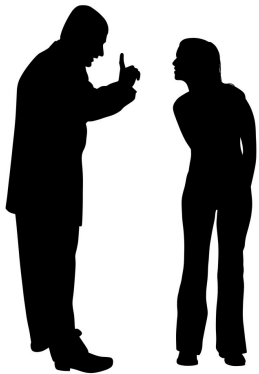
It Takes a Village: The Economics of Parenting with Neighborhood and Peer Effects

Francesco Agostinelli[1] Matthias Doepke[2]

Giuseppe Sorrenti[3] Fabrizio Zilibotti[4]

University of Pennsylvania[1], London School of Economics[2]

University of Amsterdam[3], Yale University[4]



Parenting When Peer Effects Matter

- As children turn into teenagers, parents matter less and peers matter more
- But parents can still have influence by shaping their child's peer group
  - Choice of neighborhood, school, and activities
  - Direct intervention in peer formation

Open Questions

- How do parents take decisions that shape their child's peer group?
- Are there interactions with parenting style and investments in skill accumulation?
- Are there interactions with policy interventions that also affect peer groups? (busing, tracking, school choice, ...)

What We Do

- **Develop Model of Parenting with Peer Effects**
  - Children grow up in different neighborhoods/environments
  - Peer formation and parenting style are mutually interdependent equilibrium outcomes
- **Estimate the Model with Data on US Teenagers (Add Health)**
  - Information on parenting style and friendship networks
- **Policy Analysis: Moving Children to a Better Environment**
  - Scaling up the policy reduces effect on skills by up to 50% ...
  - ...largely because of endogenous parenting and peer formation

Literature We Build On

- **Family Environment and Skill Formation:** Cunha and Heckman (2007); Cunha et al. (2010); Dahl and Lochner (2012); Løken et al. (2012); Del Boca et al. (2014); Attanasio (2015); Agostinelli and Wiswall (2016); Agostinelli and Sorrenti (2018); Attanasio et al. (2019); Mullins (2019), ...
- **Social Environment and Neighborhoods:** Cutler and Glaeser (1997); Brock and Durlauf (2001a, 2001b, 2007); Ioannides and Durlauf (2010); Chetty et al. (2016); Chetty and Hendren (2018a, 2018b); Agostinelli (2018); Altonji and Mansfield (2018); Eckert and Kleinberg (2019); Fogli and Guerrieri (2019); List, Momeni, and Zenou (2019), ...
- **Parenting Style:** Baumrind (1967); Doepke and Zilibotti (2017); Doepke and Zilibotti (2019); Doepke, Sorrenti, and Zilibotti (2019); Del Boca et al. (2019), ...

Data and Descriptive Evidence

National Longitudinal Study of Adolescent Health (Add Health)

- 144 public and private schools, representative for US in 1994
- In-school survey: 90,118 adolescents in grades 7-12
  - Friendship network within school
  - Core subject grades; Peabody Picture Vocabulary Test (PPVT)
- In-home survey: subsample of 20,745
  - Parental involvement Details
  - Parenting style

New Facts on Parenting Style and Peers

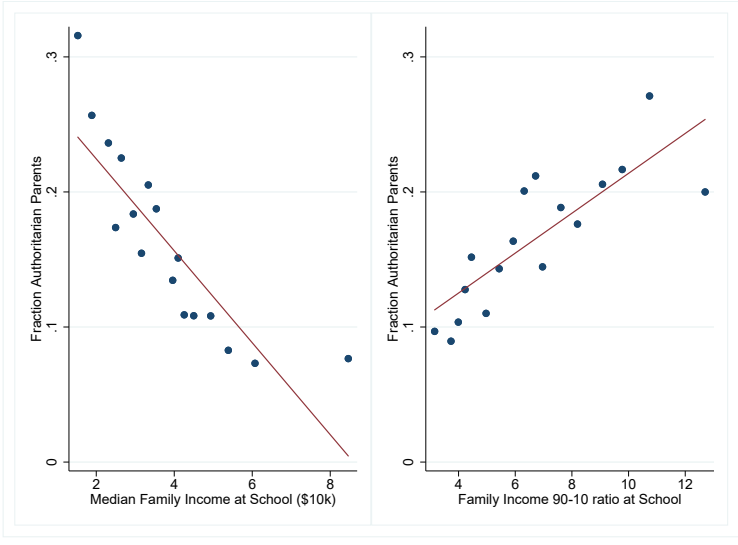
- Question in in-home survey:

  "Do your parents let you make your own decisions about the people you hang around with?"

