlled for.
  - Once we control for cognitive skills, we find that cognitive decline is a major driver of the age-dependent profile of risk attitude.

The Survey of Health, Aging and Retirement in Europe

- The survey
  - SHARE is a multidisciplinary survey targeted on 50+ individuals in 11 European countries (Austria, Belgium, Denmark, France, Germany, Greece, Italy, The Netherlands, Spain, Sweden and Switzerland).
  - The data were collected using a computer assisted personal interviewing (CAPI) program, supplemented by a self-completion paper and pencil questionnaire.
  - Three cognitive tests: Word recall test, Fluency test and numeracy test .
  - Self-reported willingness to take fincancial risks.

The Survey of Health, Aging and Retirement in Europe

- Self-reported willingness to take fincancial risks

When people invest their savings they can choose between assets that give low return with little risk to lose money, for instance a bank account or a safe bond, or assets with a high return but also a higher risk of losing, for instance stocks and shares. Which of the statements on the card comes closest to the amount of financial risk that you are willing to take when you save or make investments?

1. *Take substantial financial risks expecting to earn substantial returns*
2. *Take above average financial risks expecting to earn above average returns*
3. *Take average financial risks expecting to earn average returns*
4. *Not willing to take any financial risks*

Distribution of financial risk preference

Financial risk preferences	Freq.	Percent
Not willing to take any financial risks	8,852	75.9%
Take average financial risks	1,998	17.1%
Take above average financial risks	694	6.0%
Take substantial financial risks	118	1.0%
Total	11,662	100.0%

Note: SHARE 2006.

Is self-reported financial Risk Attitude related to actual Risk Behavior?

Linear probability model of stocks ownership.

	Stock ownership	
	(i)	(ii)
Willingness to take financial risks:		
No risks at all	-	-
Average risks	0.250***	0.212***
	(0.009)	(0.009)
Above average risks	0.366***	0.324***
	(0.015)	(0.014)
Substantial risks	0.364***	0.317***
	(0.032)	(0.031)
Age/10 (in years)	-0.015***	0.002
	(0.003)	(0.005)
Socio-economic and demographic characteristics	No	Yes
Country fixed effect	Yes	Yes
Number of observations	11,217	11,217

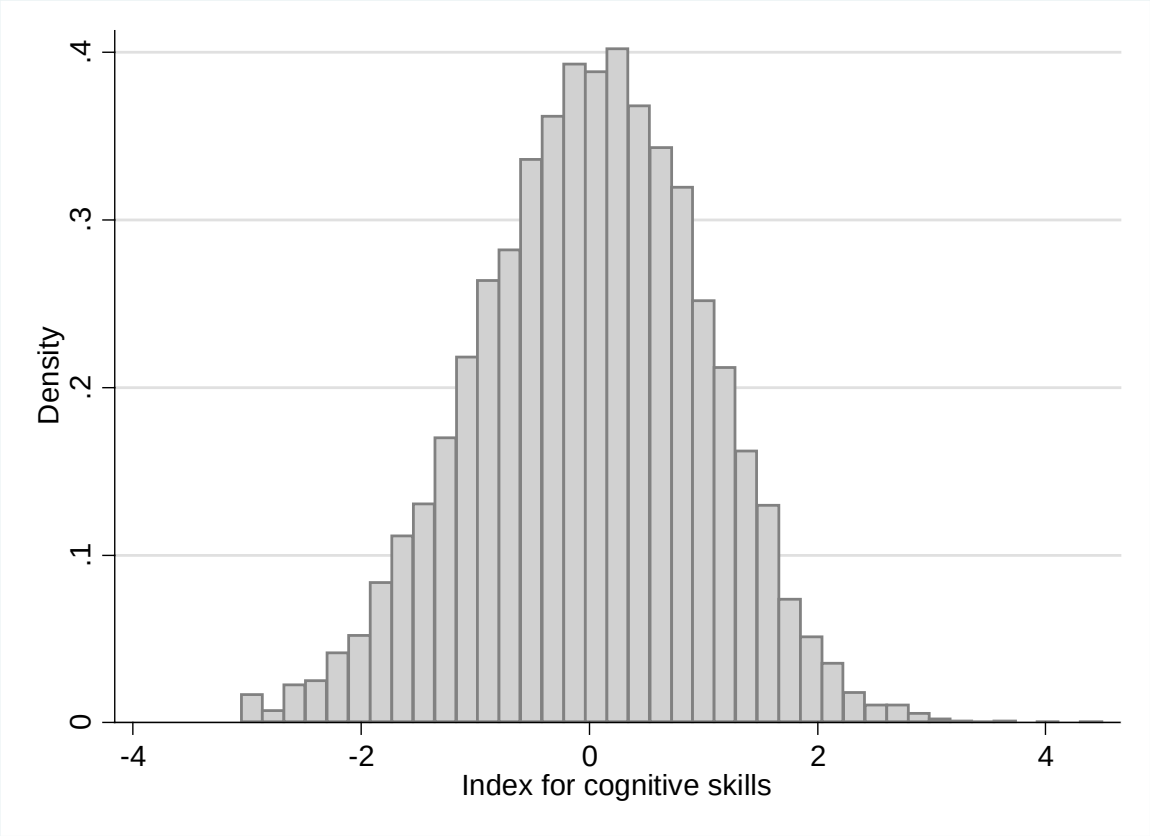
Note: SHARE 2006. The dependent variable takes the value of 1 for individuals reporting having stocks and 0 otherwise. Standard errors are in parentheses. (*), (**), (***) mean that the coefficent estimate is significantly different from zero at the 10%, 5%, 1% levels, respectively.

The Survey of Health, Aging and Retirement in Europe

- Cognitive tests in SHARE
  - **Episodic memory test:** Test of verbal learning and recall of a list of ten common words. Immediate and delayed recall tasks are carried out.
  - **Executive skills test:** Assessed through a fluency task: a test of how quickly participants can think of words from a particular category. They have to remember as many different names of animals in 1 minute as possible.
  - **Numeracy test:** Numeracy is assessed by asking a few questions that involve simple calculations based on real life situations.
- Index for cognitive skills
  - We use principal component analysis to combine those three test scores into one general measure of cognitive skills defined as the first principal component. The measure is then normalized with mean zero and unit variance. The distribution of our cognitive skills measure is close to the normal distribution.

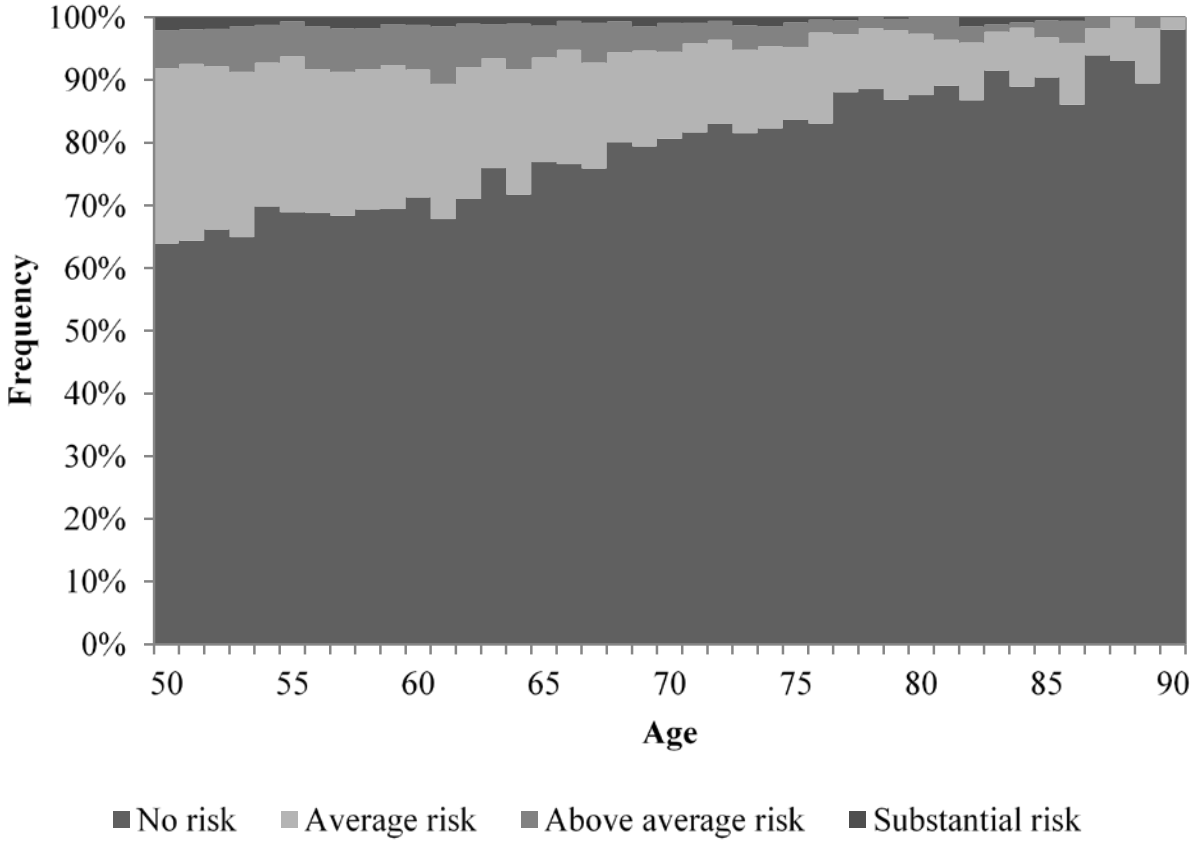
The Survey of Health, Ageing and Retirement in Europe

Distribution of the index for cognitive skills.



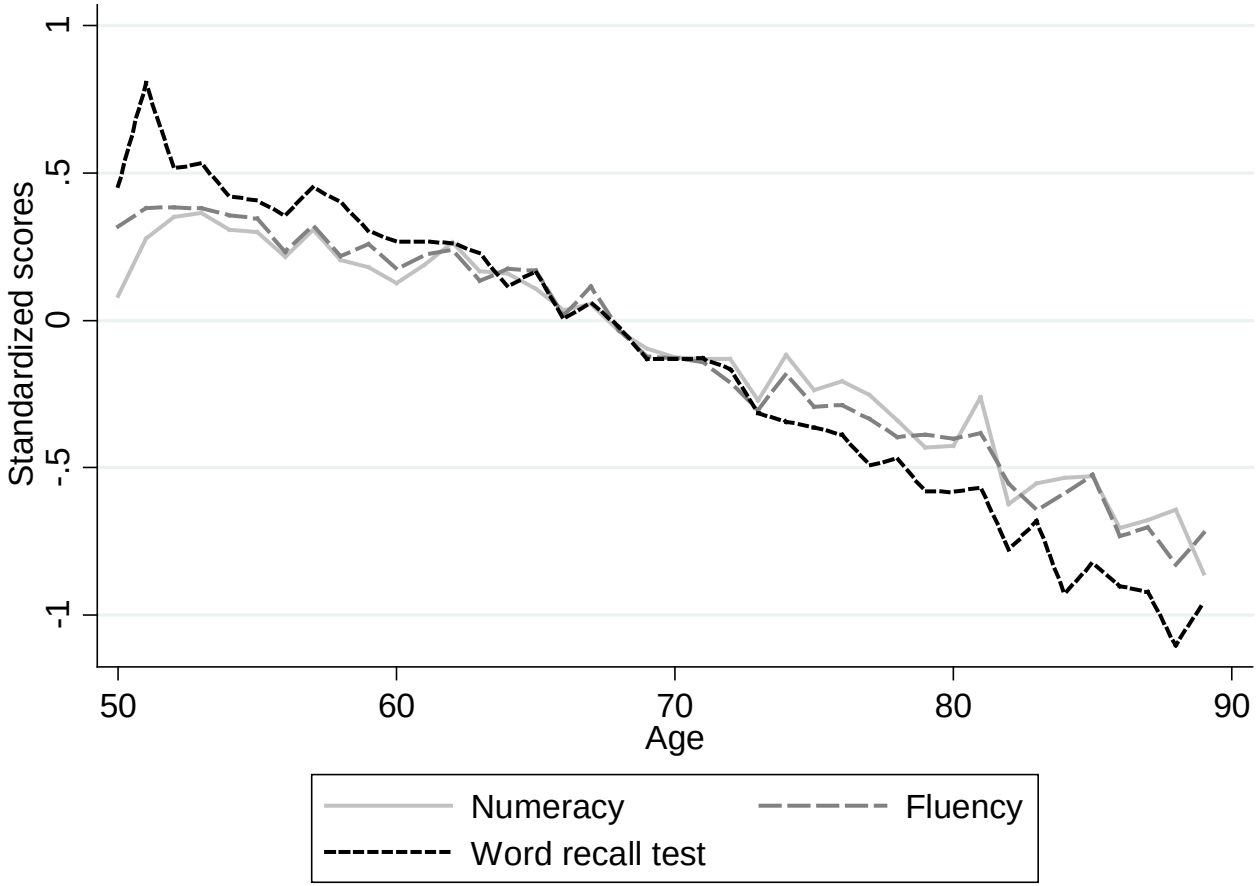
Note: SHARE 2006. The index for cognitive skills is measured as the first component from a principal component analysis using the score from the fluency test, the word recall test and the numeracy test.

Risk Attitude and Health



Note: SHARE 2006.

Cognitive Test Scores and Age



Note: SHARE 2006.

Models for financial Risk Attitude

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Age/10 (in years)	**-0.104*** (0.006)**	**-0.058*** (0.006)**	**-0.043*** (0.008)**	**-0.024*** (0.008)**	**-0.040*** (0.008)**	**-0.023*** (0.008)**
Index for cognitive skills	**-**	**0.108*** (0.007)**	**-**	**0.064*** (0.007)**	**-**	**0.054*** (0.007)**
1 if female	**-**	**-**	**-0.062*** (0.016)**	**-0.068*** (0.016)**	**-0.067*** (0.016)**	**-0.071*** (0.016)**
Years of education	**-**	**-**	**0.020*** (0.001)**	**0.015*** (0.002)**	**0.017*** (0.001)**	**0.013*** (0.002)**
1 if Living in a couple	**-**	**-**	**0.099*** (0.015)**	**0.086*** (0.015)**	**0.056*** (0.015)**	**0.047*** (0.015)**
Household size	**-**	**-**	**-0.027*** (0.008)**	**-0.024*** (0.008)**	**-0.028*** (0.008)**	**-0.025*** (0.008)**
# of chronic diseases	**-**	**-**	**-0.001 (0.005)**	**-0.001 (0.005)**	**0.000 (0.005)**	**0.000 (0.005)**
# of symptoms	**-**	**-**	**-0.002 (0.004)**	**0.000 (0.004)**	**0.001 (0.004)**	**0.003 (0.004)**
Height (in cm)	**-**	**-**	**0.004*** (0.001)**	**0.004*** (0.001)**	**0.004*** (0.001)**	**0.004*** (0.001)**
Ln(Wealth)	**-**	**-**	**-**	**-**	**0.038*** (0.003)**	**0.036*** (0.003)**
Controls for labour force status	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**
Country fixed effect	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Number of observations	**11,662**	**11,662**	**11,662**	**11,662**	**11,662**	**11,662**

Note: SHARE 2006. The dependent variable takes the value of 1 for individuals not willing to take any financial risks and 4 if the individual reports willing to take substantial financial risks expecting receive a substantial return. Cognitive skills are measured as the first component from a principal component analysis using the score from the fluency test, the word recall test and the numeracy test. Standard errors are in parentheses. (*), (**), (***) mean that the coefficient estimate is significantly different from zero at the 10%, 5%, 1% levels, respectively.

Measurement Error Issue

- Measurement error in the measure of cognitive skills is likely to induce a attenuation bias on the coefficient estimate of cognitive skills.
- Furthermore, measurement error in the measure of cognitive skills is likely to induce inconsistent coefficient estimates for the other explanatory variables:

$$risk_i = \beta_1\, age_i + \beta_2\, cognition\ *_i + \varepsilon_i,$$

$$cognition_i = cognition\ *_i + \nu_i, \text{ with } Cov(cognition\ *, \nu) = 0,$$

it can be shown that the coefficient on age will be biased as follows:

$$p\lim \hat{\beta}_{1OLS} = \beta_1 + \frac{\sigma_v^2 \sigma_{age\ cognition}}{\sigma_{age}^2 \sigma_{cognition}^2 - \sigma_{age\ cognition}^2 + \sigma_v^2 \sigma_{age}^2} \beta_2$$

- As a result, the previous results are likely to provide a lower bound estimate of the role of cognitive decline in explaining the age-cohort profile of risk attitude. Intuitively, age absorbs a part of the true variation of risk that is due to cognitive decline.

Measurement Error Issue

- Assuming that measurement error is uncorrelated over time, this issue can be mitigated by using the lag of the cognitive skills score as an instrument for contemporaneous cognitive skills score.

Models for financial risk attitude.

	OLS	OLS	2SLS
	(v)	(vi)	(ix)
Age/10 (in years)	-0.040***	-0.023***	-0.012
	(0.008)	(0.008)	(0.009)
Index for cognitive skills	-	0.054***	0.091***
		(0.007)	(0.013)
Controls for socio-economic and demographic characteristics	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Number of observations	11,662	11,662	11,662

Note: SHARE 2006. The dependent variable takes the value of 1 for individuals not willing to take any financial risks and 4 if the individual reports willing to take substantial financial risks expecting receive a substantial return. Cognitive skills are measured as the first component from a principal component analysis using the score from the fluency test, the word recall test and the numeracy test. Standard errors are in parentheses. (*), (**), (***) mean that the coefficient estimate is significantly different from zero at the 10%, 5%, 1% levels, respectively.

Robustness Checks

- Including the three cognitive test scores separately

	OLS	OLS	OLS	OLS	2SLS
	(i)	(ii)	(v)	(vi)	(ix)
Age/10 (in years)	-0.104***	-0.063***	-0.040***	-0.026***	-0.013
	(0.006)	(0.006)	(0.008)	(0.008)	(0.009)
Numeracy score	-	0.085***	-	0.040***	0.042**
		(0.006)		(0.007)	(0.019)
Fluency score	-	0.039***	-	0.018**	0.035*
		(0.007)		(0.007)	(0.019)
Memory score	-	0.011	-	0.011	0.037*
		(0.007)		(0.007)	(0.022)
Controls for socio-economic and demographic characteristics	No	No	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Number of observations	11,662	11,662	11,662	11,662	11,662

Note: SHARE 2006. The dependent variable takes the value of 1 for individuals not willing to take any financial risks and 4 if the individual reports willing to take substantial financial risks expecting receive a substantial return. Cognitive test scores are normalized. Standard errors are in parentheses. (*), (**), (***) mean that the coefficient estimate is significantly different from zero at the 10%, 5%, 1% levels, respectively.

Robustness Checks

- Using stock ownership as an alternative measure of risk attitude

	OLS	OLS	OLS	OLS	OLS	OLS	2SLS
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(ix)
Age/10 (in years)	-0.038***	-0.012***	-0.008*	0.001	-0.006	0.001	0.009*
	(0.003)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Index for cognitive skills	-	0.060***	-	0.031***	-	0.023***	0.048***
		(0.004)		(0.004)		(0.004)	(0.008)
1 if female	-	-	0.007	0.005	0.004	0.002	0.000
			(0.010)	(0.010)	(0.009)	(0.009)	(0.009)
Years of education	-	-	0.014***	0.012***	0.011***	0.010***	0.008***
			(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
1 if Living in a couple	-	-	0.075***	0.069***	0.043***	0.040***	0.035***
			(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Household size	-	-	-0.008	-0.006	-0.008*	-0.007	-0.005
			(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
# of chronic diseases	-	-	-0.003	-0.003	-0.002	-0.002	-0.002
			(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
# of symptoms	-	-	-0.006***	-0.005**	-0.003	-0.002	-0.002
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Height (in cm)	-	-	0.002***	0.002***	0.002***	0.002***	0.001***
			(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ln(Wealth)	-	-	-	-	0.028***	0.027***	0.026***
					(0.002)	(0.002)	(0.002)
Controls for labour force status	No	No	Yes	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	11,217	11,217	11,217	11,217	11,217	11,217	11,217

Note: SHARE 2006. The dependent variable is takes the value of 1 for individuals reporting having stocks and 0 otherwise. Cognitive skills are measured as the first component from a principal component analysis using the score from the fluency test, the word recall test and the numeracy test. Standard errors are in parentheses. (*), (**), (***) mean that the coefficient estimate is significantly different from zero at the 10%, 5%, 1% levels, respectively.

Robustness Checks

- We estimate the model using the ordered probit model in order to account for the ordinal nature of our dependent variable and found similar results as those obtained trough OLS.
- Estimating the model restricting the sample to the 50-75 year-old provides results in line with our main findings.
- Country by country estimation: All countries present a negative correlation between the willingness to take financial risks and age. Once controlling for socio-demographic characteristics and measurement error of cognitive skills, the age coefficent estimate is not significantly different from zero in all countries.
- Comparison of the predictive power of age vs. cognitive skills for financial risk attitude. The model that includes cognitive skills but not age has a better predictive power than the model that includes age but not cognitive skills.

Conclusion

- In this paper, we tested for the hypothesis that age-differences in risk attitude is related to age-differences in cognitive functioning and provide suggestive evidence that the change in risk attitude at older age is driven by cognitive decline.
- We show that about 70% of the age-related change in risk attitude can be attributed to cognitive ageing. We also show the importance of taking into account measurement error when using cognitive skills measures as explanatory variables.
- These findings are important as they shed light on what drives changes in risk attitudes over the life-cycle, a process that is not yet well understood, and because they point towards a causal relationship between cognitive ability and risk preference.

