

SOCIOEMOTIONAL DEVELOPMENT DURING ADOLESCENCE: EVIDENCE FROM A LARGE MACRO SHOCK

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MOTIVATION

LARGE (AND GROWING) INTEREST IN

- ◇ Formation/ development of socioemotional (or non-cognitive) skills
(e.g. Cunha and Heckman (2007); Cunha, Heckman, and Schennach (2010))
- ◇ Socioemotional skills shown to have critical implications for long-term economic and social success
(e.g. Heckman et.al. (2013); Deming (2017); Butikofer and Peri (2021); Izadi and Tuhkuri (2022))
- ◇ Adolescence identified as a critical period (in economics and other disciplines)
(e.g., Burnett et al. (2011); Rapee et al. (2019); Blakemore and Mills (2014))

LESS WELL UNDERSTOOD: process of socioemotional skill development

- ◇ Limited (causal) evidence of impact of **ENVIRONMENT** on these skills
- ◇ Malleability of skills at different developmental stages (or ages)

THIS PAPER

MAIN FOCUS

Estimate causal effect of a macro shock on adolescents' **socioemotional development**.

- I How do socioemotional skills adjust to changes in the environment?
- II Does age (stage) in adolescence matter?
- III Are socioemotional skills linked to long-run behavior and outcomes?

HOW WE DO THIS

We use the **quasi-experiment** of German Reunification (Oct. 1990)

- ◇ Diff-in-diff exploiting timing of Reunification for different cohorts
- ◇ Focus on the socioemotional development of East-German individuals during **early adolescence**

CONTRIBUTION

I Impact of environment on youths' socioemotional development

→ Overcoming identification challenges

1. Household specific shocks can lead to selection bias → use macro shift and panel data
2. Reverse causality concern → macro level uncertainty unlikely to be *caused* by child

II Importance of adolescence as a stage of development

→ Malleability of socioemotional development

- ◇ adolescence is a critical point for development, but we know little about process
- ◇ two separate empirical strategies to identify causal effects and age heterogeneities

III Linking socioemotional development to Later Behavior

- ◇ we study: externalizing and internalizing behavior, behavioral control problems and labor market outlook

PREVIEW OF RESULTS

IN THE SHORT-RUN

- ◇ Reunification had **DRASTIC EFFECTS** on the socioemotional development of (young) adolescents (impulse control and self-confidence **decrease**)
- ◇ Adolescents from **low socioeconomic** backgrounds particularly affected
- ◇ Timing matters: shock during **EARLY** adolescence has a **LARGER IMPACT** on socioemotional development

IN THE LONG-RUN

- ◇ **Negative effect** of socioemotional development **PERSISTS** INTO ADULTHOOD in terms of behavior and labor market outlook

GENDER DIFFERENCES

- ◇ Similar short-run impact of shock on socioemotional development and in adaptation
- ◇ BUT different manifestation in later behavior:
 Male > Female in *externalizing behavior* and *behavioral control*
 Male < Female for *internalizing behavior*

CONTEXT: GERMAN REUNIFICATION

- ◇ Until 1945 single country
- ◇ After defeat in World War II: separation **EXOGENOUSLY IMPOSED** by winning Allies
- ◇ November 1989: fall of Berlin Wall
- ◇ October 3rd 1990: East Germany joined Federal Republic of Germany (**REUNIFICATION**)
- ◇ GDR ceased to exist: East Germany switched from **STATE SOCIALISM** to **LIBERAL DEMOCRATIC CAPITALISM** within short time period
- ◇ Large and unexpected change in economic and political system

Overall, period around Reunification represented **GREAT DEAL OF UNCERTAINTY**

DATA: “LONGITUDINAL STUDY OF STUDENTS”