  - No = Authoritarian about Friends
  - Yes = Nonauthoritarian about Friends

- 14 percent of parents in Add Health are Authoritarian about Friends

Parenting Style and Peers Across Schools



Parenting Style and Peers Within Schools

- School fixed effects
- Variation between quality of cohorts within the same school (Hoxby 2000)

Parenting Style and Peers Within Schools

- School fixed effects
- Variation between quality of cohorts within the same school (Hoxby 2000)

	(1)	(2)	(3)	(4)	(5)	(6)
			Authoritarian about Friends			
Mean GPA within Grade	-0.135***		-0.070*	-0.086**		-0.049
	(0.039)		(0.039)	(0.039)		(0.038)
SD GPA within Grade		0.389***	0.311***		0.291***	0.249***
		(0.078)	(0.081)		(0.090)	(0.089)
Obs	13327	13327	13327	13327	13327	13327
Clusters	73	73	73	73	73	73
Controls	No	No	No	Yes	Yes	Yes
School F.E.	Yes	Yes	Yes	Yes	Yes	Yes

Parenting Style and Peers Within Schools

- Effects of cohort's mean GPA:
  - ↑ 0.1 points in average GPA ⇒
    ↓ 0.5-to-1.3 percentage points probability of being authoritarian
- Effect of cohort's inequality (conditional on average GPA):
  - ↑ 1 standard deviation (σ=0.08) in the inequality of GPA ⇒
    ↑ 2-to-3 percentage points probability of being authoritarian

Parenting Style and Changes in the Peer Environment

	(1)	(2)	(3)	(4)	(5)	(6)
	Change in Authoritarian Style					
Change in Peer GPA	-0.029**	-0.028**	-0.027**	-0.027**	-0.026**	-0.026**
	(0.011)	(0.011)	(0.012)	(0.010)	(0.010)	(0.011)
Change in Child GPA		-0.017	-0.055***		-0.016	-0.054**
		(0.014)	(0.015)		(0.015)	(0.017)
Child GPA (t-1) × Change in Child GPA			0.012*			0.012
			(0.007)			(0.007)
Mean Dependent Variable	-0.036	-0.036	-0.036	-0.036	-0.036	-0.036
Observations	1489	1489	1489	1489	1489	1489
Clusters	10	10	10	10	10	10
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Classroom F.E.	No	No	No	Yes	Yes	Yes

Model of Parenting with Peer Effects

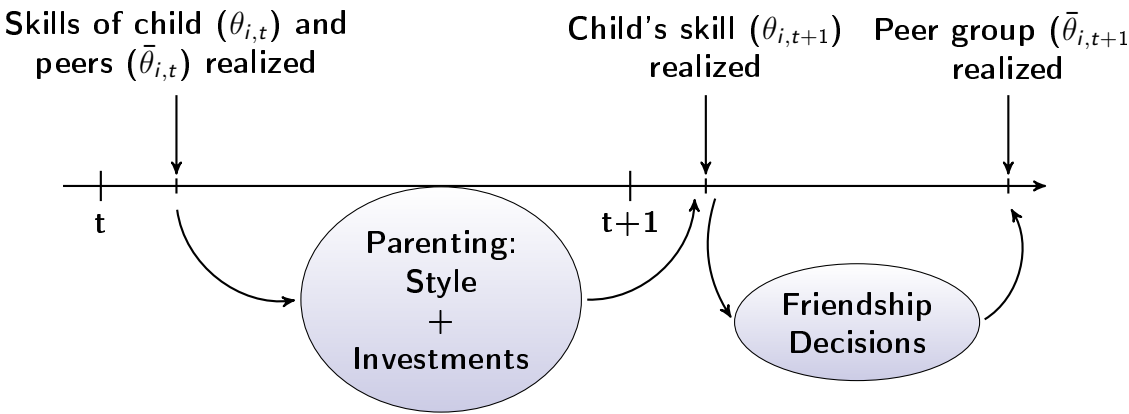
Setting: Parenting through the High School Years