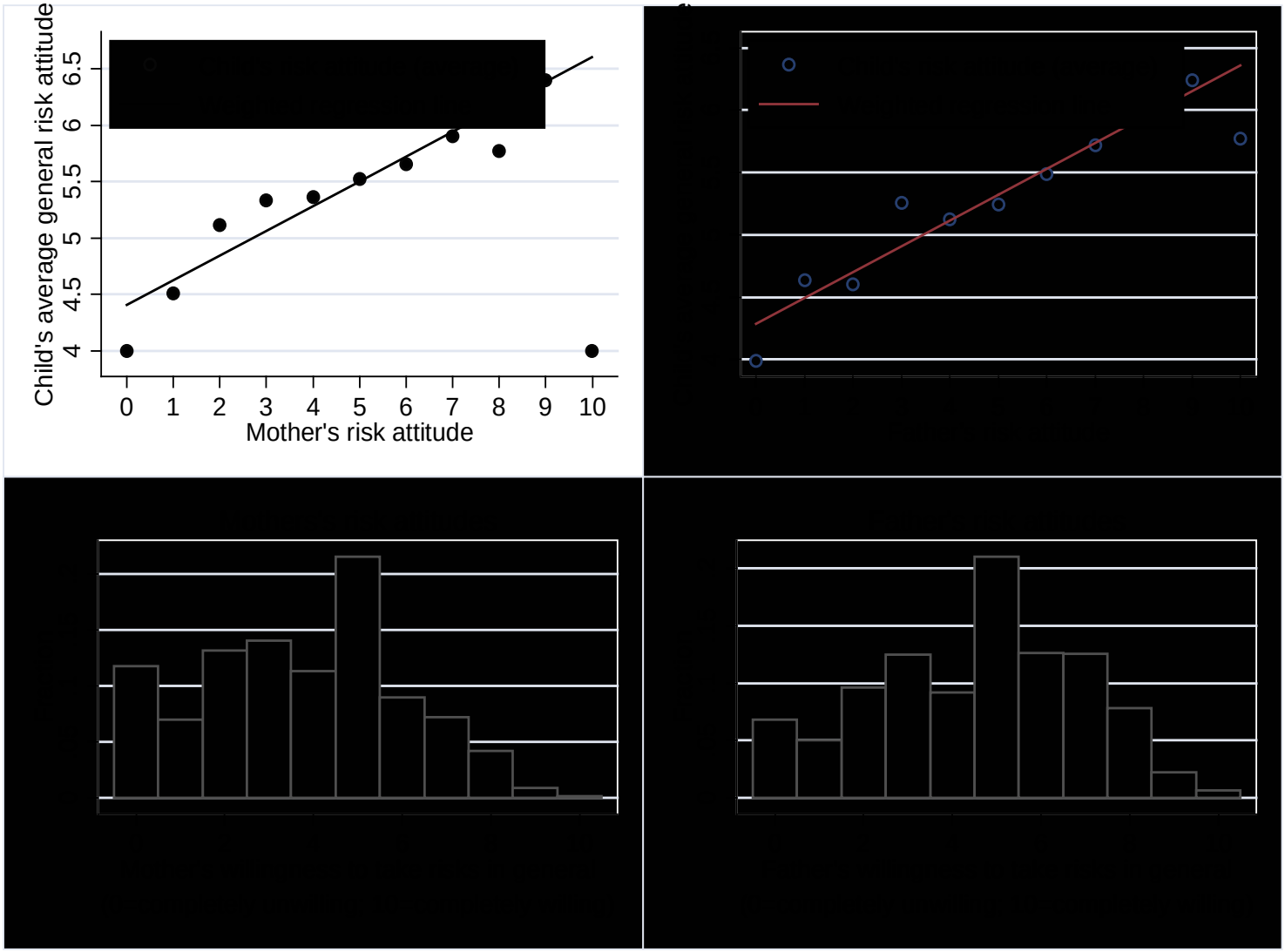
Origin of Preferences

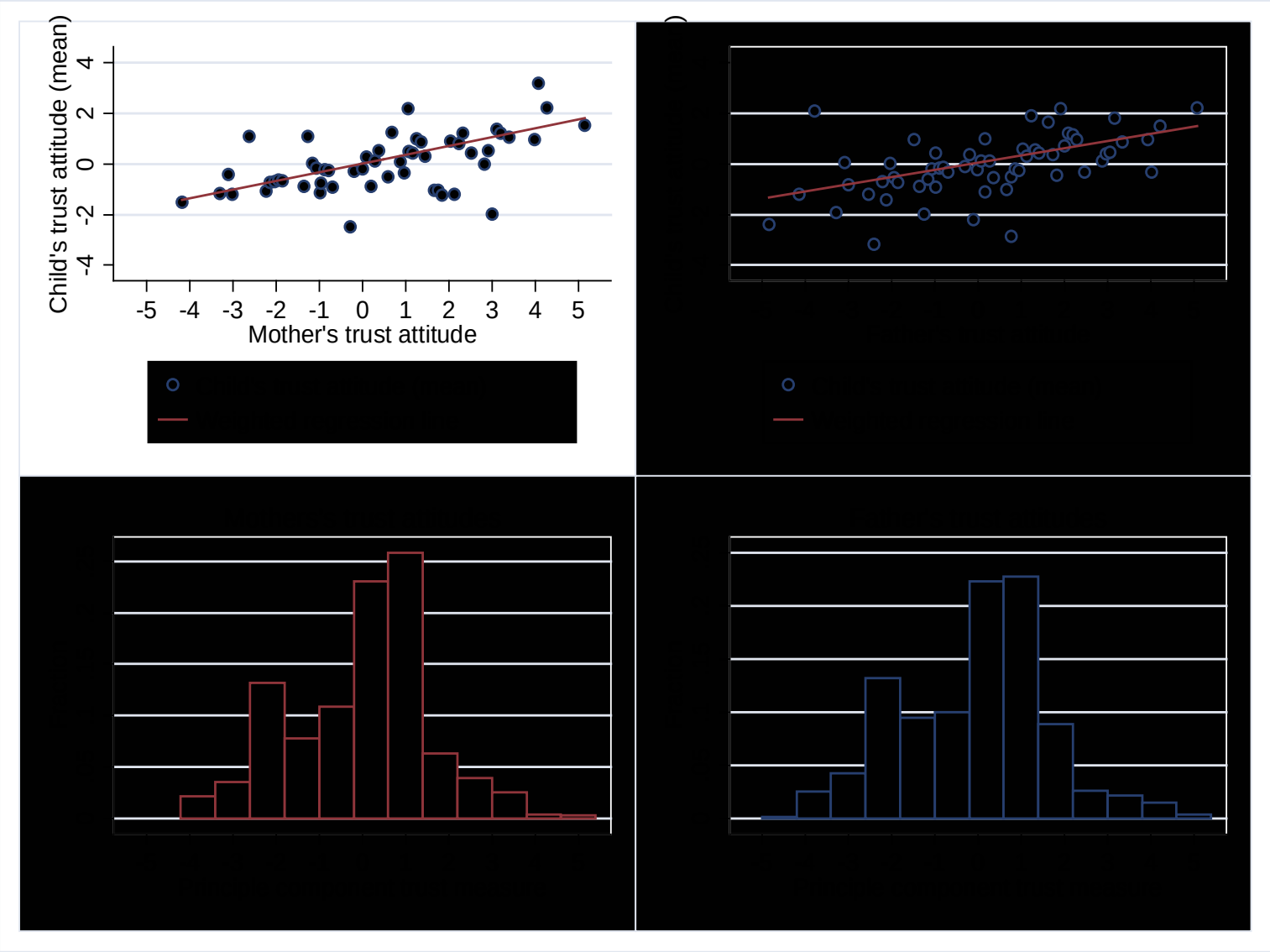
Intergenerational Transmission

Dohmen, Falk, Huffman, Sunde (2012). The Intergenerational Transmission of Risk and Trust Attitudes. Review of Economic Studies 79, 645–677.

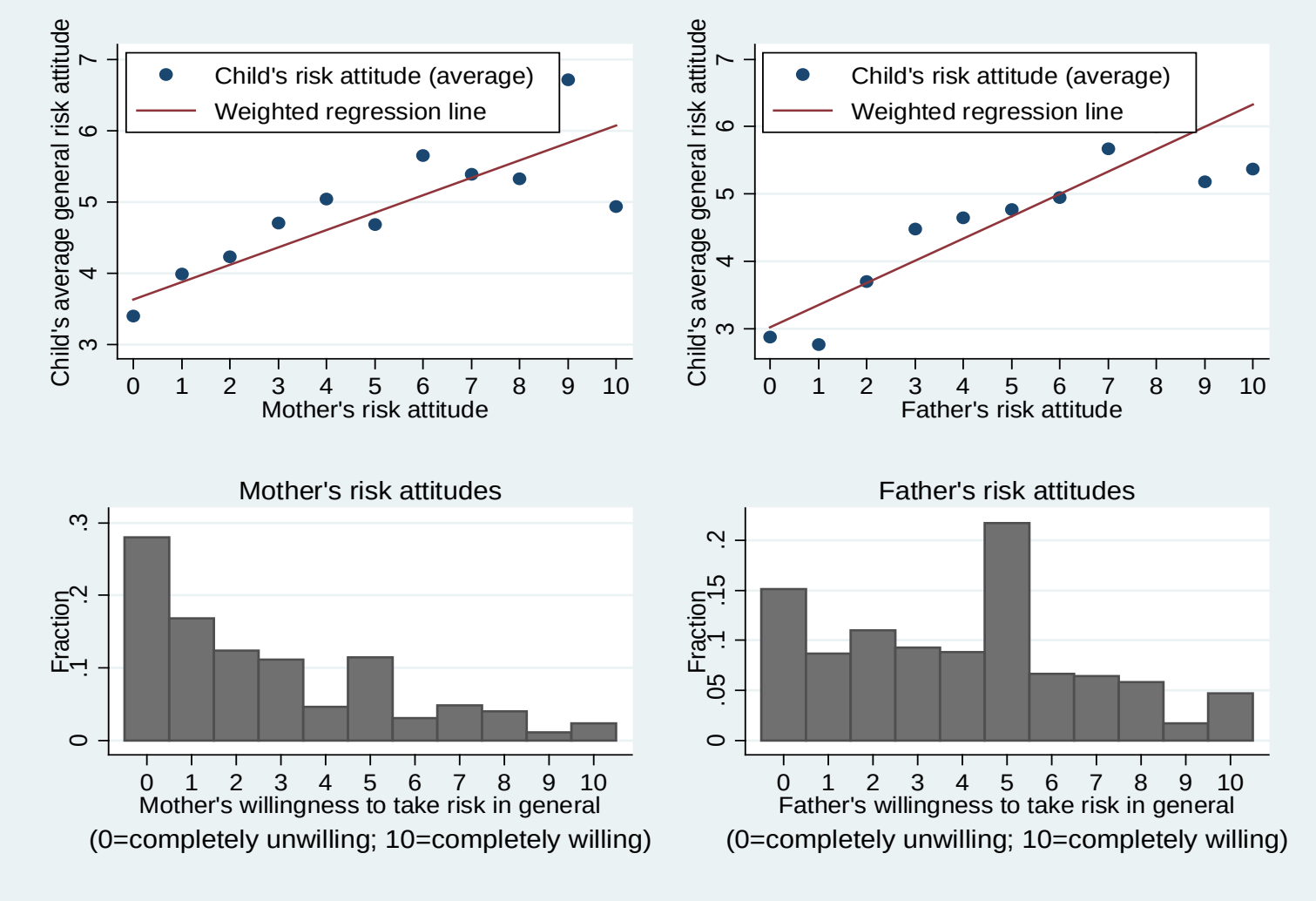
The Intergenerational Transmission of Risk and Trust Attitudes

- Are preferences, attitudes and beliefs transmitted from one generation to the next?
  - How precise and detailed is this transmission?
  - Is the transmission reinforced by assortative mating?
- What is the role of the social environment in shaping preferences? To what extent are preferences and attitudes determined by genetic predisposition?

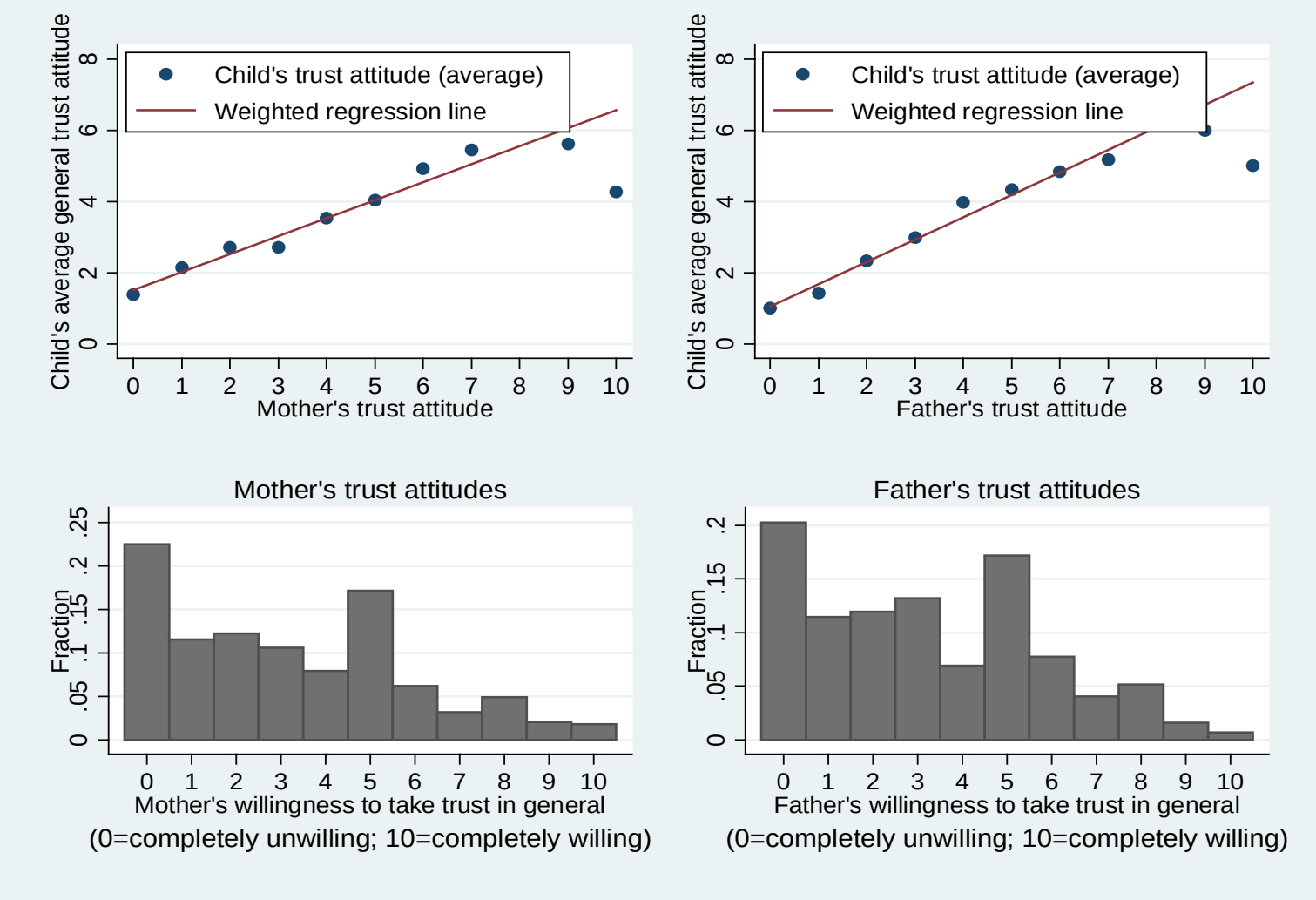

Child's average general risk attitude
4
4.5
5
5.5
6
6.5
0
1
2
3
4
5
6
7
8
9
10
Mother's risk attitude


Child's trust attitude (mean)
4
2
0
-2
-4
-5 -4 -3 -2 -1 0 1 2 3 4 5
Mother's trust attitude

Same in Ukraine…



Same in Ukraine…



The relationship between children´s and parents´attitudes

	Child's willingness to take risks in general				Child's trust (principal component)			
Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mother's willingness to take risks in general	0·166***	0·154***	0·149***	0·141***				−0·015
	[0·019]	[0·019]	[0·022]	[0·024]				[0·022]
Father's willingness to take risks in general	0·157***	0·143***	0·153***	0·173***				−0·035
	[0·020]	[0·020]	[0·023]	[0·025]				[0·023]
Trust: mother				−0·067***	0·239***	0·235***	0·200***	0·202***
				[0·025]	[0·020]	[0·020]	[0·024]	[0·024]
Trust: father				−0·031	0·160***	0·157***	0·140***	0·145***
				[0·025]	[0·020]	[0·020]	[0·024]	[0·024]
Child's willingness to take risks in general								0·044**
								[0·022]
Trust: child				0·046**				
				[0·023]				
1 if female		−0·229***	−0·215***	−0·254***		0·000	−0·038	−0·017
		[0·051]	[0·055]	[0·060]		[0·052]	[0·060]	[0·060]
Age of child (years)		−0·017***	−0·020***	−0·016***		−0·014***	−0·009*	−0·009*
		[0·004]	[0·005]	[0·005]		[0·004]	[0·005]	[0·005]
Height of child (cm)		0·009***	0·009***	0·008**		0·003	0·001	0·001
		[0·003]	[0·003]	[0·004]		[0·003]	[0·003]	[0·003]
Age of mother (years)		0·010**	0·015***	0·015**		0·009*	0·013**	0·012*
		[0·005]	[0·006]	[0·006]		[0·005]	[0·006]	[0·006]
Age of father (years)		−0·007	−0·012**	−0·015**		0·005	−0·000	−0·000
		[0·004]	[0·005]	[0·006]		[0·005]	[0·006]	[0·006]
Height of mother (cm)		−0·002	−0·002	−0·002		−0·000	−0·003	−0·003
		[0·003]	[0·004]	[0·004]		[0·003]	[0·004]	[0·004]
Height of father (cm)		−0·003	−0·003	−0·002		0·004	0·001	0·001
		[0·003]	[0·003]	[0·003]		[0·003]	[0·003]	[0·003]
Constant	0·001	−0·461	−0·729	−0·596	0·001	−1·496**	0·354	0·325
	[0·017]	[0·616]	[0·759]	[0·803]	[0·017]	[0·640]	[0·824]	[0·830]
Additional controls	No	No	Yes	Yes	No	No	Yes	Yes
Observations	3337	3333	2985	2583	3301	3250	2601	2583
R^2	0·072	0·112	0·208	0·228	0·119	0·128	0·258	0·261

Notes on previous table

Notes: The dependent variable in Columns (1)–(4) measures general willingness to take risks on a 11-point scale from 0 (completely unwilling to take risks) to 10 (completely willing to take risks). The dependent variable in Columns (5)–(8) is trust measured as the principal component obtained from agreement with three statements regarding trust (general trust, reliance on others, need for caution in dealing with strangers) measured on a four-point scale. All dependent variables are standardized. Explanatory risk variables are also measured on the 11-point scale; explanatory trust variables are measured as principal components and are also standardized. Coefficients in all columns are OLS estimates. Robust standard errors in brackets allow for clustering at the household level; ***, **, and * indicate significance at 1%, 5%, and 10% level, respectively. Additional controls include years of schooling of child and child's father and mother; corresponding indicator variables for missing schooling information; indicator variables for characteristics of the residence of youth before the age of 16, for child and parents (big city, city, countryside, missing; the reference category is small town); indicator variables for religion of child and parents (catholic, protestant, other non-Christian, no religious affiliation, missing religion; the reference category is other Christian), gross annual household income for child, child's mother and father, subjective health status of child, and child's mother and father (five response categories), and fixed effects for region (Raumordnungsregion) and 17 nationality–ethnicity dummies (reference category is German). All religion information is obtained from the 2003 wave of the SOEP.

TABLE 2

Robustness to alternative risk measures

	Child's willingness to take risks in the context of						
	General	Car driving	Financial matters	Sports & leisure	Career	Health	Hypothetical lottery (amount)
Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Willingness to take risks: mother	0·149***	0·147***	0·136***	0·185***	0·177***	0·168***	0·177***
(in respective context)	[0·022]	[0·023]	[0·021]	[0·021]	[0·024]	[0·022]	[0·029]
Willingness to take risks: father	0·153***	0·143***	0·136***	0·163***	0·145***	0·135***	0·166***
(in respective context)	[0·023]	[0·024]	[0·022]	[0·022]	[0·025]	[0·022]	[0·026]
Observations	2985	2637	2892	2931	2547	2979	2975
R^2	0·21	0·23	0·21	0·25	0·23	0·19	0·10

Scale Use and Specificity of Transmission Process

- Do family members just use scales similarly?
- Observe differences in response behavior in different contexts for parents; context questions all use the same 11-point scale.
- If children are similar to their parents in terms of this distinct response behavior, scale use cannot be the whole story, because the scale is held constant across measures.
- We regress responses in different contexts on parental responses in all these different contexts.
  - If transmission is distinct: ‘diagonal’ should be most important

Specificity of the intergenerational correlation in risk attitudes

	Child's willingness to take risks in the context of					
	General	Car driving	Financial matters	Sports & leisure	Career	Health
Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
Willingness to take risks in the context of						
General: mother	0·084***	−0·022	−0·015	0·020	0·027	−0·041
	[0·025]	[0·025]	[0·026]	[0·023]	[0·024]	[0·025]
General: father	0·086***	−0·027	−0·054*	−0·015	0·018	−0·014
	[0·025]	[0·027]	[0·029]	[0·025]	[0·026]	[0·028]
Driving: mother	−0·046**	0·114***	0·012	−0·007	−0·016	−0·015
	[0·023]	[0·026]	[0·025]	[0·022]	[0·024]	[0·025]
Driving: father	0·005	0·097***	−0·020	0·009	−0·006	−0·022
	[0·024]	[0·026]	[0·026]	[0·023]	[0·025]	[0·025]
Financial: mother	0·019	−0·045*	0·114***	−0·016	−0·041*	−0·006
	[0·023]	[0·026]	[0·027]	[0·022]	[0·025]	[0·026]
Financial: father	−0·025	0·024	0·089***	0·036	−0·028	−0·036
	[0·024]	[0·027]	[0·025]	[0·024]	[0·026]	[0·026]
Sports: mother	−0·020	0·005	−0·058**	0·111***	−0·030	0·012
	[0·025]	[0·030]	[0·028]	[0·025]	[0·027]	[0·027]
Sports: father	−0·022	−0·038	0·032	0·090***	0·019	−0·022
	[0·026]	[0·027]	[0·026]	[0·025]	[0·026]	[0·027]
Career: mother	0·004	−0·001	−0·016	0·019	0·080***	−0·021
	[0·026]	[0·030]	[0·030]	[0·026]	[0·028]	[0·029]
Career: father	−0·022	0·001	0·051*	−0·030	0·084***	−0·014
	[0·026]	[0·027]	[0·028]	[0·026]	[0·028]	[0·029]
Health: mother	0·019	−0·028	−0·016	−0·045**	0·015	0·102***
	[0·023]	[0·026]	[0·028]	[0·022]	[0·024]	[0·026]
Health: father	−0·035	−0·008	−0·037	−0·037*	−0·045*	0·145***
	[0·022]	[0·024]	[0·025]	[0·021]	[0·024]	[0·025]
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2311	2311	2311	2311	2311	2311
R^2	0·536	0·489	0·443	0·572	0·529	0·472

Specificity of the intergenerational correlation in risk attitudes

	General trust	Reliability	Need for caution
Dependent variable is child's	(1)	(2)	(3)
Trust: mother	0·156***	0·053**	−0·016
	[0·025]	[0·024]	[0·023]
Trust: father	0·098***	0·040*	0·042*
	[0·025]	[0·024]	[0·025]
Reliability: mother	0·034	0·124***	0·028
	[0·023]	[0·024]	[0·024]
Reliability: father	0·035	0·147***	0·013
	[0·025]	[0·026]	[0·025]
Caution: mother	0·043**	−0·014	0·132***
	[0·021]	[0·022]	[0·023]
Caution: father	0·017	−0·010	0·081***
	[0·021]	[0·022]	[0·022]
Trust: child		−0·422***	−0·134***
		[0·022]	[0·023]
Reliability: child	−0·431***		0·185***
	[0·022]		[0·023]
Caution: child	−0·118***	0·159***	
	[0·021]	[0·019]	
1 if female	0·036	0·009	−0·016
	[0·054]	[0·053]	[0·054]
Age of child (years)	0·006	−0·007	0·006
	[0·005]	[0·005]	[0·005]
Height of child (cm)	−0·000	−0·003	0·005
	[0·003]	[0·003]	[0·003]
Age of mother (years)	0·004	0·014**	0·001
	[0·006]	[0·006]	[0·006]
Age of father (years)	−0·005	−0·007	0·004
	[0·005]	[0·005]	[0·005]
Height of mother (cm)	0·006*	0·002	0·001
	[0·003]	[0·003]	[0·003]
Height of father (cm)	−0·002	0·002	−0·003
	[0·003]	[0·003]	[0·003]
Constant	−1·704**	−0·676	−0·934
	[0·743]	[0·732]	[0·769]
Additional controls	Yes	Yes	Yes
Observations	2601	2601	2601
R^2	0·390	0·405	0·293

Socialization, Reverse Causality, and Culture

- Nature or Nurture?
  - Difficult to say with data at hand, but:
    - specificity results
    - family structure matters (first-born, later-born)

- Reverse Causality?
  - Use work from literature on culture (Guiso et al., 2003)

➔ Religion, education as proxy for culture
➔ parental religion/education as instrument for parental risk attitudes