- ◇ Microdata following students **BEFORE AND AFTER** Reunification
- ◇ Follow **TWO PARALLEL COHORTS** of students in East Germany from 1985 to 1995 (ages 9 to 21)
 - ◇ **Younger cohort** (treated): surveyed from ages 9/10 to 18/19
 - ◇ **Older cohort**: surveyed in the same calendar years from ages 11/12 to 20/21
- ◇ socioemotional measures: [▶ details](#)
 - ◇ **IMPULSE CONTROL**:
Ability to resist an impulse/ temptation and to control its translation into an action
 - ◇ **SELF-CONFIDENCE**:
Trust in one's own abilities and judgment
[▶ Summary statistics](#)
- ◇ Other measures:
 - ◇ **BEHAVIOR**: externalizing, internalizing, and behavioral control issues
 - ◇ **OUTLOOK**: (occupational) optimism, employment expectations
[▶ Summary statistics](#)

IDENTIFICATION STRATEGY

CAUSAL EFFECT OF GERMAN REUNIFICATION ON SOCIOEMOTIONAL SKILLS

- ◇ Apply a DIFFERENCE-IN-DIFFERENCES (BY ACADEMIC GRADE)
 - ◇ TREATMENT: socioemotional development for the **younger cohort** (narrow period BEFORE AND AFTER REUNIFICATION, i.e. grades 7 - 8, ages 12 - 14)
 - ◇ CONTROL: as counterfactual trend, use evolution of **older cohort's** socioemotional development at the **SAME AGES** (BEFORE REUNIFICATION)
- ◇ Focus on grades directly PRE- AND POST-Reunification for the **treated cohort**, while **control cohort** is PRE-Reunification in both grades (i.e., no contamination of control group).
- ◇ We estimate:

$$S_{icg} = \beta_0 + \beta_1 Treat_i + \beta_2 \underbrace{Post_{ig}}_{\text{Student in Grade 8}} + \beta_3 (Treat_i Post_{ig}) + D_i + \epsilon_{icg}$$

ENVIRONMENT EFFECT

DIFFERENCE-IN-DIFFERENCES BY GRADE

	Causal Effect			
	Impulse Control		Self-Confidence	
	[1]	[2]	[3]	[4]
Treated Cohort x Post Reunification	-0.339*** [0.067]	-0.339*** [0.067]	-0.449*** [0.082]	-0.449*** [0.081]
Treated Cohort (Young)	0.055 [0.074]		0.045 [0.062]	
Post Reunification (Age 14)	0.071 [0.044]	0.071 [0.044]	0.013 [0.041]	0.013 [0.041]
Constant	0.044 [0.048]	0.067*** [0.017]	0.088** [0.042]	0.107*** [0.019]
N Observations	1754	1754	1754	1754
N Individuals	877	877	877	877
N Schools	62	62	62	62
Individual FE	NO	YES	NO	YES
R-squared	0.012	0.029	0.030	0.064

▶ parallel trends

INTERACTIONS WITH INDIVIDUALS' BACKGROUND

	Impulse Control			Self-Confidence		
	Parents Abitur [1]	Parents Executive [2]	FDJ mem. w. function [3]	Parents Abitur [4]	Parents Executive [5]	FDJ mem. w. function [6]
Triple Interactions:						
Treated x Post x YES	-0.289** [0.131]	-0.360** [0.149]	-0.323*** [0.116]	-0.345** [0.162]	-0.353** [0.149]	-0.555*** [0.116]
Treated x Post x NO	-0.469*** [0.108]	-0.604*** [0.124]	-0.277*** [0.093]	-0.509*** [0.111]	-0.546*** [0.163]	-0.371*** [0.119]
p-value diff.	0.289	0.257	0.754	0.292	0.354	0.259
N Observations	1204	1012	1604	1204	1012	1604
N Individuals	602	506	802	602	506	802
N Schools	61	61	62	61	61	62
Individual FE	YES	YES	YES	YES	YES	YES
R-squared	0.043	0.056	0.025	0.056	0.066	0.075

- ◇ Socioemotional development of **HIGH SES** adolescents are **LESS AFFECTED**
- ◇ Students with formerly **STRONG POLITICAL TIES** to Socialist regime particularly **STRONGLY AFFECTED**