- Parents and children
- Initial heterogeneity in child skills, varies across schools/neighborhoods

- **Parent** decides about:
  - **Authoritarian versus nonauthoritarian** parenting style
  - **Authoritative time investments** (continuous variable)

- **Child** decides about:
  - **Who to be friends with** ...
  - ... taking as given the parent's behavior

Timeline


Skills of child ($\theta_{i,t}$) and peers ($\bar{\theta}_{i,t}$) realized
Child's skill ($\theta_{i,t+1}$) realized
Peer group ($\bar{\theta}_{i,t+1}$) realized
t
t+1
Parenting: Style + Investments
Friendship Decisions

Technology of Skill Formation

$$\theta_{i,t+1} = A(t \quad) \cdot \left[\alpha_4 \quad \theta_{i,t}^{\alpha_6} \quad + \alpha_5 \quad \left[\alpha_1 \quad \overline{\theta}_{i,t}^{\alpha_3} \quad + \alpha_2 \quad I_{i,t}^{\alpha_3} \right]^{\frac{\alpha_6}{\alpha_3}} \right]^{\frac{1}{\alpha_6}}$$

- Next-period skill ($\theta_{i,t+1}$) depends on:
  - Current stock of skills ($\theta_{i,t}$)
  - Peer effects ($\overline{\theta}_{i,t}$)
  - Parental investments ($I_{i,t}$)

Technology of Skill Formation

$$\theta_{i,t+1} = A(t,P) \cdot \left[\alpha_{4,P}\, \theta_{i,t}^{\alpha_{6,P}} + \alpha_{5,P} \left[\alpha_{1,P}\, \overline{\theta}_{i,t}^{\alpha_{3,P}} + \alpha_{2,P}\, I_{i,t}^{\alpha_{3,P}} \right]^{\frac{\alpha_{6,P}}{\alpha_{3,P}}} \right]^{\frac{1}{\alpha_{6,P}}}$$

- Next-period skill ($\theta_{i,t+1}$) depends on:
  - Current stock of skills ($\theta_{i,t}$)
  - Peer effects ($\overline{\theta}_{i,t}$)
  - Parental investments ($I_{i,t}$)
  - Parenting style ($P_{i,t} \in \{0,1\}$)
- Captures idea that authoritarian parenting may disrupt skill accumulation

The Child's Problem: Forming Friendships

- Functional form for friendship utility:

$$f_{i,j,t+1} = \gamma_0 + \gamma_1 \ln \theta_{i,t+1} + \gamma_2 \ln \theta_{j,t+1} + \gamma_3 \left(\ln \theta_{i,t+1} - \ln \theta_{j,t+1}\right)^2 + \gamma_4 \mathbb{1}(\theta_{j,t+1} < \theta_{i,t+1}) \left(\ln \theta_{i,t+1} - \ln \theta_{j,t+1}\right)^2 P_{i,t} + \eta_{i,j,t+1}$$

- Friendship forms if there is mutual agreement:

$$f_{i,j,t+1} > 0 \;\; \& \;\; f_{j,i,t+1} > 0$$

- Total friendship utility:

$$f_{i,t+1} = \sum_{j \in \mathcal{X}_{i,t+1}} f_{i,j,t+1}$$

The Parent's Problem: Paternalism versus Altruism

- The parent's value function:

$$V_t^n(\theta_{i,t}, \bar{\theta}_{i,t}, \Theta_t^n) = \max_{P_{i,t} \in \{0,1\}, I_{i,t} \geq 0} \Big\{ \mathrm{E}\left[U^n(I_{i,t}, P_{i,t}, \epsilon_{i,t}) + Z\left[\lambda \tilde{u}(\theta_{i,t}, P_{i,t}) + (1-\lambda) u(f_{i,t+1})\right] + B \times V_{t+1}^n(\theta_{i,t+1}, \bar{\theta}_{i,t+1}, \Theta_t^n) \right] \Big\}$$

- Cost of investing in skills: $U_I(I_{i,t}, P_{i,t}, \epsilon_{i,t}) < 0$
- Cost of influencing friendships: $U(I_{i,t}, 1, \epsilon_{i,t}) < U(I_{i,t}, 0, \epsilon_{i,t})$
- Final continuation utility: $V_{T+1}^n = v_{T+1}^n(\theta_{i,T+1})$

Estimating the Model

Model Estimation and Validation

- Simulated Method of Moments (SMM)
  - **Indirect inference** on regression coefficients (within school and grade) of:
    - Parenting style on child's and peers' skills Reg 1
    - Next-period skills on child's and peers' skills and parenting style Reg 2
    - Next period peer quality on child's and peers' skills Reg 3
    - Investments on child's and peers' skills, by parenting style Reg 4
    - Parenting style and investments on changes in child's and peers' skills.
    - Pattern of parenting styles across schools/neighborhoods.