Socialization

TABLE 8
Evidence on mechanisms of socialization

Panel A

	Child's willingness to take risks									
	Similarity of parents		Only mothers		Siblings		Relationship		Gender	
	Homogeneous	Heterogeneous	Single	Homogeneous	None	One or more	Harmonic	Fights	Daughters	Sons
Dependent variable										
Sample	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Willingness to take risks: mother	0·138***	0·111***	0·336***	0·285***	0·255***	0·138***	0·206***	0·177**	0·163***	0·149***
	[0·038]	[0·030]	[0·102]	[0·025]	[0·055]	[0·020]	[0·060]	[0·086]	[0·027]	[0·027]
Willingness to take risks: father	0·179***	0·093***			0·104*	0·148***	0·346***	0·047	0·147***	0·140***
	[0·039]	[0·032]			[0·058]	[0·021]	[0·068]	[0·086]	[0·027]	[0·028]
Observations	2286	1047	111	2286	347	2958	229	198	1575	1758
R^2	0·126	0·088	0·177	0·116	0·146	0·115	0·241	0·077	0·113	0·075

Panel B

	Child's trust (principal component)									
	Similarity of parents		Only mothers		Siblings		Relationship		Gender	
	Homogeneous	Heterogeneous	Single	Homogeneous	None	One or more	Harmonic	Fights	Daughters	Sons
Dependent variable										
Sample	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Trust: mother	0·231***	0·226***	0·363***	0·375***	0·274***	0·228***	0·211***	0·156**	0·262***	0·208***
	[0·046]	[0·029]	[0·100]	[0·023]	[0·057]	[0·022]	[0·062]	[0·069]	[0·029]	[0·028]
Trust: father	0·170***	0·144***			0·147**	0·160***	0·327***	0·171***	0·142***	0·173***
	[0·048]	[0·027]			[0·059]	[0·022]	[0·064]	[0·062]	[0·028]	[0·029]
Observations	2212	1038	90	2215	347	2875	248	213	1524	1726
R^2	0·144	0·104	0·172	0·138	0·161	0·127	0·305	0·194	0·135	0·126

TABLE 5

The relationship between children's and parents' attitudes: IV results

	Child's willingness to take risks in general			Child's trust (principal component)		
Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
Mother's willingness to take risks in general	0·255***		0·229**			
	[0·086]		[0·100]			
Father's willingness to take risks in general		0·190*	0·026			
		[0·099]	[0·116]			
Trust: mother				0·842***		0·371**
				[0·126]		[0·163]
Trust: father					0·585***	0·259*
					[0·085]	[0·151]
1 if female	−0·231***	−0·233***	−0·232***	−0·012	−0·008	−0·008
	[0·047]	[0·049]	[0·048]	[0·056]	[0·052]	[0·049]
Age of child (years)	−0·016***	−0·017***	−0·016***	0·001	−0·004	−0·003
	[0·004]	[0·004]	[0·004]	[0·004]	[0·003]	[0·003]
Height of child (cm)	0·009***	0·009***	0·009***	0·001	0·003	0·003
	[0·003]	[0·003]	[0·003]	[0·003]	[0·003]	[0·003]
Constant	−1·139**	−1·226**	−1·139**	−0·153	−0·446	−0·386
	[0·513]	[0·524]	[0·517]	[0·573]	[0·536]	[0·503]
Additional controls						
Observations	3333	3333	3333	3253	3250	3250
R^2 second stage (centred)	0·09	0·09	0·10	−0·16	−0·01	0·09
First-stage partial R^2 (mother)	0·04		0·03	0·02		0·02
First-stage F(2,50) (mother)	9·99		6·19	5·24		5·97
First-stage partial R^2 (father)		0·03	0·03		0·05	0·02
First-stage F(2,50) (father)		7·32	4·23		9·20	6·99
Hansen overidentification (p-value)	0·22	0·78	0·21	0·67	0·52	0·34

Does the regional Environment matter?

- Could it be that average attitudes (willingness to take risks in a particular region, trust) affect individuals‘ attitudes beyond parents?

- Could this interfere/interact with the intergenerational transmission within a family?

(Data: Intergenerational data as before)

TABLE 6

The role of regional attitudes

	Child's willingness to take risks in general			Child's trust (principal component)		
Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
Mother's willingness to take risks in general	0·154***	0·140***	0·141***			
	[0·019]	[0·019]	[0·019]			
Father's willingness to take risks in general	0·143***	0·135***	0·134***			
	[0·020]	[0·020]	[0·020]			
Average regional willingness to take risks in general		0·363***	0·461***			
		[0·078]	[0·082]			
Trust: mother				0·235***	0·217***	0·217***
				[0·020]	[0·020]	[0·020]
Trust: father				0·157***	0·142***	0·143***
				[0·020]	[0·020]	[0·020]
Average regional trust (principal component)					0·476***	0·441***
					[0·074]	[0·076]
1 if female	−0·229***	−0·227***	−0·240***	0·000	0·003	−0·006
	[0·051]	[0·051]	[0·051]	[0·052]	[0·051]	[0·051]
Age of child (years)	−0·017***	−0·018***	−0·019***	−0·014***	−0·014***	−0·015***
	[0·004]	[0·004]	[0·004]	[0·004]	[0·004]	[0·004]
Height of child (cm)	0·009***	0·009***	0·009***	0·003	0·003	0·004
	[0·003]	[0·003]	[0·003]	[0·003]	[0·003]	[0·003]
Age of mother (years)	0·010**	0·011**	0·011**	0·009*	0·009*	0·008
	[0·005]	[0·005]	[0·005]	[0·005]	[0·005]	[0·005]
Age of father (years)	−0·007	−0·007	−0·007*	0·005	0·003	0·003
	[0·004]	[0·004]	[0·004]	[0·005]	[0·005]	[0·005]
Height of mother (cm)	−0·002	−0·002	−0·002	−0·000	−0·001	−0·001
	[0·003]	[0·003]	[0·003]	[0·003]	[0·003]	[0·003]
Height of father (cm)	−0·003	−0·003	−0·003	0·004	0·003	0·003
	[0·003]	[0·003]	[0·003]	[0·003]	[0·003]	[0·003]
Constant	−0·461	−0·427	−1·408**	−1·496**	−1·319**	−2·234***
	[0·616]	[0·615]	[0·676]	[0·640]	[0·635]	[0·692]
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3333	3333	3333	3250	3250	3250
R^2	0·112	0·118	0·121	0·128	0·140	0·144

Assortative Mating?

- Partners tend to be similar
  - Age, social background, physical attractiveness or height but also behaviors (e.g., smoking, leisure activities)
- Assortative mating wrt. attitudes depends on whether traits are complements or substitutes for household production
- Transmission context: Positive assortative mating because this minimizes distortions in child attitudes caused by dissimilar spouse
- This reinforces strength and importance of intergenerational transmission

Data

- German Socio-Economic Panel
- 7,278 couples with non-missing information on attitudes
- General risk and trust measure as before

Assortative Mating: Willingness to take Risks

	Willingness to take risks in general: female spouse					
	Full sample			Parents in sample		
Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
Willingness to take risks						
Male partner (standardized)	0·341***	0·312***	0·272***	0·388***	0·358***	0·262***
	[0·012]	[0·012]	[0·013]	[0·019]	[0·020]	[0·021]
Additional controls						
Age, height	No	Yes	Yes	No	Yes	Yes
Other controls	No	No	Yes	No	No	Yes
Observations	7278	7271	6677	3337	3337	3112
R^2	0·116	0·130	0·190	0·151	0·166	0·297

Assortative Mating: Trust

	Trust (principal component): female spouse					
	Full sample			Parents in sample		
Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
Trust: male partner (standardized)	0·482***	0·477***	0·412***	0·477***	0·472***	0·411***
	[0·012]	[0·012]	[0·013]	[0·020]	[0·021]	[0·022]
Additional controls						
Age, height	No	Yes	Yes	No	Yes	Yes
Other controls	No	No	Yes	No	No	Yes
Observations	6967	6953	6408	3301	3292	2868
R^2	0·232	0·234	0·288	0·227	0·234	0·340

Summary of Findings

- Intergenerational Transmission of Preferences
  - Robust intergenerational correlation in willingness to take risks and trust
  - Evidence is based on experimentally-validated measures that predict actual risk taking and trusting behavior
  - Transmission process is relatively fine-tuned
  - Reinforced by positive assortative mating
  - Socialization matters (family size, birth order, region)
    - Additional evidence on socialization: parental involvement is related to difference in preferences of parents and children (Zumbühl, Dohmen, Pfann)

Details

Concluding Remarks

- Channel: genetics, deliberate inculcation (investment), child learning by imitation and interaction
  - Unlikely to be only genetics (culture, family structure)
- Tip of the iceberg: other attitudes transmitted?
  - time preference
  - reciprocity
  - work attitudes

Cultural Origins of Between-Country Heterogeneity?

- Preference variation may have deep cultural or historical roots
- One approach: Use language structure as proxy for cultural variation
- Chen (AER, 2013): Future-time reference (FTR) predictive of future-oriented behaviors such as savings
- Strong FTR: Explicit coding of future (I will go home); weak FTR: coding of tense optional
- Argument: Strong FTR makes future seem more distant, so people less future-oriented

FTR and Patience Across Countries

	Patience	Risk taking	Pos. reciprocity	Neg. reciprocity	Altruism	Trust
	(1)	(2)	(3)	(4)	(5)	(6)
Fraction of population speaking weak FTR	0.24***	-0.0080	0.16**	-0.088	0.099	0.18**
	(0.09)	(0.07)	(0.08)	(0.09)	(0.10)	(0.08)
Log [GDP p/c PPP]	0.15***	0.032	-0.072*	0.058	-0.078*	-0.00072
	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)
Distance to equator	0.010*	0.0017	-0.0069	-0.0081	-0.0022	-0.0072
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Longitude	-0.0019	0.0023	0.0022	0.00091	0.0025	-0.00004
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
% at risk of malaria	0.25	-0.14	-0.27	-0.13	-0.71**	-0.16
	(0.21)	(0.23)	(0.29)	(0.17)	(0.27)	(0.19)
Average precipitation	-0.00024	-0.00092	0.00065	-0.0011	0.0031**	-0.0011
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Constant	-1.42***	-0.041	1.39***	-0.13	1.27**	0.56
	(0.51)	(0.36)	(0.43)	(0.50)	(0.50)	(0.38)
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	74	74	74	74	74	74
R^2	0.636	0.442	0.253	0.271	0.334	0.408

Preferences and Country-Level Characteristics

Pairwise correlations between preferences and geographic and cultural variables

	Patience	Risk taking	Pos. recip.	Neg. recip.	Altruism	Trust	# Obs.
(Bio-) geography							
Geographic conditions (O-H)	0.45***	-0.31**	0.20	0.39***	-0.10	0.39***	51
Absolute latitude	0.48***	-0.19	0.13	0.25**	-0.13	0.26**	76
Agricultural suitability (aa)	-0.02	-0.14	0.03	0.03	-0.22*	-0.47***	73
Crop suitability (aa)	0.11	-0.18	-0.11	0.08	-0.22*	-0.37***	73
Biological conditions (O-H)	0.37***	-0.37***	0.30**	0.30**	-0.00	0.44***	51
<u>Culture</u>	0.32***	-0.13	0.13	-0.04	0.07	0.21*	68
Weak future time reference							
Pronoun drop not allowed	0.57***	0.08	0.04	0.06	0.01	0.18	67
Share Protestants	0.45***	0.10	-0.20*	-0.17	-0.14	-0.01	76
Individualism	0.65***	-0.01	-0.05	0.14	-0.14	0.16	62
Family ties	-0.57***	0.34**	0.11	-0.02	0.27*	0.09	49

Notes. Pairwise Pearson correlations between average preferences and other geographic and climatic variables at country level. (aa) = ancestry-adjusted. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Stability of Character Skills and Preferences

Pieces of Evidence

- Heritability
  - Measures of character skills tend to be about 30%-60% heritable, suggesting that something tied to the person, rather than the situation, influences behavior (Bouchard and Loehlin, 2001).
  - Cesarini et al. (2009, QJE) provide evidence for heritability of preferences

- Neuroscience
  - Evidence suggests that expression of different skills is linked to different regions of the brain (see Canli, 2006, and DeYoung, Hirsh, Shane, Papademetris, Rajeevan, and Gray, 2010).

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More evidence on the role of the family

Maria Zumbuehl, Thomas Dohmen, Gerard Pfann (2013). Parental Investment and the Intergenerational Transmission of Economic Preferences and Attitudes. IZA DP 7476

Research Question

- Is similarity in preferences between parents and children affected by parental investments?

- Is there a possibility to shape the transmission of preferences?
  - Theory (e.g. Doepke and Zilibotti, 2012, IZA DP 7108) predicts this

Data

- SOEP data
- Waves 2004-2011
- Only individuals aged 17-26
- 2187 triplets for analysis of risk attitudes
- 1466 triplets for analysis of trust

- Measure:
  - absolute difference between the child's and parent's attitude.
  - standardized difference measure

Investment Variables: Descriptives

	Risk Sample		Trust Sample	
VARIABLES	mean	sd	mean	sd
Parents show interest in performance	3.031	(0.727)	3.023	(0.732)
Parents take part in parents-evening	0.765	(0.424)	0.765	(0.424)
Parents come to teacher office hours	0.573	(0.495)	0.567	(0.496)
Parents visit teacher outside office hours	0.222	(0.416)	0.225	(0.418)
Parents involved in at least one school activity	0.923	(0.267)	0.925	(0.264)
Mother helps with studying	0.742	(0.438)	0.747	(0.435)
Mother talks about things you do	3.778	(0.910)	3.780	(0.893)
Mother talks about things that worry you	3.296	(0.993)	3.299	(0.980)
Mother asks you prior to making decision	3.728	(1.065)	3.733	(1.066)
Mother expresses opinion on something you do	4.027	(0.834)	4.028	(0.805)
Mother is able to solve problems with you	3.636	(0.991)	3.634	(0.988)
Mother asks your opinion on family matters	3.471	(1.033)	3.469	(1.010)
Mother gives reason for making decision	3.576	(1.026)	3.547	(1.006)
Father helps with studying	0.554	(0.497)	0.550	(0.498)
Father talks about things you do	3.328	(0.991)	3.323	(0.983)
Father talks about things that worry you	2.984	(1.001)	2.988	(0.989)
Father asks you prior to making decisions	3.578	(1.140)	3.574	(1.125)
Father expresses opinion on something you do	3.838	(0.938)	3.831	(0.915)
Father is able to solve problems with you	3.449	(1.056)	3.448	(1.046)
Father asks your opinion on family matter	3.325	(1.090)	3.314	(1.073)
Father gives reason for making decision	3.418	(1.083)	3.398	(1.058)
Observations	2,187		1,466	

Table 2: Descriptive statistics on high and low investing parents

	Mother				Father			
	High investing		Low investing		High investing		Low investing	
No. of kids in family	2.461	(1.067)	2.657	(1.285)	2.491	(1.177)	2.634	(1.181)
Age	18.341	(1.209)	18.415	(1.283)	18.341	(1.223)	18.419	(1.271)
1 if female	0.509	(0.500)	0.470	(0.499)	0.492	(0.500)	0.488	(0.500)
Mother's years of education	12.687	(2.714)	11.833	(2.542)	12.617	(2.717)	11.864	(2.544)
Father's years of education	12.911	(2.838)	12.203	(2.763)	12.937	(2.843)	12.127	(2.737)
1 if no migration background	0.837	(0.369)	0.746	(0.436)	0.835	(0.372)	0.743	(0.437)
Age difference MC	27.942	(4.771)	27.511	(5.172)	27.995	(4.840)	27.420	(5.110)
Age difference FC	30.597	(5.670)	30.245	(5.983)	30.639	(5.617)	30.172	(6.058)
HH-income vigintile	11.749	(5.371)	10.619	(5.332)	11.793	(5.279)	10.495	(5.420)
1 if $\Delta_R^{MF} >$ median	0.355	(0.479)	0.358	(0.480)	0.348	(0.477)	0.366	(0.482)
Mother/Father important	4.803	(0.426)	4.619	(0.552)	4.729	(0.491)	4.375	(0.722)
Argue with mother/father	3.658	(0.889)	3.823	(0.945)	3.573	(0.895)	3.729	(0.984)
Observations	1136		1051		1198		989	

Notes: Descriptive statistics, means and standard deviations in parenthesis, of the control variables for high and low investing parents. We use the sample of our analysis on risk for this summary table.

Data source: SOEP, v28.

Table 3: PCA: The impact of parental investments on differences in risk attitudes

VARIABLES	Δ_R^{MC}		Δ_R^{FC}	
	(1)	(2)	(3)	(4)
Investment mother (PCA)	−0.065***	−0.050**		
	(0.023)	(0.023)		
Investment father (PCA)			−0.045*	−0.042*
			(0.024)	(0.025)
1 if Δ_R^{MF} > median		0.476***		0.222***
		(0.048)		(0.048)
No. of kids in family		0.003		−0.015
		(0.020)		(0.019)
Age		0.001		0.006
		(0.018)		(0.020)
1 if female		−0.201***		−0.077*
		(0.041)		(0.043)
Mother's years of education		−0.008		−0.002
		(0.011)		(0.011)
Father's years of education		0.001		−0.003
		(0.011)		(0.011)
1 if no migration background		−0.186***		−0.080
		(0.057)		(0.064)
Age difference MC		−0.001		−0.003
		(0.007)		(0.007)
Age difference FC		0.003		0.007
		(0.006)		(0.006)
HH-income vigintile		0.002		−0.002
		(0.005)		(0.005)
Constant	−0.016	0.051	−0.018	−0.049
	(0.023)	(0.376)	(0.023)	(0.399)
Observations	2,187	2,187	2,187	2,187
R-squared	0.004	0.078	0.002	0.022

Table 4: PCA: The impact of parental investments on differences in trust attit

VARIABLES	Δ_T^{MC}		Δ_T^{FC}	
	(1)	(2)	(3)	(4)
Investment mother (PCA)	−0.030	−0.040		
	(0.025)	(0.026)		
Investment father (PCA)			−0.064**	−0.062**
			(0.032)	(0.031)
1 if Δ_T^{MF} > median		0.267***		0.564**
		(0.057)		(0.058)
No. of kids in family		−0.015		−0.037*
		(0.025)		(0.020)
Age		0.000		0.002
		(0.019)		(0.019)
1 if female		0.024		0.071
		(0.052)		(0.051)
Mother's years of education		0.013		0.019
		(0.013)		(0.013)
Father's years of education		−0.014		−0.013
		(0.012)		(0.013)
1 if no migration background		0.073		−0.043
		(0.065)		(0.075)
Age difference MC		−0.002		0.010
		(0.007)		(0.008)
Age difference FC		0.003		−0.007
		(0.007)		(0.007)
HH-income vigintile		−0.002		−0.000
		(0.006)		(0.005)
Constant	−0.040	−0.150	0.002	−0.253
	(0.026)	(0.420)	(0.027)	(0.444)
Observations	1,466	1,466	1,466	1,466
R-squared	0.001	0.022	0.003	0.083

Table 5: Measurement error correction: Lubotsky-Wittenberg. The impact of parent investments on differences in risk and trust attitudes

VARIABLES	Risk Δ_R^{MC} (1)	Risk Δ_R^{FC} (2)	Trust Δ_T^{MC} (3)	Trust Δ_T^{FC} (4)
Investment Mother/Father (LW)	−0.091***	−0.096***	−0.085***	−0.093***
	(0.019)	(0.020)	(0.023)	(0.021)
1 if Δ_R^{MF} > median	0.485***	0.235***		
	(0.048)	(0.047)		
1 if Δ_T^{MF} > median			0.266***	0.561***
			(0.058)	(0.059)
No. of kids in family	0.005	−0.016	−0.014	−0.036*
	(0.021)	(0.019)	(0.025)	(0.021)
Age	0.002	0.011	−0.002	0.004
	(0.017)	(0.020)	(0.020)	(0.020)
1 if female	−0.201***	−0.067	0.034	0.075
	(0.041)	(0.043)	(0.050)	(0.052)
Mother's years of education	−0.005	−0.001	0.013	0.016
	(0.011)	(0.012)	(0.013)	(0.013)
Father's years of education	0.001	−0.002	−0.016	−0.012
	(0.011)	(0.011)	(0.012)	(0.013)
1 if no migration background	−0.168***	−0.072	0.069	−0.052
	(0.057)	(0.063)	(0.070)	(0.076)
Age difference MC	−0.001	−0.003	−0.002	0.010
	(0.007)	(0.007)	(0.008)	(0.008)
Age difference FC	0.003	0.006	0.003	−0.007
	(0.006)	(0.006)	(0.007)	(0.007)
HH-income vigintile	0.000	−0.003	−0.002	−0.001
	(0.005)	(0.005)	(0.006)	(0.005)
Constant	−10.179	−16.634	−11.031	−7.053
	(17.560)	(18.132)	(23.219)	(24.002)
Observations	2,187	2,187	1,466	1,466
R-squared	0.082	0.027	0.028	0.089

Impact of an increase in investment on the difference in attitude

Risk: Mother-Child (Δ_R^{MC})

	PCA investment index		LW investment index	
A change from the	std	abs	std	abs
25th - 75th percentile in investment	-0.064	-0.126	-0.125	-0.247
5th - 95th percentile in investment	-0.161	-0.319	-0.301	-0.596

Trust: Mother-Child (Δ_T^{MC})

	PCA investment index		LW investment index	
A change from the	std	abs	std	abs
25th - 75th percentile in investment	-0.050	-0.021	-0.111	-0.046
5th - 95th percentile in investment	-0.127	-0.053	-0.280	-0.116

Impact of an increase in investment on the difference in attitude

Risk: Father-Child (Δ_R^{FC})

	PCA investment index		LW investment index	
A change from the	std	abs	std	abs
25th - 75th percentile in investment	-0.047	-0.087	-0.129	-0.237
5th - 95th percentile in investment	-0.120	-0.221	-0.318	-0.584

Trust: Father-Child (Δ_T^{FC})

	PCA investment index		LW investment index	
A change from the	std	abs	std	abs
25th - 75th percentile in investment	-0.069	-0.029	-0.124	-0.053
5th - 95th percentile in investment	-0.174	-0.074	-0.306	-0.130

Evidence on parenting

Thomas Dohmen, Bart Golsteyn, Lena Lindahl, Gerard Pfann, André Richter (2018). “Teach Your Children Well: Determinants and Consequences of Parenting Styles”

Motivation

- Preferences are transmitted from parents to their children (Dohmen et al., 2012)
- Parents are essential for children's development.
- Empirical evidence indicates that parenting styles affect the formation of cognitive skills and personality (Dooley and Stewart 2007; Fiorini and Keane 2014)
  - "parenting in early childhood contributes to the intergenerational persistence in incomes found in many studies" (Ermisch 2008, p. 69).
  - parents who invest more in the upbringing of their children are more similar to them with respect to risk and trust (Zumbühl, Dohmen and Pfann 2013)

Motivation

- Parenting style has been modeled to affect children's skills and preferences
  - in human captial framework: Cobb-Clark, Salamanca and Zhu 2016
  - in game-theoretic framework: e.g. Burton et al. 2002; Hao et al. 2008; Cosconati 2009; Lundberg et al. 2009.

Motivation

- Dominant parenting styles differ across time and between countries.
- Doepke and Zilibotti (2017): Choice of parenting style is depends on economic incentives and social mobility.
- Besides predicting the choice of parenting styles, the model generates implications for child outcomes.

This Study

- This study investigates whether there is empirical support for the model:
  - Assumptions of the model are assessed empirically
  - Outcomes for children later in life are investigated
- We use a Swedish survey on parenting styles when children are 15 years, linked to administrative registers of the children that span five decades.