HETEROGENEOUS EXPOSURE TO REUNIFICATION

- ◇ Is AGE (or educational stage) at which individuals are affected by a shock relevant for socioemotional development?
- ◇ Apply DIFFERENCE-IN-DIFFERENCES with **alternative control group**
 - ◇ Evolution in socioemotional skills over the SAME YEARS (i.e., same environment but impacted by shock at different age)
 - ◇ Compare **treated (younger) cohort** at time of Reunification (ages 13-14) to **control (older) cohort** at time of Reunification (ages 16-17)
- ◇ Focus on socioemotional development OVER THE SAME YEARS (i.e., shortly before-after October 1990)
- ◇ We estimate:

$$S_{ict} = \beta_0 + \beta_1 Treat_i + \beta_2 \underbrace{Post_{it}}_{\substack{\text{year} \\ \text{post-1990}}} + \beta_3 (Treat_i Post_{it}) + D_i + \epsilon_{ict}$$

HETEROGENEOUS EXPOSURE BY AGE

	Adjustment Process			
	Impulse Control [1]	Control [2]	Self-Confidence [3]	Confidence [4]
Treated Cohort x Post Reunification	-0.236*** [0.086]	-0.263*** [0.078]	-0.242** [0.096]	-0.266*** [0.100]
Treated Cohort (Young)	0.091 [0.076]		0.153** [0.066]	
Post Reunification (Year 1991)	-0.022 [0.070]	0.006 [0.060]	-0.182*** [0.067]	-0.157** [0.073]
Constant	0.068 [0.053]	0.110*** [0.018]	0.059 [0.048]	0.133*** [0.023]
N Observations	1473	1473	1471	1471
N Individuals	825	825	825	825
N Schools	62	62	62	62
Individual FE	NO	YES	NO	YES
R-squared	0.010	0.036	0.028	0.085

Older cohort is affected but to much **LESSER EXTEND**

e.g.: impact on younger cohorts' impulse control

MORE THAN THREE TIMES LARGER: 0.34 vs. 0.08 = 0.34 - 0.26

ESTIMATION STRATEGY

LINKING SOCIOEMOTIONAL DEVELOPMENT TO LATER OUTCOMES

How is the **NEGATIVE EFFECT** of the macro shock on socioemotional development **RELATED TO LONGER-RUN OUTCOMES?**

We estimate in the long-run:

$$B_{ic} = \gamma_0 + \gamma_1 \Delta S_{ic} + \gamma_1^T (\Delta S_{ic} T_{ic}) + \gamma_2 S_{ic,pre} + \gamma_2^T (S_{ic,pre} T_{ic}) + \gamma_3 T_{ic} + \gamma_4 X_{ic} + \epsilon_{ic}$$

B_{ic} : measure of certain behavior of individual i in cohort c at ages 18 to 21
for both cohorts, this is POST-Reunification

T_i : treatment indicator (i.e., one if i belongs to younger cohort)

F_i : gender dummy (i.e., one if i is female)

$S_{ic,pre}$: level of socioemotional skill at age 12 (i.e., before Reunification for both cohorts)

ΔS_{ic} : change in socioemotional skill from 1989-1991

LINK TO LONG-RUN BEHAVIOR

	Externalizing Behavior		Behav. Control Problems		Internalizing Behavior	
	[1]	[2]	[3]	[4]	[5]	[6]
Change in Socioemotional Skills						
Impulse Control	-0.148*** [0.053]	-0.046 [0.056]	-0.112*** [0.037]	-0.018 [0.050]	-0.012 [0.040]	0.072 [0.051]
Impulse Control x Treated		-0.212* [0.110]		-0.165** [0.079]		-0.199** [0.082]
Self-Confidence	0.030 [0.052]	0.014 [0.048]	0.039 [0.037]	0.010 [0.061]	-0.116** [0.046]	-0.010 [0.054]
Self-Confidence x Treated		0.001 [0.117]		0.063 [0.076]		-0.213** [0.090]