Model Estimates

- Technology: Technology
  - Authoritarian parenting $P = 1$:
    - **Lowers productivity** of skill accumulation
  - Non-authoritarian parenting $P = 0$:
    - Child's quality and other inputs are **complements**
    - Peers and parents are **substitutes**
  - Authoritative and authoritarian styles as:
    - Alternative responses to a problematic peer environment

Model Estimates

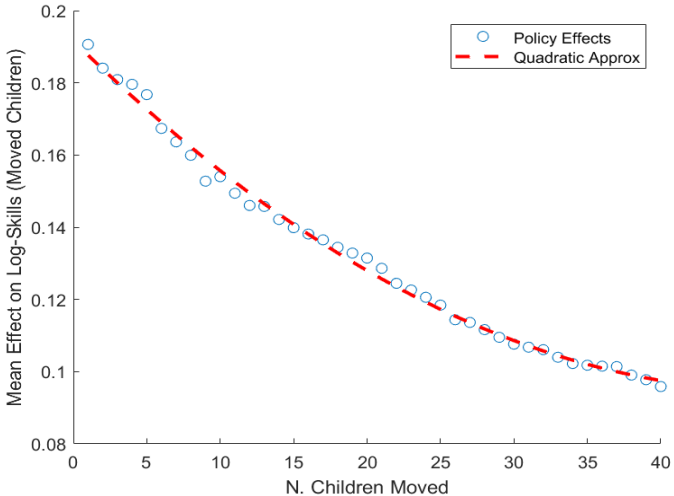
- Peer Formation: Friendships
  - Negative coefficient on peer skills; **homophily**
  - **Authoritarian parenting style is effective**:
    - Probability of friendship of average child with child one s.d. below mean of skill distribution reduced by 35 percent

Policy Analysis: Moving Children to a Better Environment

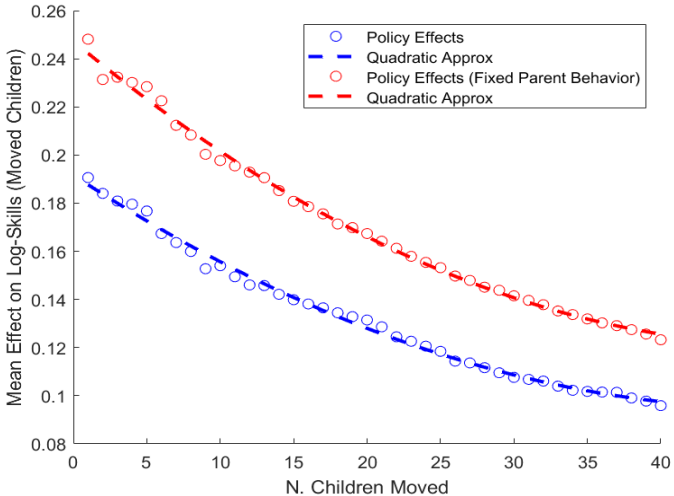
Moving to Opportunity?

- Simulate intervention that moves children to more favorable environment
  - From neighborhood with median family income of 48K ...
  - ... to neighborhood with median family income of 83K
- Questions:
  - **How does treatment effect change as intervention is scaled up?**
  - **How do parents respond to the policy?**