This Study

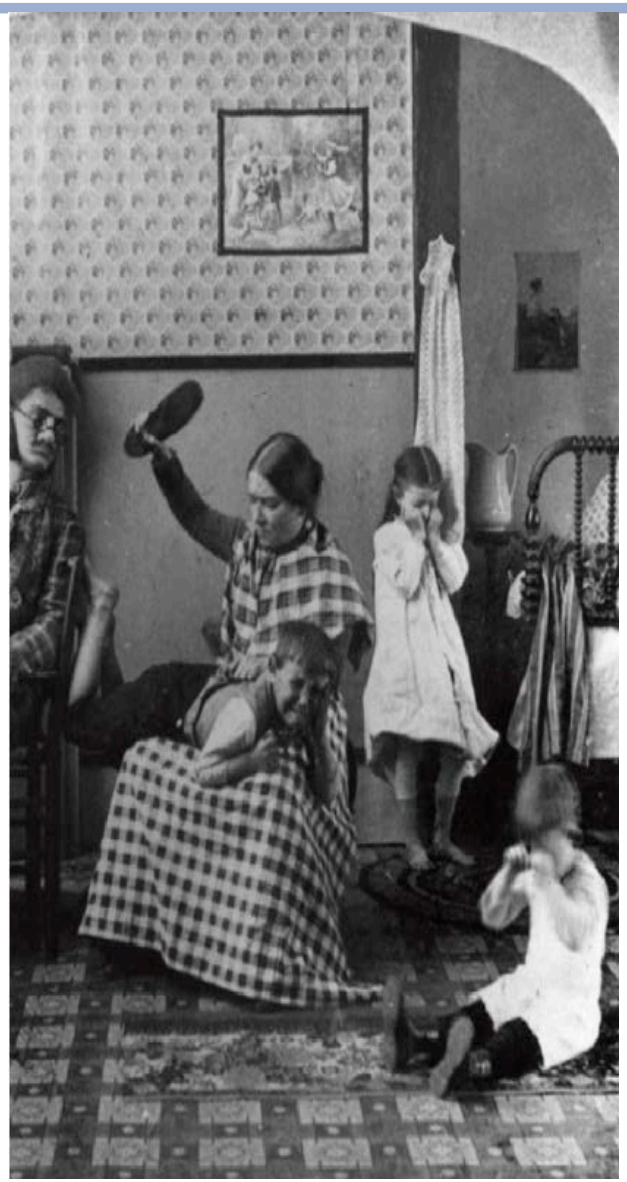
- Results confirm key predictions of of Doepke and Zilibotti's (2017) model, for example:
  - Authoritarian parenting style is more likely adopted when occupational mobility is expected to be low. Permissive parenting style is less often chosen when returns to education are high
  - Children with authoritarian parents fare better in environments with low (ex post) occupational mobility

Outline

1. Model: key features
2. Empirical Strategy
3. Data
4. Results
5. Conclusion

The Model (1/2)

- Doepke and Zilibotti (2017) distinguish threetypes of parenting styles:
  - Parents can allow children to make free choices and (**permissive style**),
  - Parents spend effort to mold children's preferences (**authoritative style**)
  - Parents spend effort to restrict children's choices (**authoritarian style**).
- Equilibrium parenting style depends on economic conditions
  - When social mobility is low, authoritarian style
  - When returns to skills (that potentially differ from skills of parents) are high and social mobility is sufficiently high, authoritative.

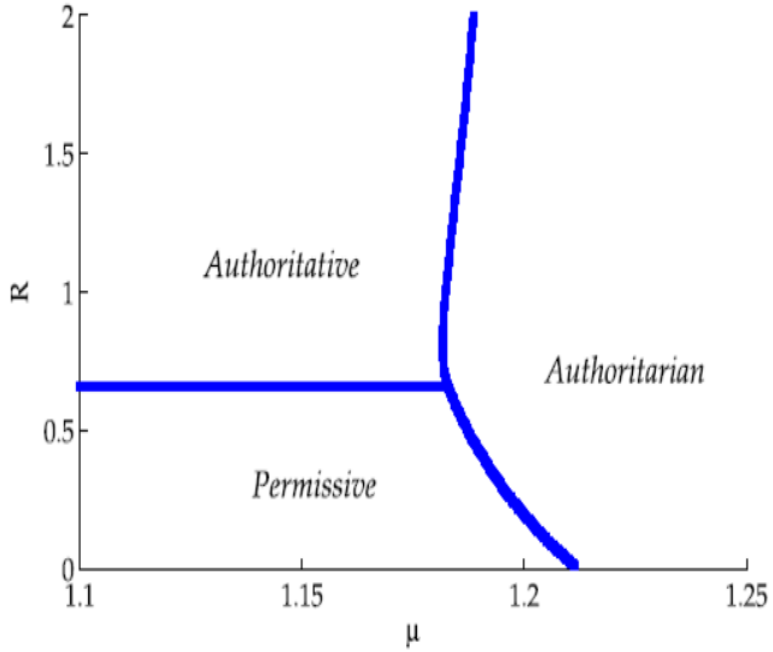


Traditional Authoritarian Parenting

The Model (2/2)

Figure 1

Model of parenting styles



Source: Doepke and Zilibotti (2017, p. 1355).

- Vertical axis: returns to skills
- Horizontal axis: incumbency premium

Predictions of the Model

- Children benefit from having authoritarian parents when they grow up in an environment with low occupational mobility.

- At higher ability levels, children benefit less from having parents with a permissive parenting style.

Figure 2
Life outcomes, dynasties and authoritarian parenting style

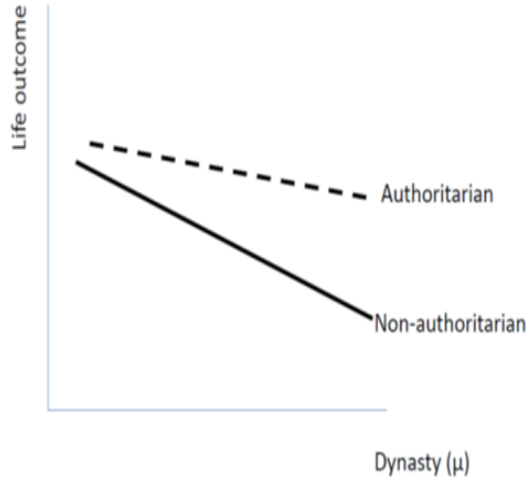
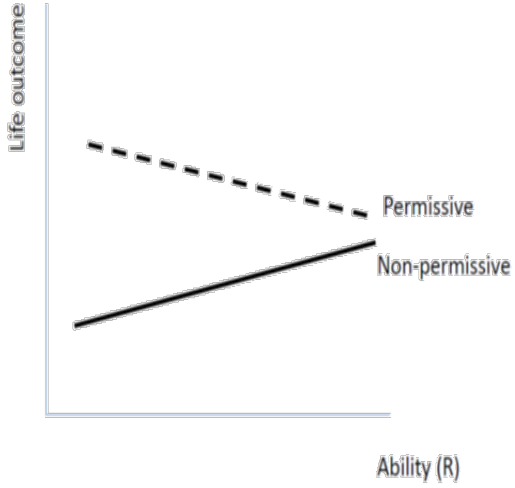


Figure 3
Life outcomes, ability and permissive parenting style



Empirical Strategy (1/2)

- Predicting parenting styles using ability and occupational mobility:
  - For a given incumbency premium, higher returns to human capital should be related to a lower likelihood of being permissive and a higher likelihood to be authoritative.
  - When the incumbency premium is high, the likelihood of being authoritarian should be higher.

$$PS_j = C + \delta r_j + \beta \mu_j + \varepsilon_j,$$

PS_i : vector of parenting styles (permissive, authoritarian and authoritative styles.
r_i : expected returns to human capital for child *i*
μ_i : incumbency premium

Expectations:

$\delta < 0$ if permissive.

$\delta > 0$ if authoritative.

$\beta > 0$ if authoritarian.

Empirical Strategy (2/2)

- Parenting styles and life outcomes:
  - When incumbency premium levels are high *and* parents choose to be authoritarian, children attain more positive life outcomes.

$$Y_j = C + \alpha_1 \mu_j + \alpha_2 PS_j + \alpha_3' PS_j \times \mu_j + \upsilon_j,$$

Y_j : long-run outcomes of the child.

Expectation:

$\alpha_3 > 0$ if authoritarian.

  - When incumbency premium levels are high *and* parents choose to be authoritarian, children attain more positive life outcomes.

$$Y_j = C + \alpha_4 r_j + \alpha_5 PS_j + \alpha_6' PS_j \times r_j + \epsilon_j.$$

Expectation:

$\alpha_6 > 0$ if authoritative.

Data

- *Stockholm Birth Cohort Study* (SBC), created in 2004/2005 by means of a probability matching of two previously existing longitudinal data sets:
  - *Stockholm Metropolitan Study 1953-1985* (individual, family, social and neighbourhood characteristics of all children born in 1953 who were living in the Stockholm metropolitan area on November 1, 1963).
  - *The Swedish Work and Mortality Database* (administrative data including information on education, income, work, unemployment and mortality for all individuals living in Sweden in 1980 or 1990 who were born before 1985).
- Sample: 13,606 individuals with information up to 2001.

Data

- Survey in 1968 (when children were 15 years old) among *some* parents:
  - Among children who scored among the highest or lowest 5% on a mental test, all parents were approached. Among the children who scored otherwise a random sample of 20% were approached.
  - The non-response among parents is low: approximately 7% did not respond. As a result, we have information on around 2,800 parents.

Measure of Parenting Style

- Based on 19 parental opinions on statements concerning the style in which they raise their children.
- Classify these items ex ante as describing one of the three styles defined by Baumrind (1967):
  - Permissive
  - Authoritative
  - Authoritarian
- Use explorative factor analysis: confirms intuitive classification
  - Cronbach's Alpha: 0.67 (authoritative), 0.51 (authoritarian), 0.33 (permissive)
- For analysis: use the principal component of each set of items

	Obs	Mean	Std. Dev.
Authoritarian			
Child must learn to obey	2819	4.43	0.81
Parents must not quarrel when the children are listening	2819	3.91	1.23
Children should be taught the difference between right and wrong	2819	4.93	0.27
Children must have firm rules	2819	4.58	0.65
When a child does not understand its own good, one has to force it	2819	3.01	1.15
Children must respect their parents	2819	3.70	1.22
Children should be taught to control themselves	2819	3.76	1.01
Too much freedom is not good for the child	2819	3.76	1.10
Parents must see to it that they are liked by the children	2819	3.83	1.14
Authoritative			
The child must learn how to manage on its own	2819	4.40	0.63
Children should be taught to think before acting	2819	4.73	0.50
The principal aim of child rearing is to develop the child's personality	2819	4.64	0.59
You have to be consistent when raising children	2819	4.63	0.60
One must give the child time	2819	4.83	0.40
One must keep one's promises	2819	4.93	0.27
Permissive			
The most important thing is that the child is happy and content	2819	4.20	0.97
Children ought to have things their own way	2819	1.67	0.78
The most important is that parents are fond of their children	2819	4.89	0.38
If only the child feels loved, nothing else matters	2819	3.53	1.14

Data: Ability

- As a proxy for ability, we use standardized primary school grades that the children attained in grade 6 (at age 13).
  - Cognitive ability is shaped in early childhood
    - interventions after age 4 do not tend to have persistent effects on IQ (Heckman and Kautz 2014).
  - School grades at young age are predictive of cognitive ability measured later in life
    - Test scores at age 6 predict those at age 13 (Borghans and Verhagen 2018) .

→ Grades at age 13 capture the persistent component of IQ.

Data: Incumbency Premium

- The incumbency premium μ is the comparative advantage of parents in transmitting skills to their children.
- We construct μ to capture the similarity of parents' occupational expectation for the child to their own occupational attainment.
  - Use the educational level of the child's parents and grandparents (nine levels of education)
  - Use information of parents' and grandparents' occupations on a scale with nine occupational levels.

Data: Later in Life Outcomes

Variable	Obs	Mean	Std. Dev.	Min	Max
Compulsory school GPA (standardized)	2632	0	1	-2.72	2.04
Upper sec. school GPA (standardized)	1396	0	1	-3.25	2.23
Completed upper sec. school	2819	0.53	0.50	0	1
Completed college	2819	0.23	0.42	0	1
Enrolled in science track	1396	0.30	0.46	0	1
Log earnings age 27	2740	6.19	0.81	0	7.84
Log earnings age 37	2611	12.15	0.71	6.47	14.23
Log earnings age 47	2456	12.39	0.79	5.32	15.05
Log long-term income	2715	12.13	0.89	3.26	15.21
Share years on welfare	2768	0.06	0.17	0	1
Annual unemployment days	2763	13.01	32.14	0	238
Obese at enlistment	1427	0.10	0.30	0	1
Early death	2819	0.03	0.16	0	1

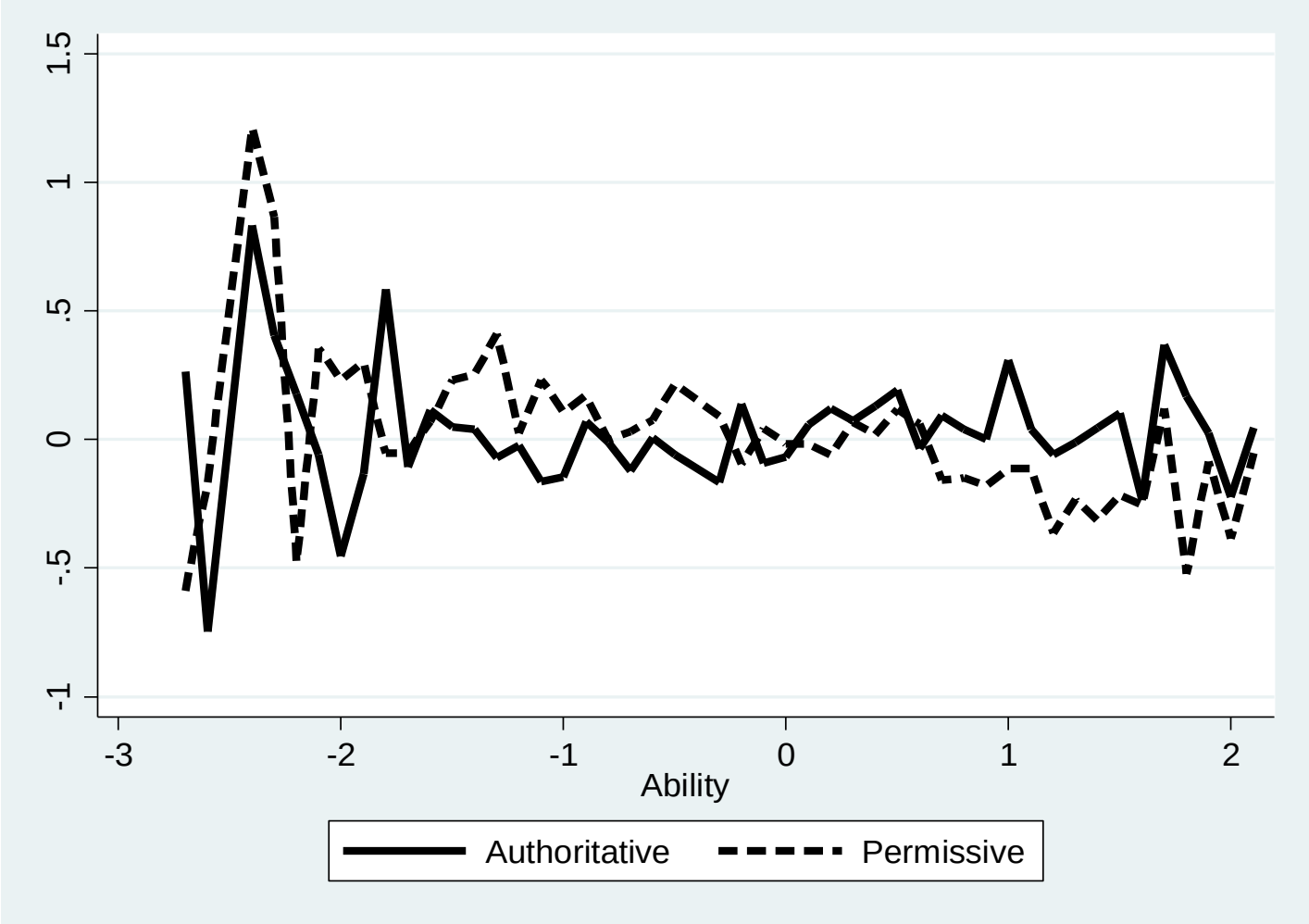
Results: Styles, Ability and Incumbency Premium

Ability and dynasty as determinants of parenting styles

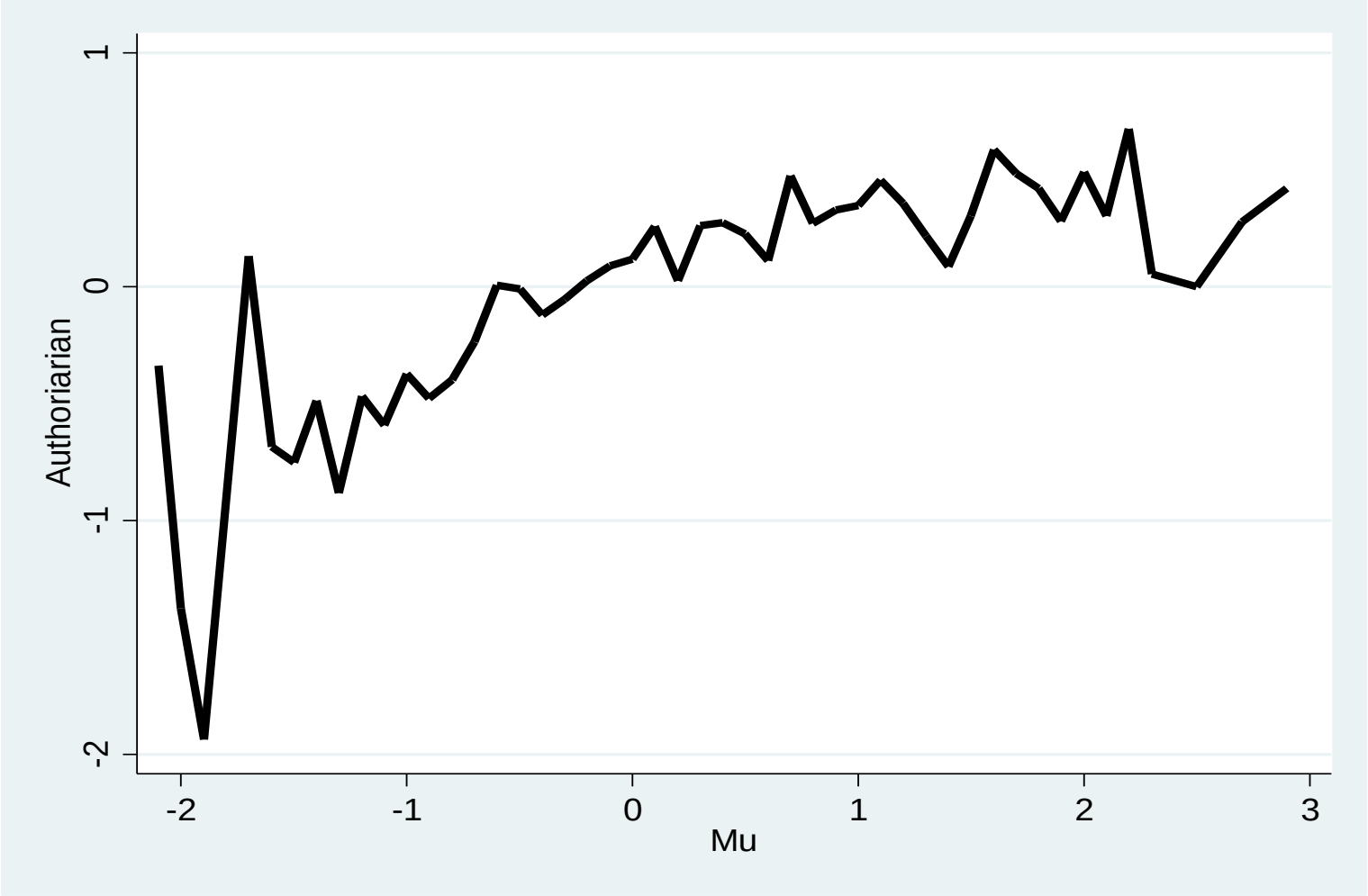
	(1) Authoritarian	(2) Authoritative	(3) Permissive
Dynasty	0.202***	-0.032	0.092***
	(0.019)	(0.022)	(0.019)
Ability	-0.206***	0.012	-0.101***
	(0.019)	(0.021)	(0.020)
Constant	-0.000	-0.001	0.000
	(0.018)	(0.019)	(0.019)
Observations	2,780	2,780	2,780
R-squared	0.117	0.001	0.026

Notes: Each column shows the result of a regression with a measure of parenting style as the dependent variables and measures of ability and dynasty as independent variables. All dependent and independent measures are standardized with a mean of zero and a standard deviation of one. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Choice for permissive and authoritative style given ability



Adoption of authoritarian style and the incumbency premium



Results:
Predictive Power of Styles, Ability and Incumbency Premium on Later Labor Market Outcomes

Life outcome regressions with interactions between parenting styles and dynasty

	(1) Compulsory school GPA (standardized)	(2) Upp. sec. school GPA (standardized)	(3) Completed upp. sec. school	(4) Completed college	(5) Enrolled in science track	(6) Log earnings age 27	(7) Log earnings age 37	(8) Log earnings age 47	(9) Log long-term income	(10) Share years on welfare	(11) Annual unemployment days	(12) Obese at enlistment	(13) Early death
Dynasty	-0.288***	-0.235***	-0.144***	-0.115***	-0.086***	0.047***	-0.004	-0.065***	-0.071***	0.022***	2.291***	0.011	0.013***
	(0.019)	(0.031)	(0.009)	(0.007)	(0.015)	(0.015)	(0.015)	(0.016)	(0.019)	(0.004)	(0.687)	(0.007)	(0.004)
Authoritarian	-0.186***	-0.099***	-0.093***	-0.048***	-0.010	-0.017	-0.046***	-0.038**	-0.062***	0.010**	1.223	0.005	0.001
	(0.021)	(0.032)	(0.010)	(0.009)	(0.014)	(0.018)	(0.016)	(0.019)	(0.019)	(0.004)	(0.774)	(0.009)	(0.004)
Authoritative	0.074***	0.042	0.029***	0.009	0.012	-0.005	0.022	0.002	0.039**	-0.000	-0.087	-0.003	-0.000
	(0.019)	(0.029)	(0.009)	(0.008)	(0.013)	(0.017)	(0.015)	(0.016)	(0.020)	(0.003)	(0.673)	(0.009)	(0.003)
Permissive	-0.046**	-0.061**	-0.010	-0.009	-0.018	-0.009	-0.005	-0.015	-0.018	-0.002	-1.205	-0.008	-0.006*
	(0.019)	(0.030)	(0.010)	(0.008)	(0.014)	(0.018)	(0.016)	(0.016)	(0.018)	(0.004)	(0.737)	(0.009)	(0.003)
Authoritarian*Dynasty	-0.002	0.019	-0.003	0.018**	-0.013	0.014	0.028**	0.030*	0.049**	0.001	-0.018	-0.000	0.002
	(0.021)	(0.033)	(0.010)	(0.008)	(0.015)	(0.016)	(0.014)	(0.018)	(0.019)	(0.004)	(0.743)	(0.008)	(0.004)
Authoritative*Dynasty	-0.006	0.040	-0.004	-0.006	-0.000	-0.015	-0.014	-0.015	-0.009	-0.002	0.006	-0.006	-0.001
	(0.018)	(0.030)	(0.008)	(0.006)	(0.014)	(0.012)	(0.013)	(0.013)	(0.015)	(0.003)	(0.648)	(0.006)	(0.003)
Permissive*Dynasty	0.046**	0.024	0.012	0.018**	-0.003	0.022	0.027*	0.001	0.006	-0.003	-0.207	0.010	-0.006
	(0.019)	(0.031)	(0.009)	(0.007)	(0.016)	(0.018)	(0.016)	(0.015)	(0.019)	(0.004)	(0.714)	(0.008)	(0.004)
Constant	-0.023	-0.120***	0.524***	0.219***	0.269***	6.184***	12.135***	12.384***	12.112***	0.061***	13.049***	0.098***	0.027***
	(0.019)	(0.028)	(0.009)	(0.008)	(0.013)	(0.016)	(0.015)	(0.017)	(0.018)	(0.003)	(0.658)	(0.009)	(0.003)
Observations	2,632	1,396	2,819	2,819	1,396	2,740	2,611	2,456	2,715	2,768	2,763	1,427	2,819
R-squared	0.152	0.082	0.151	0.114	0.031	0.005	0.009	0.015	0.020	0.024	0.008	0.005	0.008