Interactions suggest → effects are borne **entirely** by **YOUNGER COHORT**

LINK TO LABOR MARKET OUTLOOK

	Optimism		Occupational Optimism		Employment Expectations	
	[1]	[2]	[3]	[4]	[5]	[6]
Change in Socioemotional Skills						
Impulse Control	0.012 [0.022]	-0.014 [0.037]	-0.030 [0.039]	-0.056 [0.071]	-0.026 [0.047]	0.010 [0.094]
Impulse Control x Treated		0.042 [0.048]		0.054 [0.090]		-0.073 [0.108]
Self-Confidence	0.059*** [0.021]	0.005 [0.026]	0.052 [0.054]	-0.094 [0.068]	0.066 [0.049]	-0.043 [0.080]
Self-Confidence x Treated		0.118*** [0.040]		0.281*** [0.098]		0.217** [0.099]

Interactions suggest → effects are borne **entirely** by **YOUNGER COHORT** and operate only via **SELF-CONFIDENCE**

GENDER, RESPONSE TO SHOCK, BEHAVIOR

- ◇ **Biological/ medical:** well-established “fragile male” hypothesis
(e.g., Trivers and Willard, 1973; Kramer, 2000)
- ◇ **Behavioral:** males more likely to engage in “risky” behavior
(e.g., Juutilainen et al., 2004)
- ◇ **Economics:**
 - ◇ Shock to home/ school environment: STRONGER IMPACT on disruptive behavior and education for BOYS
(e.g., Autor et al., 2019; Bertrand and Pan, 2013; Brenøe and Lundberg, 2018)
 - ◇ Targeted early childhood interventions: MORE EFFECTIVE in improving outcomes of BOYS THAN GIRLS
(e.g., Conti et al., 2016)

GENDER DIFFERENCES

◇ CAUSAL EFFECT OF REUNIFICATION

- ◇ Impulse control **decreases SIMILARLY** for boys and girls
- ◇ Self-confidence **decreases STRONGER** for girls than for boys

▶ table

◇ AGE HETEROGENEITY/ ADJUSTMENT PROCESS

- ◇ Impulse control:
decreases almost **ENTIRELY** by boys and girls from **YOUNGER COHORT**
- ◇ Self-confidence:
boys in late adolescence not affected
girls from **older cohort** also affected but to **LESSER EXTENT**

▶ table

◇ LINKS TO LONG-RUN OUTCOMES:

→ transmission of shocks differ by gender

- ◇ for males: **EXTERNALIZING** behavior and **BEHAVIORAL CONTROL**
- ◇ for females: **INTERNALIZING** behavior

▶ table

CONCLUSION

- ◇ Evidence for CAUSAL LINK between increased uncertainty and socioemotional development
 - ◇ Sizable negative effect on socioemotional skills
 - ◇ Age at shock matters:
impacts during EARLY adolescence much stronger than during later stage of adolescence

- ◇ Identify LASTING IMPACTS of a macro shock on young adults' behaviors and outlook
 - propagated via shock to their socioemotional development IN ADOLESCENCE

- ◇ Effect on socioemotional development similar for both, adolescent boys and girls BUT
 - transmission to long-term behaviors differs by gender in important ways

THANK YOU

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DETAILS ON SED MEASURES

Variable	Description
Impulse Control	Combined score of 2 items. Combines the students' strength of agreement with expressing their anger in a physical and verbal way using factor analysis, we reverse the scale so a higher value indicates better impulse control.
Self-Confidence	Captures students' agreement with having problems with low self-confidence, again we reverse the scale so higher values indicate higher self-confidence.