Notes: Each column shows the result of a regression with a life outcome as the dependent variables and measures of parenting styles and dynasty as independent variables. All independent measures are standardized with a mean of zero and a standard deviation of one. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Results:
Predictive Power of Styles, Ability and Incumbency Premium on Later Labor Market Outcomes

Life outcome regressions with interactions between parenting styles and ability

	(1) Compulsory school GPA (standardized)	(2) Upp. sec. school GPA (standardized)	(3) Completed upp. sec. school	(4) Completed college	(5) Enrolled in science track	(6) Log earnings age 27	(7) Log earnings age 37	(8) Log earnings age 47	(9) Log long-term income	(10) Share years on welfare	(11) Annual unemployment days	(12) Obese at enlistment	(13) Early death
Ability	0.767***	0.667***	0.272***	0.192***	0.224***	0.074***	0.125***	0.182***	0.249***	-0.043***	-5.053***	-0.034***	-0.016***
	(0.013)	(0.029)	(0.007)	(0.007)	(0.013)	(0.018)	(0.015)	(0.016)	(0.016)	(0.004)	(0.689)	(0.009)	(0.004)
Authoritarian	-0.036**	-0.046	-0.055***	-0.023***	0.006	0.010	-0.014	-0.015	-0.019	0.005	0.782	-0.003	-0.000
	(0.015)	(0.034)	(0.009)	(0.008)	(0.013)	(0.018)	(0.016)	(0.019)	(0.018)	(0.004)	(0.769)	(0.010)	(0.004)
Authoritative	0.006	-0.013	0.013	-0.002	0.009	-0.020	0.004	-0.007	0.015	0.003	0.221	-0.001	-0.000
	(0.014)	(0.029)	(0.008)	(0.008)	(0.011)	(0.016)	(0.014)	(0.016)	(0.019)	(0.003)	(0.635)	(0.009)	(0.003)
Permissive	-0.013	-0.033	-0.003	-0.006	-0.014	0.001	-0.001	-0.009	-0.003	-0.004	-1.456**	-0.005	-0.005
	(0.014)	(0.029)	(0.009)	(0.007)	(0.012)	(0.018)	(0.017)	(0.016)	(0.019)	(0.004)	(0.734)	(0.009)	(0.003)
Authoritarian*Ability	-0.016	-0.034	0.011	-0.024***	0.008	0.009	0.002	0.016	-0.002	-0.005	-1.559*	0.013	-0.002
	(0.014)	(0.032)	(0.008)	(0.007)	(0.014)	(0.019)	(0.016)	(0.021)	(0.017)	(0.004)	(0.839)	(0.010)	(0.004)
Authoritative*Ability	0.007	0.026	-0.010	-0.001	-0.010	-0.015	-0.021	-0.025	-0.023	0.001	0.578	0.001	0.002
	(0.013)	(0.029)	(0.007)	(0.007)	(0.014)	(0.018)	(0.015)	(0.018)	(0.017)	(0.003)	(0.666)	(0.011)	(0.004)
Permissive*Ability	-0.007	-0.029	0.013*	-0.003	0.002	-0.018	0.004	0.020	0.004	0.001	0.558	-0.023**	0.005
	(0.014)	(0.028)	(0.007)	(0.007)	(0.013)	(0.019)	(0.016)	(0.017)	(0.017)	(0.004)	(0.710)	(0.010)	(0.004)
Constant	-0.054***	-0.402***	0.531***	0.219***	0.177***	6.194***	12.147***	12.400***	12.128***	0.060***	12.538***	0.100***	0.027***
	(0.013)	(0.027)	(0.008)	(0.007)	(0.011)	(0.016)	(0.014)	(0.016)	(0.018)	(0.003)	(0.625)	(0.008)	(0.003)
Observations	2,607	1,381	2,780	2,780	1,381	2,703	2,576	2,427	2,679	2,731	2,726	1,405	2,780
R-squared	0.586	0.319	0.345	0.235	0.152	0.009	0.035	0.059	0.083	0.068	0.028	0.017	0.011

Notes: Each column shows the result of a regression with a life outcome as the dependent variables and measures of parenting styles and ability as independent variables. All independent measures are standardized with a mean of zero and a standard deviation of one. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Regressions of child's patience on parenting styles

	Patience of child
Authoritarian	-0.070***
	(0.023)
Authoritative	0.014
	(0.025)
Permissive	-0.027
	(0.024)
Constant	4.024***
	(0.022)
Observations	2,795
R-squared	0.005

Conclusions

- There is not one optimal parenting style, but instead the quality of the choice for a parenting style depends on the environment.
- Our results indicate that many parents could have made a better choice given their circumstances.
- Policy makers, pedagogues, and other parental advisors may be able to help parents by examining the circumstances in which the family operates.

Related Literature: Theory

- Cobb-Clark et al. (2016) build on human capital framework and show that effective parenting styles are negatively correlated with socioeconomic disadvantage
- Models in a game-theoretic framework (e.g. Burton et al. 2002; Hao et al. 2008; Cosconati 2009; Lundberg et al. 2009).
- *Our focus:* Model in a rational-choice framework (Doepke and Zilibotti 2017), in which parents care about their children's utility and can influence their children's choices (via preferences or by restricting choices).

Related Literature: Empirics

- Parenting styles stimulate the production of cognitive and non-cognitive ability (Dooley and Stewart 2007; Fiorini and Keane 2014).
- Parents who invest more in the upbringing of their children are more similar to them with respect to risk and trust attitudes (Zumbühl et al. 2013).
- Other studies have shown that “parenting in early childhood contributes to the intergenerational persistence in incomes found in many studies” (Ermisch 2008, p. 69).

Intervention Studies

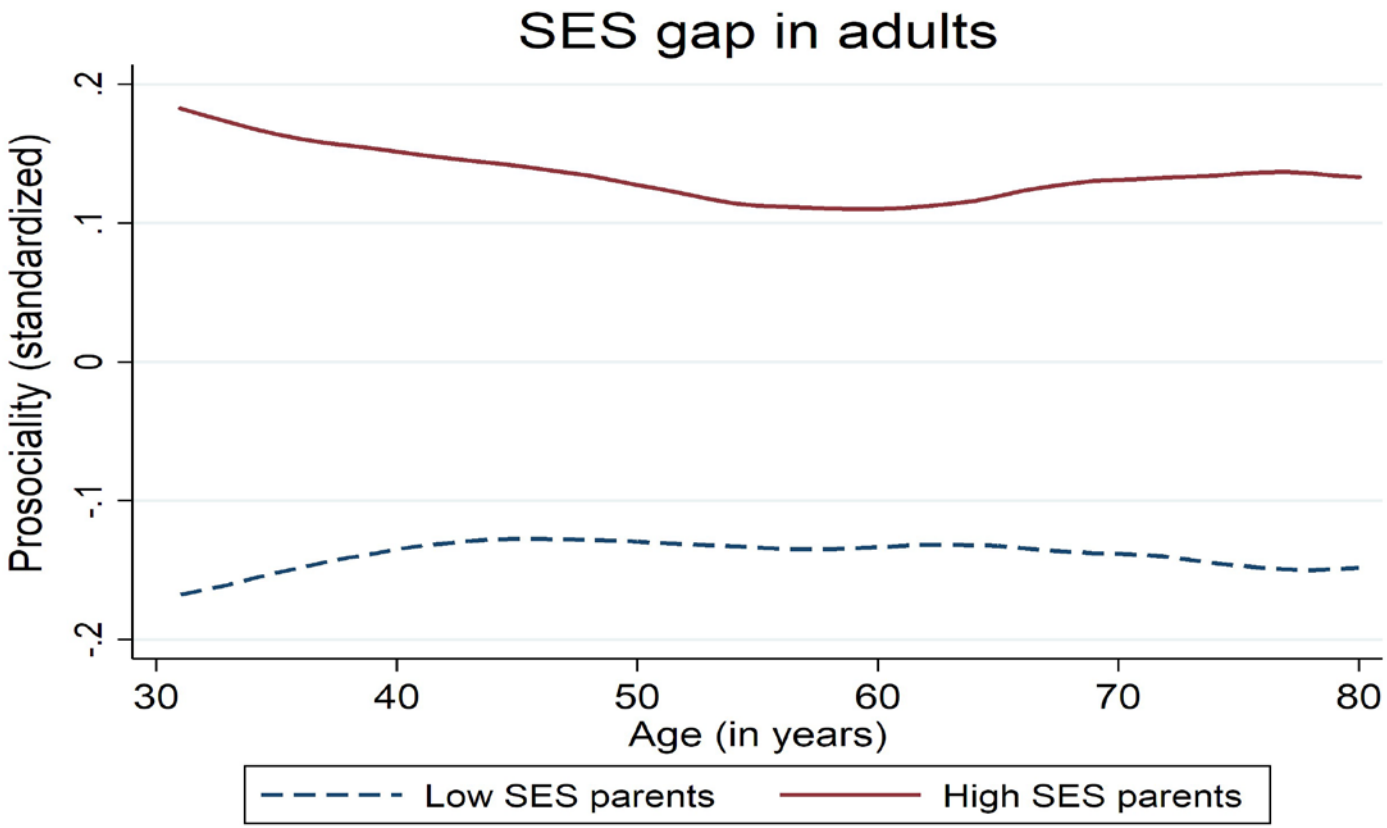
The Formation of Prosociality: Causal Evidence on the Role of Social Environment

Armin Falk, Thomas Deckers, Fabian Kosse,
Pia Pinger and Hannah Schildberg-Hörisch

Prosociality

- **Definition of prosociality**: positive other-regarding beliefs and behavior
- Prosociality governs social interaction and affects outcomes such as e.g.
  - Trade and growth (e.g. Guiso et al, 2009; Algan and Cahuc, 2010)
  - Tax compliance (e.g., Luttmer and Singhal, 2014)
  - Happiness, health, employment, wages (e.g., Becker et al., 2012; Deming, 2018)
- **Where do individual differences in prosociality come from?**
- **Can policy interventions shape prosociality?**

- **What do we know about the development of prosociality?**
- Childhood is a dynamic period: increase with age, e.g. Fehr et al. (2008, 2013), Sutter & Kocher (2007)
- Development differs by socio-economic status (SES) of the family
  - High SES children are more prosocial, e.g. Benenson et al. (2007), Bauer et al. (2014), Deckers et al. (2017)



Own estimations, Data: SOEP

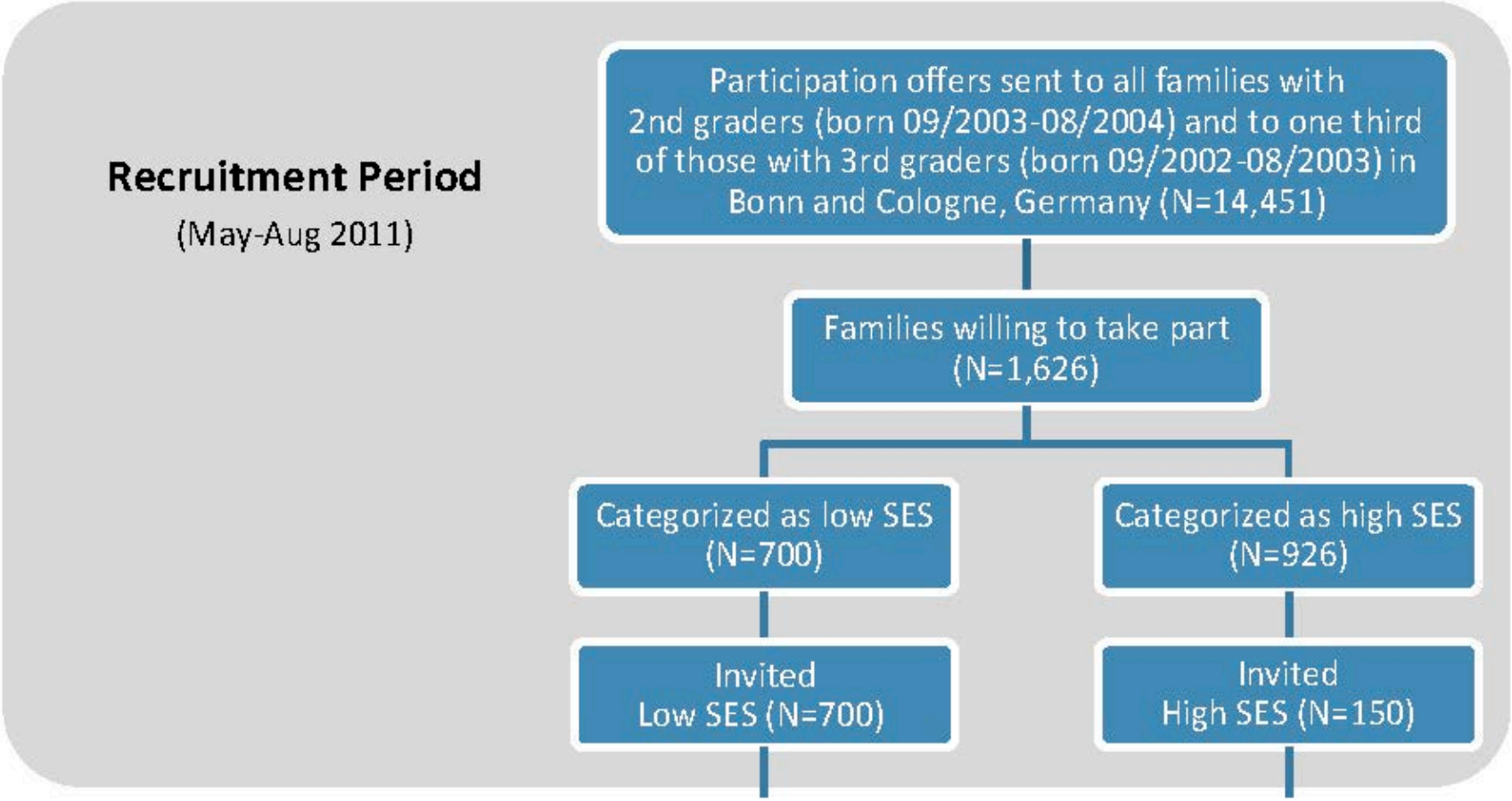
What shapes individual differences in prosociality?

- **What is the role of genes?**
  Genetic differences explain about 20% of the variation in prosociality (Cesarini et al. (2008, 2009))

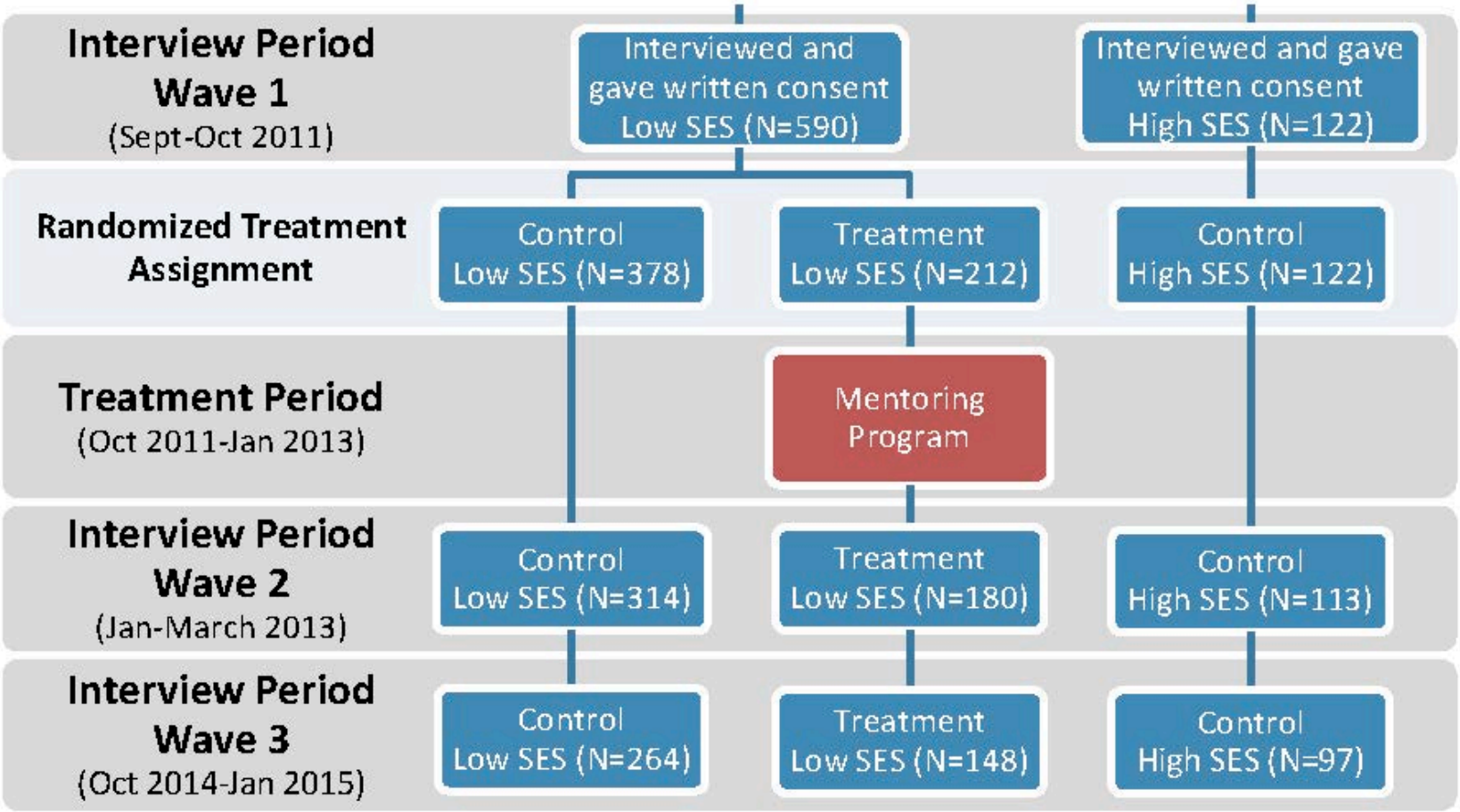
- **How does the social environment shape prosociality?**
  - Prosociality of attachment figures and role models, e.g. Bandura (1986), Williamson et al. (2013)
    Suggested process: observe → imitate → internalize
  - Experience of intense social interaction, e.g. Eisenberg et al. (2015), Falk & Kosse (2017)
    Suggested process: provides feedback → reinforcement

⇒ No causal evidence if and how prosociality is affected by the social environment

Implementation: Bonn Intervention Panel



Implementation: Bonn Intervention Panel



Implementation: Enriching Environment

- Well-established mentoring program (Baloo and You)
- Mentors:
  - Volunteers, mainly university students
  - Meet children once per week, overall duration: one year
- Concept of the mentoring program:
  - One-to-one mentoring, “informal learning”, no focus on achievement
  - Widening a child’s horizon through social interactions with a new attachment person
  - **Interactive social activities** such as cooking, visiting the zoo or park, or just having a conversation
- Professional structure: online diaries, paid coordinators, bi-weekly monitoring meetings

Implementation: interviews

- Wave 1 and 2: interviews in central location labs
- Wave 3: interviewers visited families in their homes
- Caregiver (mothers) answered a detailed questionnaire
- Children were interviewed by trained interviewers:
  - Incentivized one-to-one experiments
  - Established questionnaire items

Incentivizing Children

- Experimental currency “stars”
- Wave 1 and 2: Children exchange stars for toys
  - More stars associated with more valuable presents, pretests
- Wave 3: stars exchanged for money
  - Before experiment, incentives are explained to child and the child can have a look at the toys
  - Experiments only start after child has fully understood the rules

Measuring prosociality

- Goal: comprehensively measure positive other-regarding beliefs and behavior using different facets, sources and techniques
- Same protocol in all three waves for all children
- Facets:
  - Altruism
  - Trust
  - General other-regarding behavior
- Sources:
  - Incentivized experiments
  - Child answered questionnaire about itself
  - Mother answered questionnaire about child's behavior

Measuring prosociality: altruism

- To measure altruism children participated in three dictator games

Game 1: dividing six stars, receiver: unknown child from the same age group living in city close by

Game 2: dividing six stars, receiver: unknown child in Togo

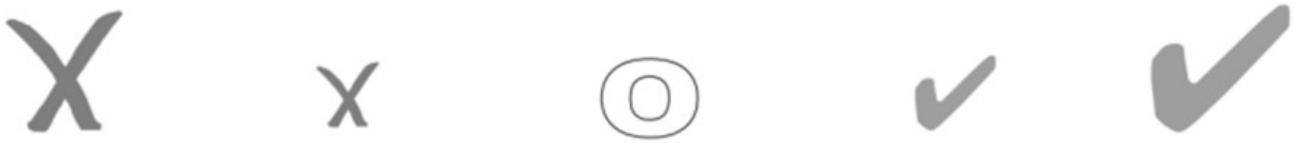
Game 3: binary choice
measure: share of giving

Measuring prosociality: trust

Children answered age-adapted and validated SOEP items:

- "One can trust other people."
- "Other people have good intentions towards me."
- "One can rely on other people, even if one does not know them well."

How much do you agree to this statement?



Totally disagree.	Rather disagree.	Sometimes agree.	Rather agree.	Totally agree.

Measuring prosociality: other-regarding behavior

- Mothers assessed their children's other-regarding behavior in everyday life using the Prosocial Scale of the Strength and Difficulties Questionnaire (SDQ)
- Five SDQ items:
  - "Considerate of other people's feelings"
  - "Shares readily with other children"
  - "Helpful if someone is hurt, upset or feeling ill"
  - "Kind to younger children"
  - "Often volunteers to help others"
- Rated on a seven-point Likert scale from "does not apply at all" (1) to "applies completely" (7)

Measuring prosociality

Focus on

- Joint measure of prosociality: equally weighted score of three facets
- Wave 2 data: post–treatment measures

Measures from mothers and mentors

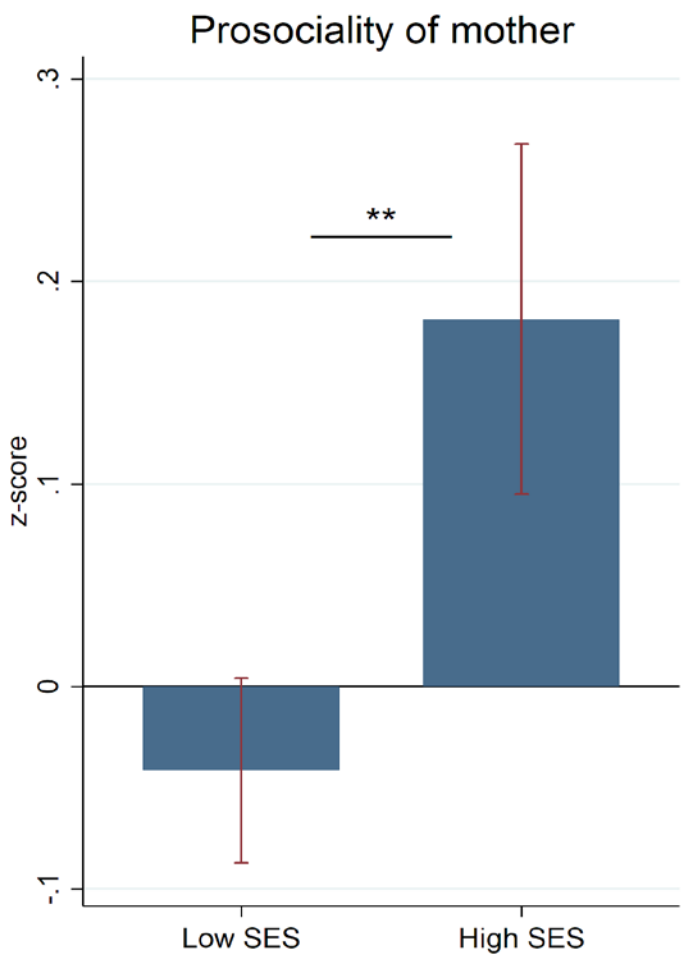
- **Prosociality:** same three facets as for the children (survey items)

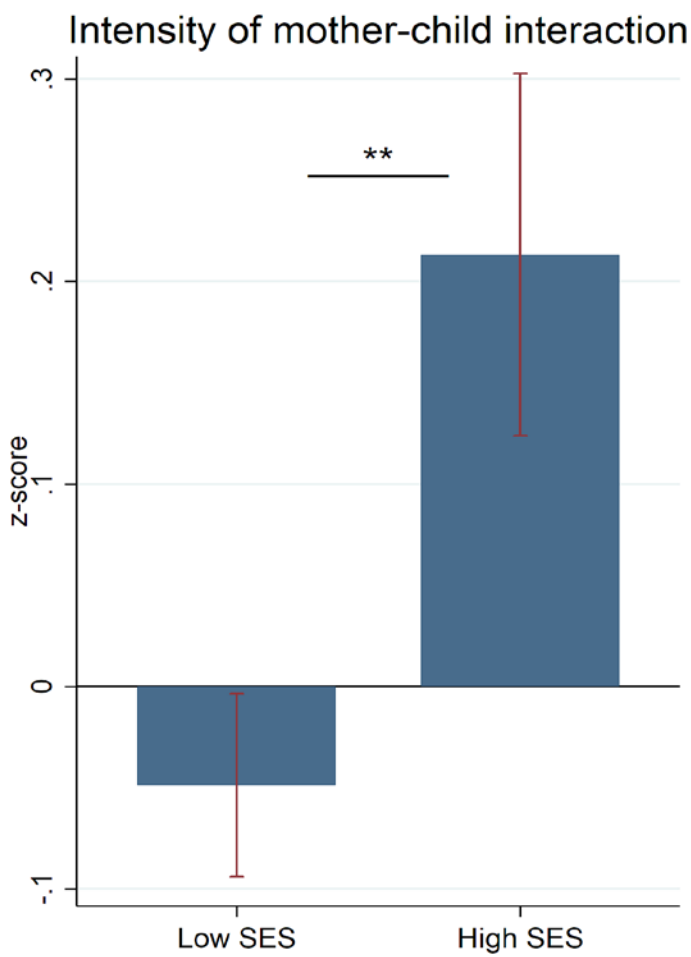
  $\longrightarrow$ Joint measure

- **Activities with the child:** time spending questionnaire

  $\longrightarrow$ Score of intensity of social interaction with the child

Descriptive analysis: parental background





Descriptive analysis: parental background

	Standardized prosociality of the child			
	(1)	(2)	(3)	(4)
High SES	0.226**			0.140
	[0.106]			[0.105]
Intensity of mother–child interaction		0.214***		0.167**
		[0.048]		[0.049]
Prosociality of mother			0.258***	0.228***
			[0.048]	[0.048]
Observations	418	418	418	418

***, **, * indicate significance at the 1%, 5% and 10% level, respectively.

Sample: Control Low SES und Control High SES.

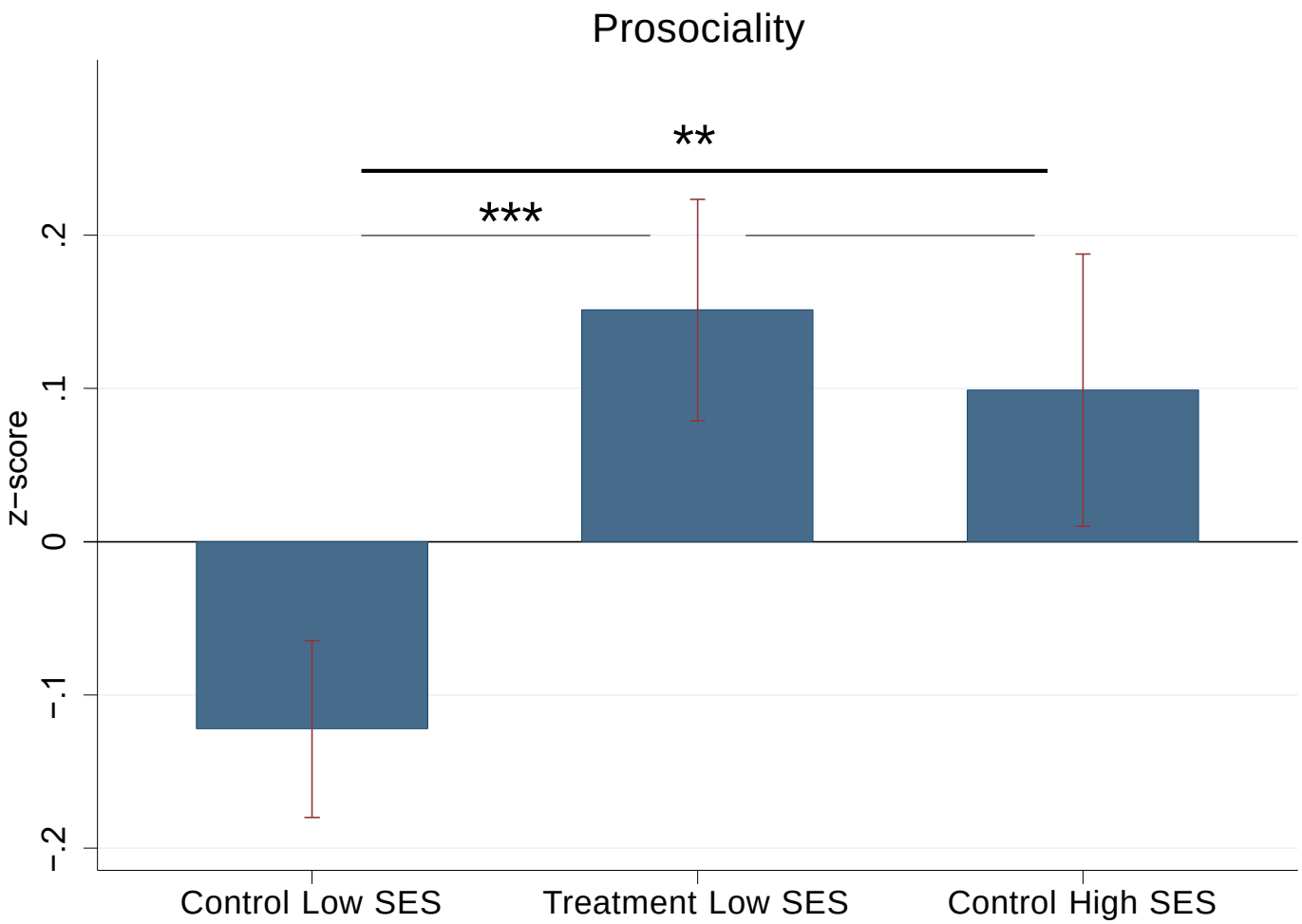
Causal analysis: hypothesis

- **Hypothesis:** positive effect of participation in the mentoring program

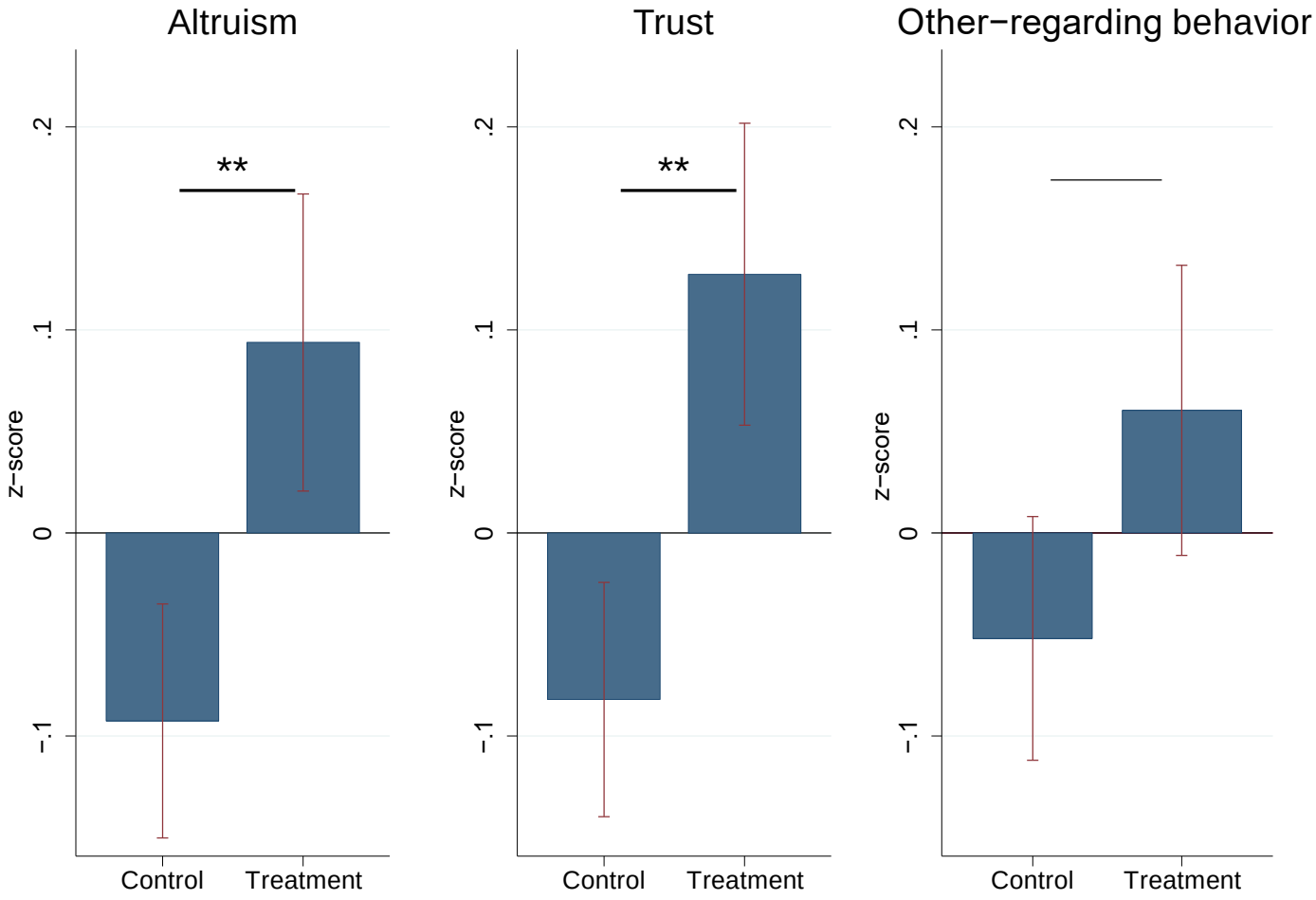
→ The program provides development-relevant resources that are scarce in low SES families

1. Prosociality of attachment figure: mentors self-selected volunteers
   → Mentors are > 1 std. more prosocial than low SES mothers
2. Intensity of social interaction: key idea of the program
   → Share of intense interactive activities per afternoon Mother-child: 41.1% vs. mentor-child: 94.8%

Results: causal effect of social environment (wave 2)

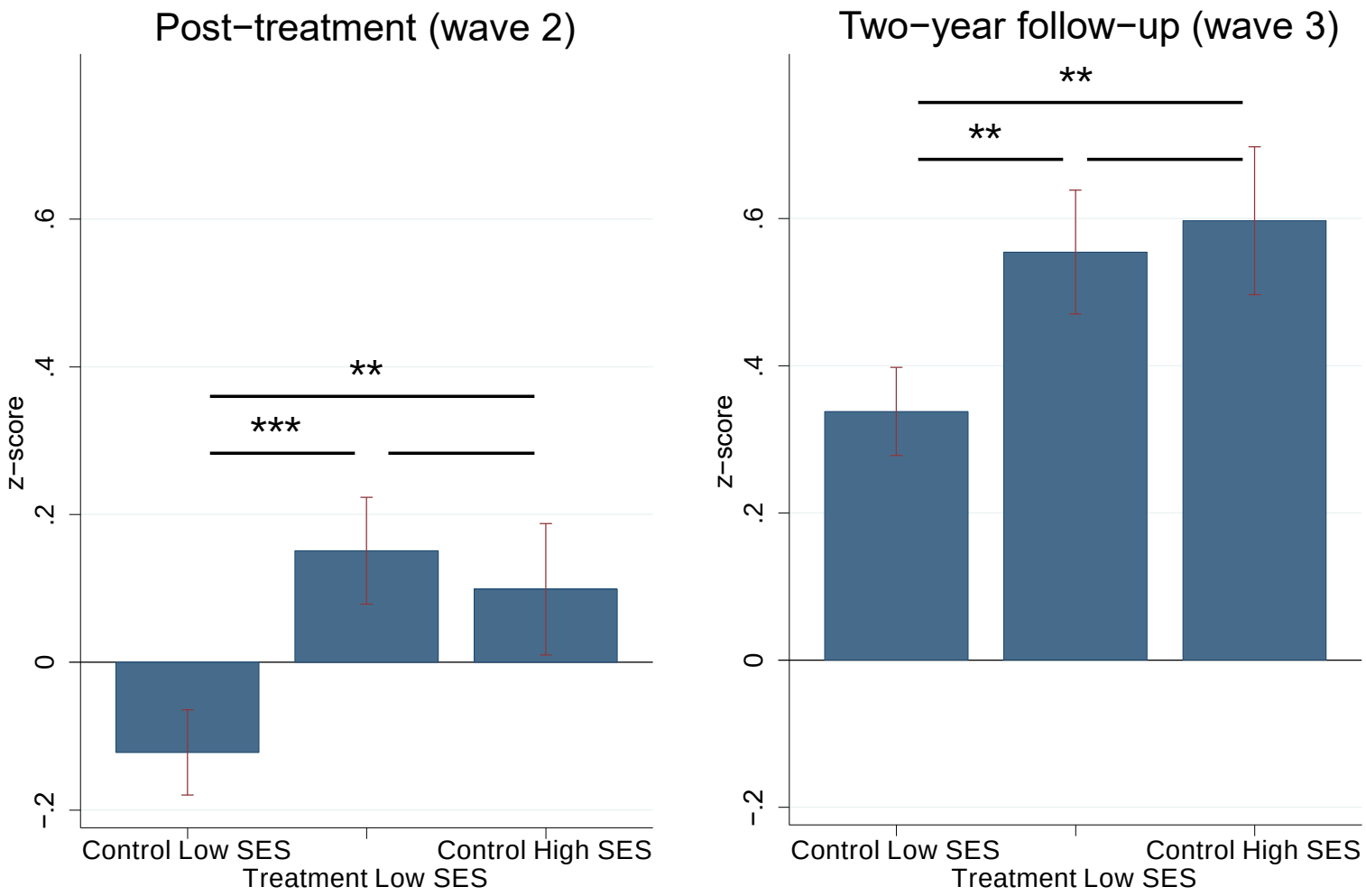


Results: causal effect of social environment – facets



Results: persistence of the treatment effect

Prosociality



Results: robustness – making use of wave 1

	Assigned to treatment (1)	Lost to follow–up Wave 2 (2)	Lost to follow–up Wave 3 (3)
Prosociality (wave 1)	0.009 [0.020]	0.015 [0.020]	–0.007 [0.024]
Treatment dummy		–0.022 [0.032]	–0.003 [0.040]
Prosociality x Treatment dummy		–0.021 [0.031]	–0.026 [0.039]
Constant	0.361*** [0.020]	0.172*** [0.020]	0.300*** [0.024]
Restricted to Low SES	Yes	Yes	Yes
Observations	590	590	590
R^2	0.000	0.002	0.002

Results: robustness – making use of wave 1

	Assigned to treatment (1)	Lost to follow–up Wave 2 (2)	Wave 3 (3)
Prosociality (wave 1)	0.009 [0.020]	0.015 [0.020]	–0.007 [0.024]
Treatment dummy		–0.022 [0.032]	–0.003 [0.040]
Prosociality x Treatment dummy		–0.021 [0.031]	–0.026 [0.039]
Constant	0.361*** [0.020]	0.172*** [0.020]	0.300*** [0.024]
Restricted to Low SES	Yes	Yes	Yes
Observations	590	590	590
R^2	0.000	0.002	0.002

- No signs of baseline imbalance or systematic attrition

Results: robustness – representativeness

Potential issue: opt–in sampling

- Non–representative SES distribution
- Non–representative prosociality distribution

Results: robustness – representativeness

Potential issue: opt–in sampling

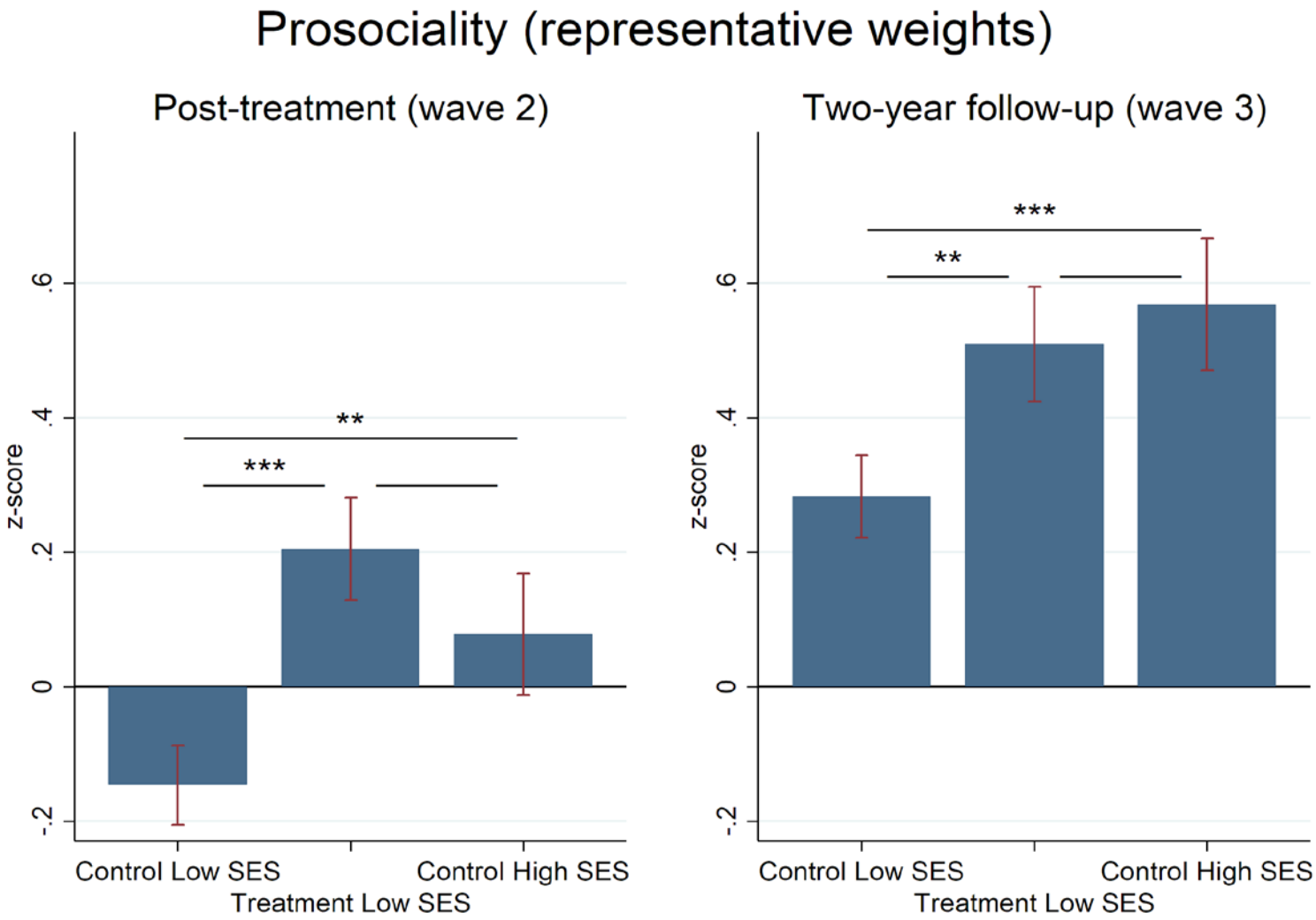
- Non–representative SES distribution
- Non–representative prosociality distribution

Solution: comparison to families in SOEP

- In terms of SES
- In terms of prosociality of mothers

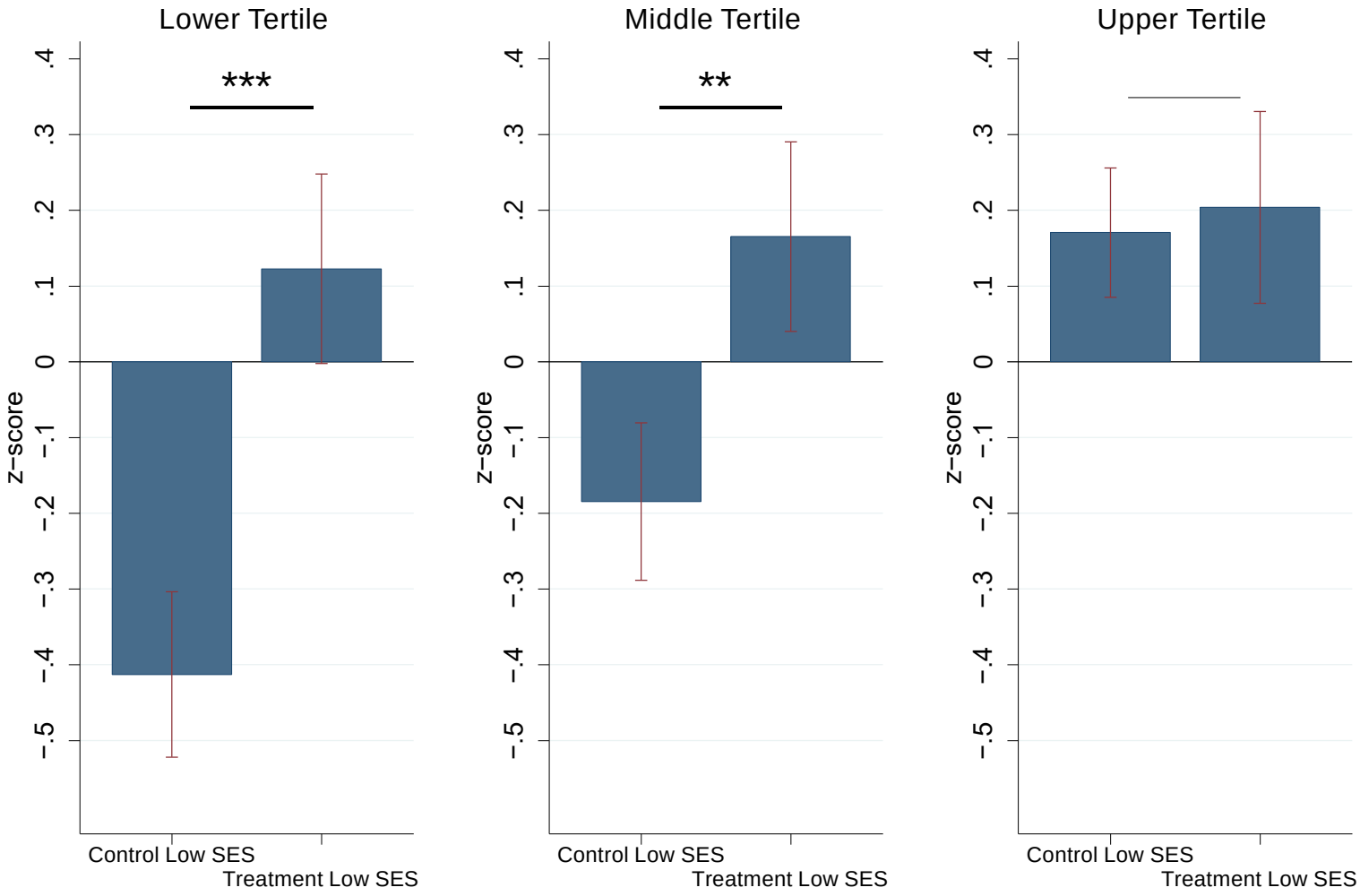
→ Calculation of inverse probability weights