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SUMMARY STATISTICS: EARLY ADOLESCENCE

	Description	Answers	Mean	Std.Dev.	N.Ind.
Impulse Control	Combined index.				
Anger expression 1	Physical expression of anger.	1 4	3.227	0.848	877
Anger expression 2	Verbal expression of anger.	1 4	2.917	0.841	877
Self-Confidence	Level of self-confidence.	1 4	3.383	0.746	877

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SUMMARY STATISTICS: LATE ADOLESCENCE/ EARLY ADULTHOOD

	Description	Answers	Mean	Std.Dev.	N.Ind.
Externalizing Behavior	Combined index.				
Physical fighting	Have you deliberately beaten or hurt someone in the last 12 months?	0 1	0.053	0.225	656
Property Damage	Have you deliberately destroyed or damaged private/others' property in the last 12 months?	0 1	0.075	0.263	656
Trouble with police	Have you been in trouble with the police due to rampage or rioting?	0 1	0.026	0.159	656
Internalizing Behavior	Combined index.				
Suicidal thoughts	Have you ever had suicidal thoughts?	0 1	0.296	0.457	656
Repeated suicidal thoughts	Have you had suicidal thoughts more than once?	0 1	0.066	0.248	656
Behavioral Control Problems	Combined index.				
Cigarette smoking	Individual is a regular smoker.	0 1	0.369	0.483	656
Substance abuse	Consume alcohol on weekly basis and/or consumed at least two types of drugs.	0 1	0.221	0.415	656
Economic Outlook					
Optimism	Indicator measuring an optimistic view on the individual future.	0 1	0.599	0.491	673
Occupational Optimism	How optimistic are you about your occupational/professional future?	1 4	2.897	0.709	673
Employment Expectations	How optimistic are you about the chances of getting a job?	1 4	2.691	0.818	673

ENVIRONMENT EFFECT (SHORT-RUN)

PARALLEL TRENDS

	Placebo-Tests			
Treated Cohort x Post Reunification	-0.035 [0.066]	-0.033 [0.064]	0.055 [0.069]	0.055 [0.066]
Treated Cohort (Young)	0.020 [0.072]		-0.023 [0.056]	
Post Reunification	0.067 [0.042]	0.067 [0.042]	0.013 [0.042]	0.013 [0.042]
Constant	0.007 [0.047]	0.015 [0.016]	0.000 [0.043]	-0.009 [0.016]
N Observations	1730	1730	1727	1727
N Individuals	877	877	877	877
N Schools	62	62	62	62
Individual FE	NO	YES	NO	YES
R-squared	0.001	0.003	0.001	0.002

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EFFECTS ON SED: GENDER DIFFERENCES - PARALLEL TRENDS

	Placebo-Tests					
	SED: Impulse Control		SED: Self-Confidence		Cognitives	
	[1]	[2]	[3]	[4]	[5]	[6]
Treated Cohort x Post Reunification	-0.076 [0.114]	-0.050 [0.114]	0.187 [0.117]	0.180 [0.118]	-0.012 [0.060]	-0.037 [0.053]
Treated Coh. x Post Reuni. x Female	0.191 [0.154]	0.155 [0.153]	-0.173 [0.171]	-0.157 [0.172]	0.040 [0.077]	0.084 [0.069]
N Observations	1488	1488	1486	1486	1456	1456
N Individuals	752	752	752	752	752	752
Individual FE	NO	YES	NO	YES	NO	YES
R-squared	0.025	0.005	0.005	0.004	0.030	0.150

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ENVIRONMENT EFFECT: DID (BY GRADE) - BY GENDER