Results: robustness – representativeness



Mechanisms: heterogeneous treatment effects

Treatment Effects by Tertiles of Prosociality of the Mother



Mechanisms: heterogeneous treatment effects

	Prosociality	
	(1)	(2)
Treatment Dummy	0.300***	0.250***
	[0.093]	[0.092]
Prosociality of mother	0.245***	
	[0.056]	
Prosociality of mother x Treat	−0.214**	
	[0.091]	
Intensity of mother–child interaction		0.255***
		[0.057]
Intensity of mother–child inter. x Treat		−0.192**
		[0.094]
Constant	−0.134**	−0.100*
	[0.057]	[0.057]
Observations	484	491

Mechanisms: heterogeneous treatment effects

	Prosociality	
	(1)	(2)
Treatment Dummy	0.300***	0.250***
	[0.093]	[0.092]
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Intensity of mother–child inter. x Treat		−0.192**
		[0.094]
Constant	−0.134**	−0.100*
	[0.057]	[0.057]
Observations	484	491

Channel: the mentoring program benefits children by providing resources and stimuli that are scarce in the family environment

Mechanisms: mediation analysis

Mechanisms: mediation analysis

Following Heckman et al. (2013), we consider:

$$P^C_{i,d} = \kappa_d + \alpha^P_d P^A_{i,d} + \alpha^I_d I^A_{i,d} + \alpha^U_d U_{i,d} + \beta_d X_i + E_{i,d}$$

P^C: prosociality of the child

$d \in \{0, 1\}$: indicates treatment or control group

P^A: prosociality of the child's attachment figures

I^A: experience of intense social interactions

U: unmeasured other factors influencing P^C

X: set of (predetermined) background characteristics

Analyzing the mechanisms of the program

For the decomposition, we assume

1. $\alpha^P_1 = \alpha^P_0$, $\alpha^I_1 = \alpha^I_0$ and $\beta_1 = \beta_0$
2. (P^A, I^A) and (U) are independent conditional on X and D

Analyzing the mechanisms of the program

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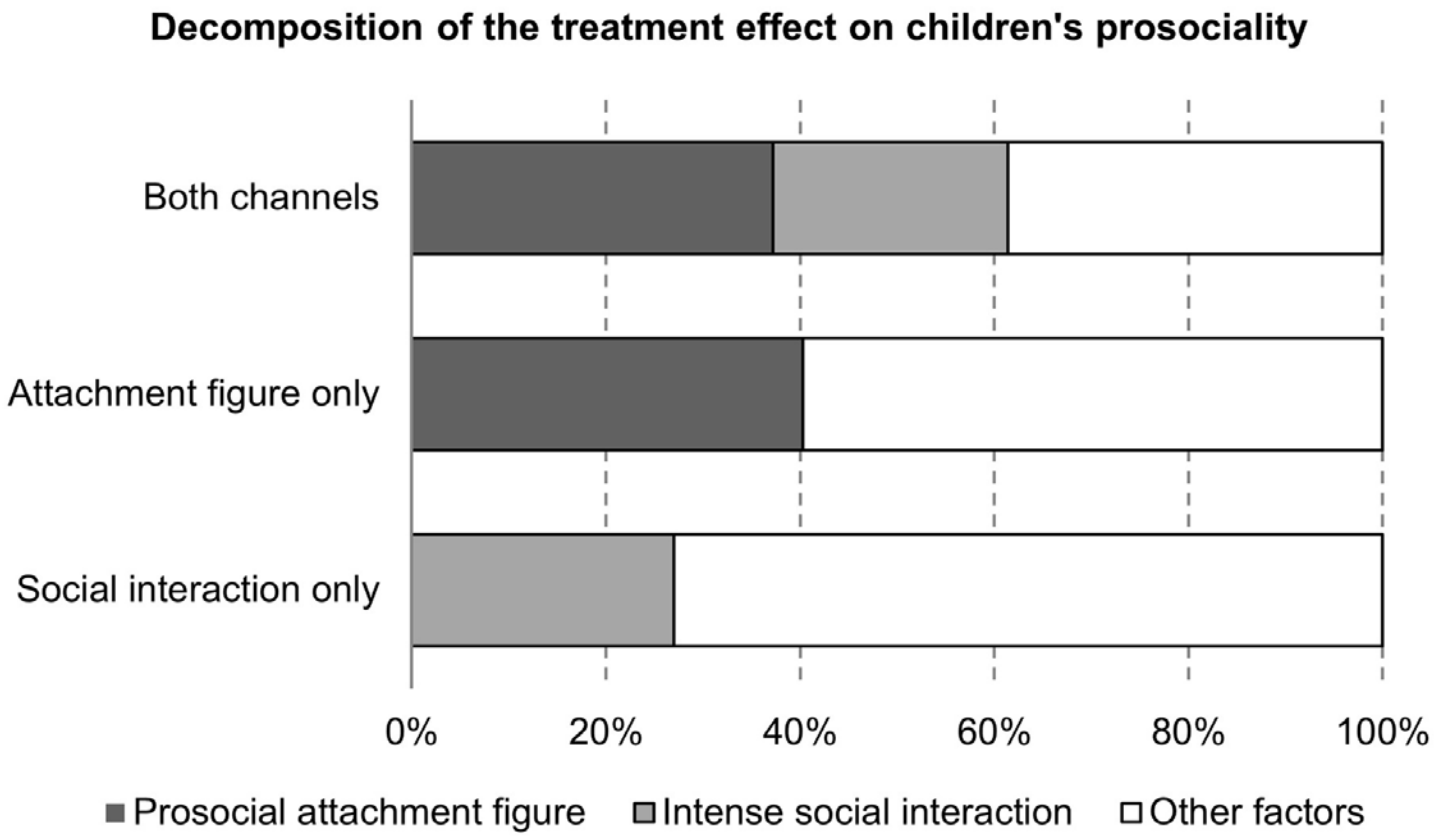
1. $\alpha^P_1 = \alpha^P_0$, $\alpha^I_1 = \alpha^I_0$ and $\beta_1 = \beta_0$
2. (P^A, I^A) and (U) are independent conditional on X and D

$\rightarrow$ The overall prosociality effect can be decomposed into

$$\underbrace{\mathrm{E}[P^C_{i,1} - P^C_{i,0}]}_{\text{treatment effect}} = \underbrace{\tau_1 - \tau_0}_{\text{unmeasured inputs}} + \underbrace{\alpha^P \mathrm{E}[P^A_{i,1} - P^A_{i,0}]}_{\text{prosocial attachment fig.}} + \underbrace{\alpha^I \mathrm{E}[I^A_{i,1} - I^A_{i,0}]}_{\text{intense social interact.}}$$

where $\tau = \kappa_d + \sum_{j \in U} \alpha^j_d \mathrm{E}[U^j_d]$

Analyzing the mechanisms of the program



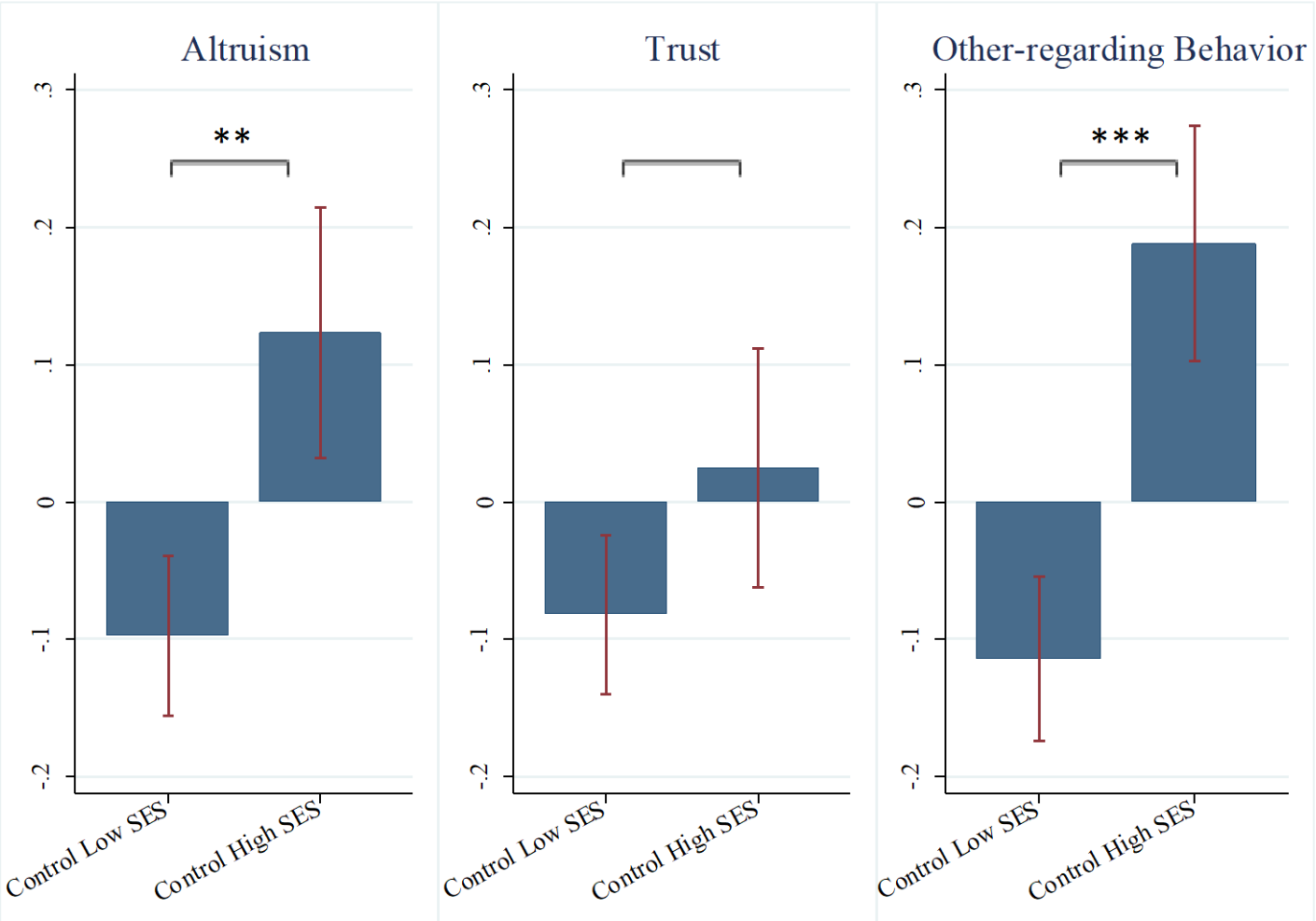
Conclusion

- Causal evidence on a positive effect of an enriched social environment
  - High-to-low SES gap is closed
  - Effect is robust and persists over time
- Mechanisms: Program serves as substitute for missing development-relevant inputs in low SES families

Differences to previous Work

- Randomization in mentoring interventions generally scarce (Perry)
- Incentivized experiments
- Focus on personality (prosociality) rather than education/achievement
- Compared to interventions providing educational services, this intervention is less intensive, less costly
  - Render our findings particularly relevant for informing policies

Additional Slides



Altruism: N = 417, p = 0.049
Trust: N = 427, p = 0.329
Other-regarding Behavior: N = 425, p = 0.007

Effect Size by Gender

- Joint measure: Treatment effect more pronounced for boys (45.6% of a standard deviation)
  - The respective p-values for coefficient in OLS regression is 0.076
- Individual measures, boys: 32.2% of a standard deviation for altruism, as well as 28.8% and 27.8% of a standard deviation for trust and other-regarding behavior, respectively.
  - Interaction of treatment and gender insignificant for any of the three facets.
  - The respective p-values for coefficients in OLS regressions are 0.152, 0.379, and 0.366, respectively.

Checks

1. Baseline balance/randomization
   - No differences between Low SES Treatment and Control Group in wave 1, wrt outcome variables (see Table A1)
2. Biased/systematic attrition
   - Moderate (16.3%), and not significantly different “loss-to follow-up rates” in Treatment and Control Group (p=0.56)
   - Baseline values (wave 1) of outcome variables and (random) treatment assignment have no systematic effect on attrition (see Table A2)
3. Alternative estimates (including wave 1)
   - Estimation strategies using lagged (dependent) variables or Diff-in-Diffs confirm main results (see Tables A3 and A4)
   - TOT effects about 35.3% above ITT effects

1.) Baseline Balance

	Assigned to ITT Group					
	All children		Attrition children		Evaluation Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
Altruism	0.011		0.020		0.009	
	(0.020)		(0.072)		(0.021)	
Trust	0.006		0.037		-0.000	
	(0.020)		(0.049)		(0.022)	
Other-regarding behavior	-0.003		-0.067		0.010	
	(0.020)		(0.048)		(0.022)	
Prosociality		0.008		-0.034		0.014
		(0.020)		(0.053)		(0.021)
Observations	569	569	87	87	482	482
Pseudo R2	0.0005	0.0002	0.0227	0.0036	0.0008	0.0007
LR test p =	0.942	0.705	0.467	0.523	0.925	0.510

Table A1: No difference in Low SES Treatment an Control Group in wave 1

	Dependent Variable: Lost to follow-up	
	(1)	(2)
ITT Group	-0.008	-0.006
	(0.032)	(0.032)
Altruism	0.011	
	(0.018)	
Altruism x ITT Group	0.006	
	(0.032)	
Trust	0.024	
	(0.019)	
Trust x ITT Group	0.019	
	(0.031)	
Other-regarding behavior	-0.006	
	(0.019)	
Other-regarding behavior x ITT Group	-0.047	
	(0.032)	
Prosociality		0.010
		(0.019)
Prosociality x ITT Group		-0.025
		(0.031)
Constant	0.155***	0.155***
	(0.019)	(0.019)
Observations	569	569
R-squared	0.017	0.001
Adj. R2	0.00445	-0.00413
Wald test p =	0.219	0.881

Table A2: Baseline (wave 1) values of outcome variables and treatment assignment have no systematic effect on attrition

The **"loss-to follow-up rates"** do not differ between treatment and control group (p=0.56, N=590, two-sided test of proportions).

Baseline values (wave 1) of outcome variables and random treatment assignment have **no systematic effect** on attrition

→ never jointly sig

→ R2 never exceeds 0.005

→ No interaction effect is significant

→ Less prosocial children (in wave 1) show up more often in second interview when they are in the treatment group

	Prosociality	Altruism	Trust	Other-regarding behavior
	(1)	(2)	(3)	(4)
ITT Group	0.267***	0.181**	0.207**	0.170**
	(0.080)	(0.088)	(0.088)	(0.073)
Wave 2	-0.139**	-0.087	-0.045	-0.118**
	(0.055)	(0.062)	(0.061)	(0.052)
Absorbed Random Effects	Yes	Yes	Yes	Yes
Clustered: Individual Level	Yes	Yes	Yes	Yes
Observations	940	950	988	978
Overall R2	0.011	0.004	0.005	0.005

Table A3: Diff-in-Diff estimates

Estimations strategy: Regression Differences-in-Differences approach allowing for random fixed effects:

$$y_{it} = \alpha + w_t + \beta ITT_{it} + u_{it} \quad \text{with} \quad u_{it} = \alpha_i + \varepsilon_{it}$$

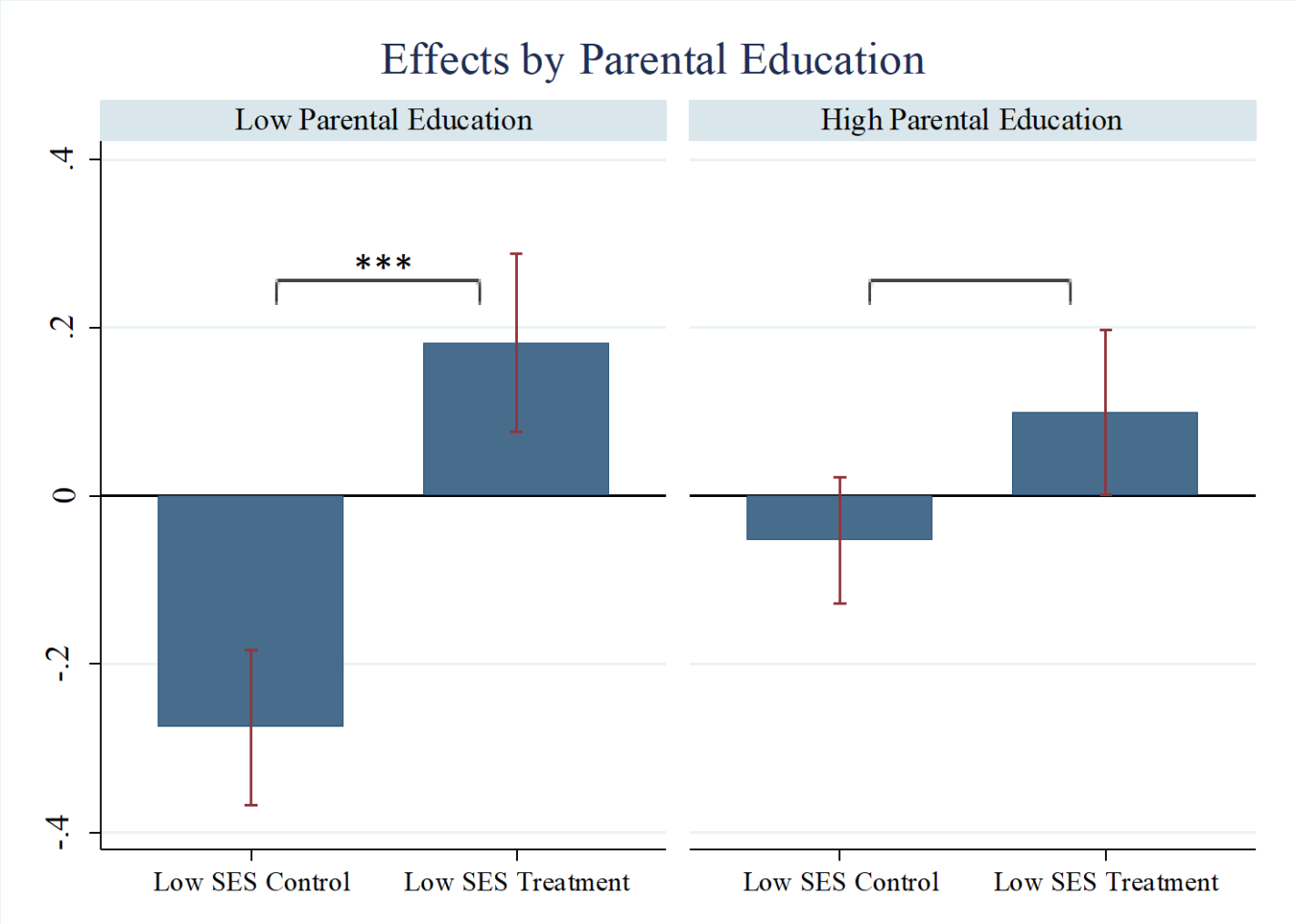
	Prosociality	Altruism	Trust	Other-regarding behavior
	(1)	(2)	(3)	(4)
ITT Group	0.267***	0.182**	0.207**	0.169**
	(0.083)	(0.089)	(0.089)	(0.076)
Lagged Dependent Variable	0.515***	0.373***	0.359***	0.605***
	(0.039)	(0.040)	(0.043)	(0.037)
Constant	-0.143***	-0.092*	-0.068	-0.113**
	(0.049)	(0.053)	(0.054)	(0.046)
Observations	470	475	494	489
R-squared	0.287	0.164	0.132	0.360
Adj. R2	0.284	0.160	0.129	0.357

Table A4: Using lagged dependent variables

Estimations strategy: Using lagged dependent variables as explanatory variable:

$$y_{it} = \alpha + w_t + \beta ITT_{it} + \gamma y_{it-1} + v_{it}$$

w_t: Wave indicatior
ITT_{it}: Dummy indicating Intention-to-treat-Group at t
v_{it}: Idiosyncratic error
→ β is always consistent for indecency of y_{it-1} and ITT_{it} (see baseline balance)
→ Represents a robustness check only for no serial correlation in v_{it}


Effects by Parental Education
Low Parental Education
High Parental Education
.4
.2
0
-.2
-.4
***
Low SES Control
Low SES Treatment
Low SES Control
Low SES Treatment

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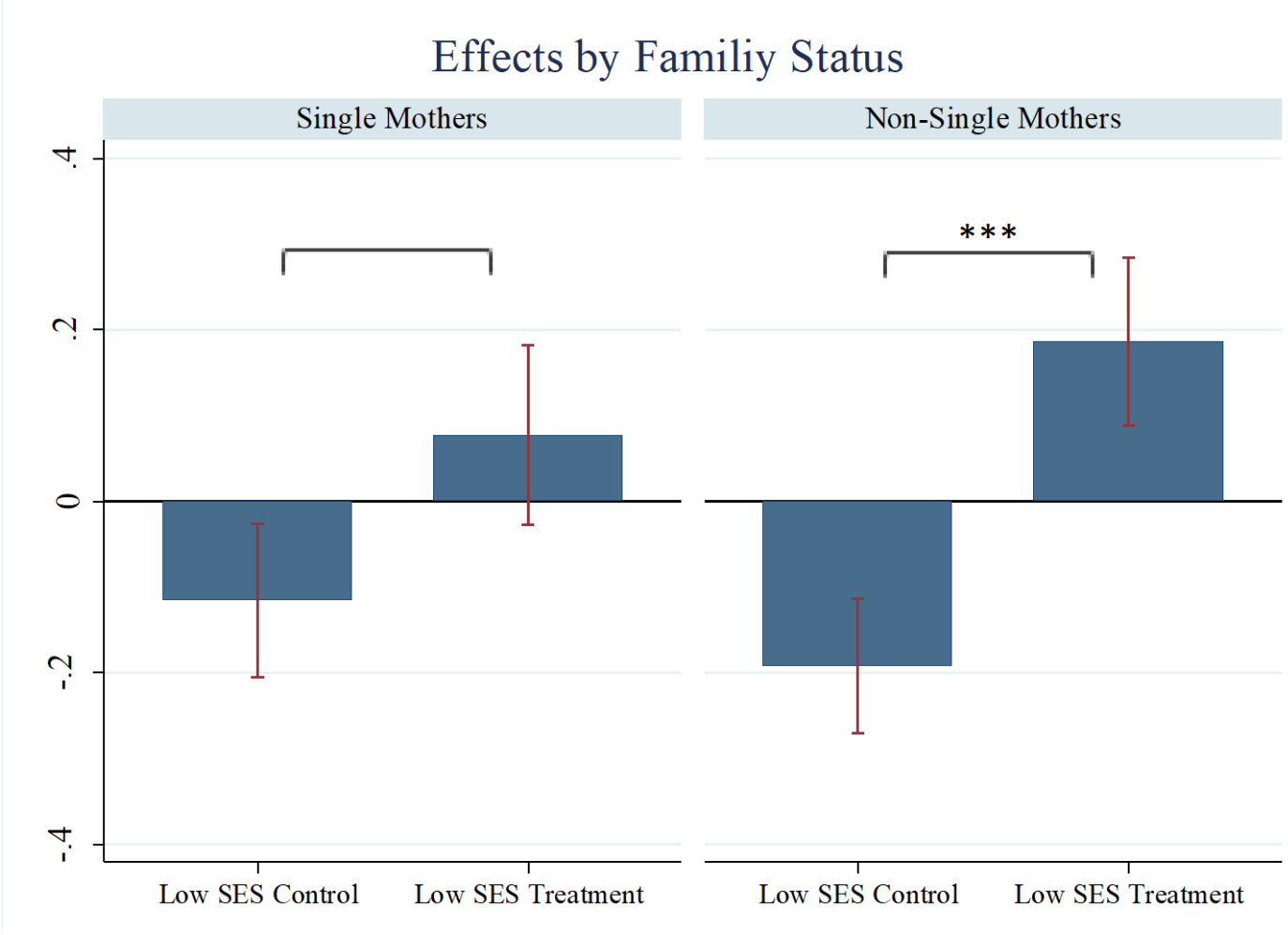

Effects by Familiy Status
Single Mothers
Non-Single Mothers
.4
.2
0
-.2
-.4
***
Low SES Control
Low SES Treatment
Low SES Control
Low SES Treatment

Other Intervention Studies

Early-Life Interventions that Begin Before Formal Schooling

- Infant Programs and Model Preschools
  - Nurse-Family Partnership
  - Jamaican Study
  - Perry Preschool Program
  - Abecedarian Program
- Large-Scale Infant and Young Child Programs
  - Head Start
  - Chicago CPC
- See summary in Heckman and Kautz (2013). IZA DP 7750:

Summary of Findings from Main Intervention Studies

	Participant/Evaluation Characteristics						Components					Effects on Outcomes							Return/Benefits	
Program	Age	Duration	Target	Selection	Follow-Up	Sample	Home	Health	Parental	On Site	Group	IQ	School	Character	Education	Health	Crime	Earnings	Return	Benefit/Cost
Early																				
NFP	< 0	2Y	SES	Prgrm	19Y	640	☒	☒	☒	□	□	●	◐	●	○	◍	◐	.		2.9
ABC	0	5Y	SES	Refer	30Y	90	□	☒	☒	☒	☒	●	●	◐	◐	◍	◐	◐		3.8
IHDP	0	3Y	Health	Prgrm	18Y	640	☒	□	☒	☒	☒	◐	◐	◐	○	○	○	.		
FDRP	0	5Y	SES	Prgrm	15Y	110	☒	☒	☒	☒	☒	○	◐	◍	.	.	●	.		
PCDC	1	2Y	SES	Prgrm	15Y	170	☒	□	☒	☒	☒	◍	◍	●	.	.	.	.		
JSS	1–2	2Y	Health	Prgrm	22Y	160	☒	☒	☒	□	□	●	●	●	◍	●	.	●		
Perry	3	2Y	SES, IQ	Prgrm	37Y	120	☒	□	☒	☒	☒	◍	●	●	◐	○	●	◐	7–10	7.1–12.2
Head Start	3	2Y	SES	Prnt	23Y	4,170	☒	☒	☒	☒	☒	◍	◍	○	●	●	◐	●		
CPC	3–4	2Y	SES	Prnt	25Y	1,290	□	☒	☒	☒	☒	.	●	●	●	●	●	●	18	10.8
TEEP	3,5	2Y	SES	Prgrm	22Y	260	☒	☒	☒	☒	□	◍	●	●	●	.	.	.		
STAR	5–6	4Y	SES	Prgrm	22Y	11,000	□	□	□	☒	☒	.	◍	●	●	.	.	●	6.2	
Elementary																				
LA's Best	5–6	6Y	SES	Schl	12Y	19,320	□	☒	☒	☒	☒	.	◍	.	●	.	○	.		0.9
CSP	5–13	5Y	Behav	Refer	35Y	510	☒	☒	☒	☒	☒	.	.	○	.	⊗	○	.		
SSDP	6–7	6Y	Crime	Prgrm	21Y	610	□	☒	☒	☒	☒	.	●	●	●	●	◍	○		3.1
Adolescence																				
BBBS	10-16	1Y	SES	Self	1Y	960	□	□	□	□	□	.	◐	○	.	◐	○	.		1.0
IHAD	11–12	7Y	SES	Prgrm	8Y	180	□	☒	☒	☒	☒	.	.	.	●	.	.	.		
EPIS	13–15	3Y	Schl	Schl	2Y	45,070	□	□	□	☒	☒	.	●	.	.	.	.	.		0.9–3.0
xl club	14	2Y	Schl	Schl	2Y	261,420	□	□	□	☒	☒	.	○	.	.	.	.	.		
SAS	14–15	5Y	Schl, SES	Schl	6Y	430	□	□	□	□	□	.	◍	○	●	.	.	.		
STEP	14–15	2Y	Schl, SES	Self	4Y	4,800	□	☒	□	☒	☒	.	○	.	○	.	.	○		
QOP	14–15	5Y	Schl	Prgrm	10Y	1,070	□	☒	□	☒	☒	.	○	.	◍	○	⊗	○		0.42
Academies	13–16	4Y	Schl, SES	Self	12Y	1,460	□	□	□	☒	☒	.	◍	○	○	○	◍	◐		
ChalleNGe	16–18	1Y	Dropout	Self	3Y	1,200	□	☒	□	☒	☒	.	.	◍	●	◐	◍	●	6.4	2.66
Job Corps	16–24	1Y	SES	Self	9Y	15,300	□	☒	□	☒	☒	.	.	.	○	◍	◍	◍		0.22
Year-Up	18–24	1Y	SES	Self	2Y	200	□	□	□	☒	☒	.	.	.	.	.	.	●		

Notes and Sources for Previous Table

Notes: □ – Does not include intervention component. ⊠ – Includes intervention component. ○ – No effects. ● – Positive effects. ◍ – Weakly positive effects. ◐ – Mixed effects (either different studies find different results or only particular sub-populations benefited). ⊗ – Negative effects. "." – Not measured. "Age" – The age at which participants entered the program. For programs that targeted grades, rather than ages, it was assumed that children entered kindergarten at ages 5–6 and the age range advanced one year for each subsequent grade. "Duration" – Length of the treatment. In cases where the treatment length varied for participants, the longest duration was presented. "Target" – Population that was targeted by the program. SES – socioeconomic status or disadvantage. Behav – Behavior. Schl – School Performance. Crime – local crime rates. IQ – low IQ. "Selection" – The party that acted first in joining the sample. Prgrm – Evaluation program contacted participants. Refer – Other party referred participants to program. Prnt – Parent applied to program. Self – Participant applied to program. Schl – School selected participants. "Follow-Up" – Duration of longest follow-up evaluation in years. "Sample" – Largest sample size from the studies examined (rounded to nearest 10). "Home" – Included home visits. "Health" – Included a nutritional component. "Parental" – Involved parents. "On Site" – Took place at an on site location. "Group" – Whether the intervention combined participants in groups. "IQ" – IQ score. "School" – school performance. "Character" – measured character skills. "Education" – educational attainment. "Health" – health (including drug use). "Crime" – crime. "Earnings" – earnings or related outcomes. "Return" – Annual rate of return. "Benefit/Cost" – Estimated benefits divided by costs.

Sources: **NFP** – Eckenrode, Campa, Luckey, Henderson, Cole, Kitzman, Anson, Sidora-Arcoleo, and Olds (2010); Kitzman, Olds, Cole, Hanks, Anson, Arcoleo, Luckey, Knudtson, Henderson, and Holmberg (2010); Olds (2006); Olds, Kitzman, Cole, Hanks, Arcoleo, Anson, Luckey, Knudtson, Henderson, Bondy, and Stevenson (2010); Olds, Kitzman, Cole, Robinson, Sidora, Luckey, Henderson, Hanks, Bondy, and Holmberg (2004); Olds, Kitzman, Hanks, Cole, Anson, Sidora-Arcoleo, Luckey, Henderson, Holmberg, Tutt, Stevenson, and Bondy (2007); Olds, Robinson, Pettitt, Luckey, Holmberg, Ng, Isacks, Sheff, and Henderson (2004). **ABC** – Breitmayer and Ramey (1986); Heckman, Moon, and Pinto (2012); Temple and Reynolds (2007). **IHDP** – McCormick, Brooks-Gunn, Buka, Goldman, Yu, Salganik, Scott, Bennett, Kay, Bernbaum, Bauer, Martin, Woods, Martin, and Casey (2006). **FDRP** – Lally, Mangione, and Honig (1987). **PCDC** – Besharov, Germanis, Higney, and Call (2011); Bridgeman, Blumenthal, and Andres (1981); Johnson and Walker (1991). **JSS** – Gertler, Heckman, Pinto, Zanolini, Vermeersch, Walker, Chang, and Grantham-McGregor (2013); Grantham-McGregor, Powell, Walker, and Himes (1991); Walker, Chang, Powell, and Grantham-McGregor (2005); Walker, Chang, Powell, Simonoff, and Grantham-McGregor (2007). **Perry** – Heckman, Moon, Pinto, Savelyev, and Yavitz (2010a); Heckman et al. (2010b, 2013). **Head Start** – Carneiro and Ginja (2012); Currie and Thomas (1995); Deming (2009); Garces, Thomas, and Currie (2002); Ludwig and Miller (2007); Westat (2010). **CPC** – Niles, Reynolds, and Nagasawa (2006); Reynolds (1994); Reynolds and Temple (1998); Reynolds, Temple, Ou, Arteaga, and White (2011); Reynolds, Temple, Robertson, and Mann (2002); Reynolds, Temple, White, Ou, and Robertson (2011). **TEEP** – Kagitcibasi, Sunar, and Bekman (2001); Kagitcibasi, Sunar, Bekman, Baydar, and Cemalcilar (2009). **STAR** – Chetty, Friedman, Hilger, Saez, Diane, and Yagan (2011); Krueger (2003). **LA's BEST** – Goldschmidt and Huang (2007); Huang, Gribbons, Kim, Lee, and Baker (2000); Huang, Kim, Marshall, and Pérez (2005). **CSP** – McCord (1978). **SSDP** – Hawkins, Catalano, Kosterman, Abbott, and Hill (1999); Hawkins, Kosterman, Catalano, Hill, and Abbott (2005, 2008). **BBBS** – Tierney, Baldwin-Grossman, and Resch (1995). **IHAD** – Kahne and Bailey (1999). **EPIS** – Martins (2010). **XL Club** – Holmlund and Silva (2009). **SAS** – Johnson (1999). **STEP** – Walker and Vilella-Velez (1992). **QOP** – Rodríguez-Planas (2010, 2012). **Academies** – Kemple and Snipes (2000); Kemple and Willner (2008). **ChalleNGe** – Bloom, Gardenhire-Crooks, and Mandsager (2009); Millenky, Bloom, and Dillon (2010); Millenky, Bloom, Muller-Ravett, and Broadus (2011). **Job Corps** – Schochet, Burghardt, and Glazerman (2001); Schochet, Burghardt, and McConnell (2008). **Year Up** – Roder and Elliot (2011).

Summary of Findings

- Early childhood interventions tend to have higher returns
  - Stronger effects
  - Longer-lasting effects
  - Only interventions that start before the age of 3 affect cognition in the long-term
- Small-scale programs tend to be more successful

Nurse-Family Partnership

- Targeted at low-income, unmarried, and/or adolescent mothers without previous births
- Nurses visit mothers from the first or second trimester of pregnancy until the second birthday of child
  - Around 30-35 visits, 1.25-1.5 hours
- Improving prenatal conditions and early parenting
  - Encourages mothers to reduce smoking
  - Teaches mothers how to care for their children
  - Helps mothers to pursue education and find jobs
- Improved child skills and outcomes
  - Lower substance use at age 12
  - Less likely to engage in crime at age 19

Summary of Effects of the Nurse-Family Partnership

Outcome	Treatment	Control	Treatment Effect
Age 6[1]			
Vocabulary Skills(ES)			0.17**
Internalizing Disorders(%)	12.6	14.7	−2.1
Externalizing Disorders(%)	17.4	20.2	−2.8
Age 9[2]			
GPA(ES)			0.09
Antisocial Behavior(%)			−0.03
Grade Retention(%)	16.0	12.4	3.6
Age 12[3]			
GPA			0.08
Achievement Tests[a]			1.09
Grade Retention(%)	24.9	20.8	4.1
Internalizing Disorders(%)[b]	22.1	30.9	−8.8**
Externalizing Disorders(%)[c]	19.7	17.8	1.9
Used Substance Last 30 Days(%)	1.7	5.1	−3.4**
Ever Arrested(%)	3.1	3.1	0.0
Welfare Benefits Mother[d]	8772	9797	−1025**
Age 19[4]			
Ever Arrested(%)	21.3	37.4	−16.1**
Arrested in Last Year(%)	8.2	5.5	2.7
Illicit Drug Use(%)	48.7	51.9	−3.2
Has HS Diploma(%)	70.6	74.5	−3.9
Economically Productive(%)[e]	71.4	68.3	3.1

Jamaican Study

- See
- Gertler, P., J. Heckman, R. Pinto, A. Zanolini, C. Vermeersch, S. Walker, S. Chang, and S. Grantham-McGregor (2014). Labor market returns to an early childhood stimulation intervention in Jamaica *Science* **344**, 998-1001.
- Grantham-McGregor, S. M., C. A. Powell, S. P. Walker, and J. H. Himes (1991). Nutritional supplementation, psychosocial stimulation, and mental development of stunted children: The Jamaican study. The Lancet 338 (8758), 1-5.

Jamaican Study

- Randomized intervention conducted in 1986–1987
- Psychosocial stimulation to growth-stunted Jamaican toddlers.
  - weekly visits from community health workers over a 2-year period
  - taught parenting skills and encouraged mothers and children to interact in ways that develop cognitive and socioemotional skills
- 105 out of 129 study participants interviewed 20 years later
- Earnings increased by 25%, catch up to the earnings of a nonstunted comparison group identified at baseline (65 out of 84 participants).

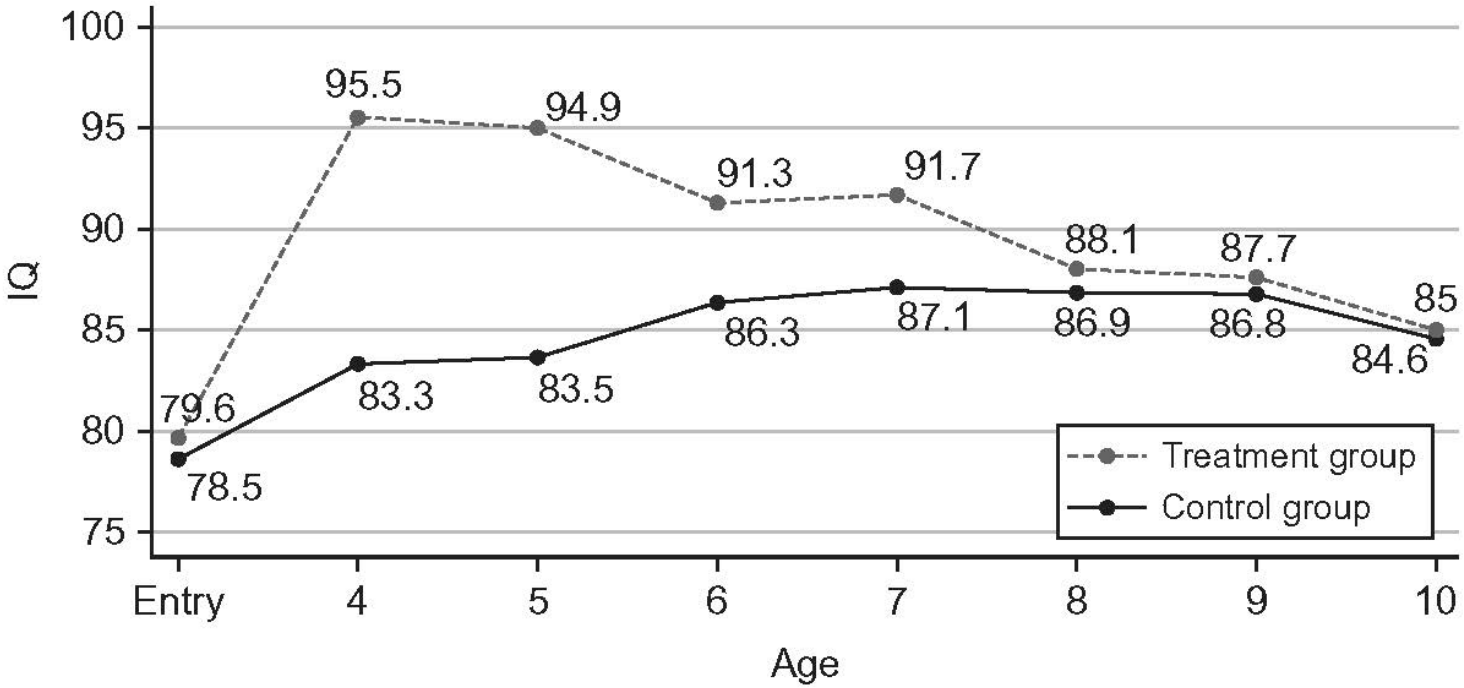
Effects of treatment on log monthly earnings

Job type	All job types	Full-time jobs	Nontemporary jobs
Treatment effect	**0.30**	**0.22**	**0.39**
Single *P*-value	**(0.01)**	**(0.04)**	**(0.01)**
Stepdown *P*-value	**[0.02]**	**[0.04]**	**[0.02]**
Control mean	9.40	9.59	9.67
Sample size	109	105	82

Perry Preschool Program

- Enriched the lives of 3- and 4-year-old low-income black children with initial IQ below 85 at age 3
  - 2.5 hours of center-based preschool five days a week for two years
  - home visits to promote parent-child relationships
  - Participants were taught social skills in a daily ”plan-do-review" sequence
- No long-term improvement of IQ
- Lasting effects on character skills
  - see Heckman, J. J., R. Pinto, and P. A. Savelyev (2013). Understanding the mechanisms through which an influential early childhood program boosted adult outcomes. American Economic Review 103 (6): 1-35.

Perry Preschool Program: IQ by Age and Treatment Group

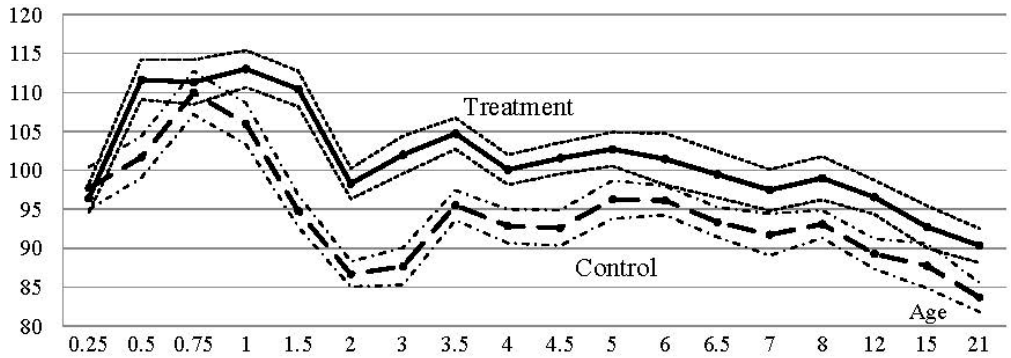


Source: Cunha et al. (2006) and Heckman and Masterov (2007), based on data provided by the High Scope Foundation.
Notes: IQ measured on the Stanford-Binet Intelligence Scale (Terman and Merrill, 1960). The test was administered at program entry and at each of the ages indicated.

Abecedarian Program

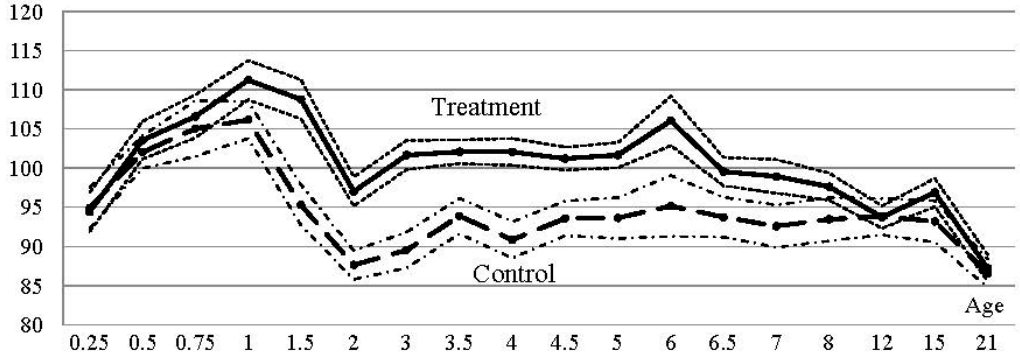
- Lasting effects on IQ

(a) Females



	0.25	0.5	0.75	1	1.5	2	3	3.5	4	4.5	5	6	6.5	7	8	12	15	21
Treatment	96.4	111.6	111.3	113.0	110.4	98.3	102.0	104.7	100.1	101.6	102.7	101.5	99.5	97.5	99.0	96.5	92.7	90.3
Control	97.7	101.7	109.9	106.0	94.8	86.7	87.7	95.5	92.8	92.6	96.3	96.1	93.4	91.7	93.1	89.3	87.7	83.7

(b) Males



	0.25	0.5	0.75	1	1.5	2	3	3.5	4	4.5	5	6	6.5	7	8	12	15	21
Treatment	94.4	103.6	106.6	111.2	108.8	97.0	101.7	102.1	102.1	101.2	101.7	106.0	99.5	99.0	97.6	93.8	96.9	87.2
Control	94.9	102.0	105.0	106.1	95.3	87.6	89.5	93.9	90.9	93.6	93.6	95.2	93.7	92.6	93.5	93.8	93.2	86.6

Source: Heckman et al. (2013).
Notes: All the cognitive tests have been standardized to population mean of 100 and standard deviation of 15. The measures used in this figure are Bayley Mental Development Index at age 0.25, 0.5, 0.75, 1, and 1.5; Stanford Binet Intelligence Scale at age 2, 3, 4, 5, and 6; McCarthy Index at age 3.5, 4.5, and 7; WPPSI IQ Score at age 5; WISC-R Intelligence Scale at age 6.5, 8, 12, and 15; WAIS-R Adult Intelligence Scale at age 21.

Abecedarian Program

- Targeted at disadvantaged black children.
- Combines a preschool intervention (starting when children are 6 weeks old) and school-age treatment through grade three.
- The preschool component full-day child care five days per week, 50 weeks a year.
  - Curriculum focused on “educational games" that emphasized language, emotional development, and the development of cognitive skills.
  - For grades one through three, the curriculum was tailored to the individual strengths of the students.
  - During this phase, teachers and parents interacted on a bi-weekly basis.

Head Start

- Targeted at young children (age 3)
- Intervention: center-based preschool intervention, medical services and parental assistance
  - Implementation differences across sites
- Outcomes: Mixed evidence