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	Main Results			
	Impulse Control		Self-Confidence	
	[1]	[2]	[3]	[4]
Treated Coh. x Post Reuni. x Female	-0.092 [0.165]	-0.092 [0.165]	-0.427*** [0.144]	-0.427*** [0.144]
Treated Cohort x Post Reunification	-0.288*** [0.108]	-0.288*** [0.108]	-0.217* [0.109]	-0.217* [0.109]
Treated Cohort (Young)	0.154 [0.114]		0.056 [0.091]	
Treated Cohort x Female	-0.191 [0.157]		-0.016 [0.133]	
Post Reunification (Age 14)	0.086 [0.060]	0.086 [0.060]	-0.056 [0.063]	-0.056 [0.063]
Post Reunification x Female	-0.028 [0.102]	-0.028 [0.102]	0.130 [0.100]	0.130 [0.100]
Female	0.336*** [0.112]		-0.160* [0.092]	
Constant	-0.135* [0.072]	0.067*** [0.017]	0.173*** [0.062]	0.107*** [0.019]
N Observations	1754	1754	1754	1754
N Individuals	877	877	877	877
N Schools	62	62	62	62
Individual FE	NO	YES	NO	YES
R-squared	0.029	0.030	0.046	0.074

AGE EFFECTS: DID (BY YEAR) - BY GENDER

▶ BACK

	Main Results			
	Impulse Control		Self-Confidence	
	[1]	[2]	[3]	[4]
Treated Coh. x Post Reuni. x Female	0.081 [0.162]	-0.078 [0.161]	-0.119 [0.150]	-0.069 [0.160]
Treated Cohort x Post Reunification	-0.278** [0.127]	-0.221* [0.117]	-0.193 [0.121]	-0.233* [0.120]
Treated Cohort (Young)	0.081 [0.112]		0.157* [0.090]	
Treated Cohort x Female	0.012 [0.152]		0.004 [0.132]	
Post Reunification (Year 1991)	0.085 [0.092]	0.028 [0.078]	-0.073 [0.084]	-0.033 [0.083]
Post Reunification x Female	-0.199* [0.102]	-0.040 [0.100]	-0.170 [0.111]	-0.221* [0.123]
Female	0.126 [0.108]		-0.175* [0.093]	
Constant	0.004 [0.072]	0.110*** [0.018]	0.149** [0.063]	0.134*** [0.023]
N Observations	1473	1473	1471	1471
N Individuals	825	825	825	825
N Schools	62	62	62	62
Individual FE	NO	YES	NO	YES
R-squared	0.013	0.038	0.053	0.097

LINK TO LONG-RUN BEHAVIOR - BY GENDER

	Externalizing Behavior		Internalizing Behavior		Behav. Control Problems	
	[1]	[2]	[3]	[4]	[5]	[6]
Change in Socioemotional Skills						
Impulse Control	-0.145*** [0.051]	-0.333*** [0.108]	-0.015 [0.039]	-0.092* [0.054]	-0.110*** [0.037]	-0.292*** [0.064]
Impulse Control x Female		0.316*** [0.119]		0.136 [0.084]		0.307*** [0.094]
Self-Confidence	-0.001 [0.051]	0.047 [0.093]	-0.085* [0.046]	0.058 [0.040]	0.031 [0.037]	0.098 [0.067]
Self-Confidence x Female		-0.083 [0.097]		-0.246*** [0.089]		-0.118 [0.088]
Significance of total effect on female						
p-value for Impulse Control		0.720		0.458		0.776
p-value for Self-Confidence		0.411		0.016		0.699

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LINK TO LABOR MARKET OUTLOOK - BY GENDER

	Optimism		Occupational Optimism		Employment Expectations	
	[1]	[2]	[3]	[4]	[5]	[6]
Change in Socioemotional Skills						
Impulse Control	0.010 [0.022]	0.014 [0.035]	-0.026 [0.041]	-0.031 [0.060]	-0.024 [0.048]	-0.018 [0.064]
Impulse Control x Female		-0.008 [0.048]		-0.003 [0.088]		-0.021 [0.079]
Self-Confidence	0.046** [0.021]	0.043 [0.030]	0.038 [0.052]	0.062 [0.074]	0.035 [0.048]	0.065 [0.064]
Self-Confidence x Female		0.007 [0.038]		-0.034 [0.101]		-0.042 [0.081]
Significance of total effect on female						
p-value for Impulse Control		0.866		0.589		0.517
p-value for Self-Confidence		0.065		0.698		0.718

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