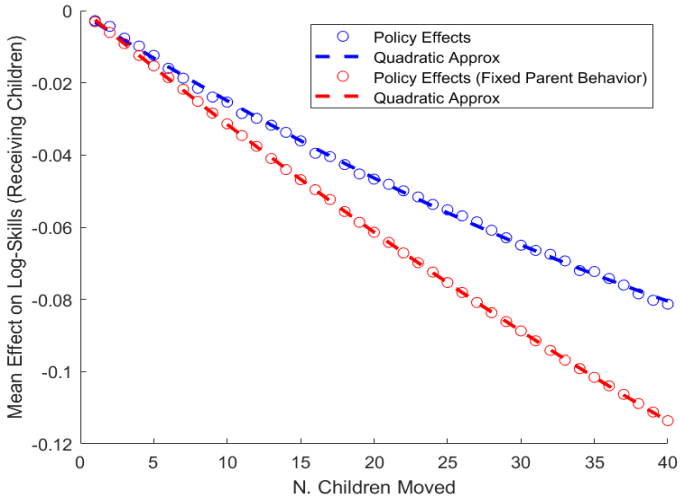
Policy Benefits Decline as More Kids are Moved



Scaling Up and Parental Responses: Moved Parents



Scaling Up and Parental Responses: Receiving Parents



Curbing Initial Inequality

- Experiments: Average Breakdown
  - Lower total inequality
  - Lower between-community inequality (residential desegregation)
  - Lower within-community inequality
  - Curb lower-tail inequality
  - Subsidize authoritative investments

- Key insights:
  - Targeting residential segregation is ineffective
  - For each experiment, change in popularity of authoritarian parenting matters

Conclusions

- Economic model of parenting accounts well for interaction between social environment, peer groups, and parenting
- Key policy implication: elusive gains as desegregation policies are scaled up
- Taking children's and parents' behavioral responses into account can help identify more promising policies

Sample Fit

	Authoritarian	
	(1)	(2)
	Model	Data
Child's Skills	-0.075	-0.016
Peer Skills	-0.021	-0.017
Mean Dep. Variable	0.135	0.140

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Sample Fit

	Next-Period Skills					
	Pooled Sample		Authoritarian = 0		Authoritarian = 1	
	(1)	(2)	(3)	(4)	(5)	(6)
	Model	Data	Model	Data	Model	Data
Child's Skills	0.889	0.823	0.917	0.835	0.776	0.650
Peer Skills	0.316	0.144	0.332	0.129	0.194	0.212
Authoritarian	-0.048	0.047				
Mean Child's Skills (Grade 9)	-0.039	-0.017				
Mean Child's Skills (Grade 10)	0.053	0.082				
Mean Child's Skills (Grade 11)	0.204	0.130				
Mean Child's Skills (Grade 12)	0.313	0.341				

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Sample Fit

	Next Period Peer Skills					
	Pooled Sample		Authoritarian = 0		Authoritarian = 1	
	(1)	(2)	(3)	(4)	(5)	(6)
	Model	Data	Model	Data	Model	Data
Child's Skills	0.283	0.223	0.277	0.223	0.321	0.152
Peer Skills	0.179	0.314	0.183	0.327	0.149	0.248
Authoritarian	0.070	0.012				
Mean Number of Friends	6.812	6.935				

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Sample Fit

	Parental Investments			
	Authoritarian = 0		Authoritarian = 1	
	(1) Model	(2) Data	(3) Model	(4) Data
Child's Skills	0.153	0.114	0.003	0.035
Peer Skills	-0.093	-0.065	0.002	0.028
Mean Dep. Variable	0.028	0.025	-0.178	-0.192

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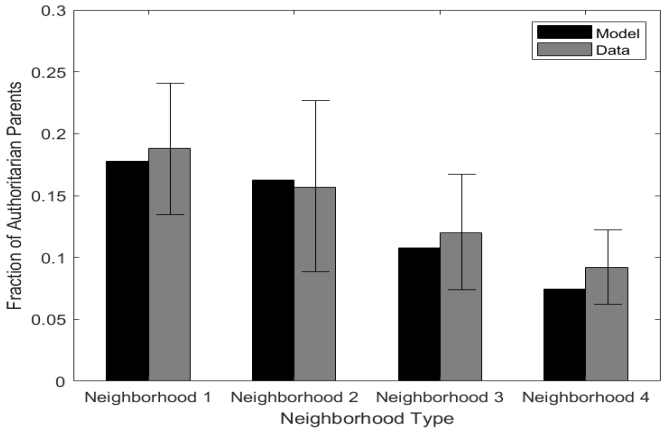
(Untargeted) Fit Across Neighborhoods



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Measures of Parental Involvement

- The current measures of parental involvement are related to specific activities that children can have done with their mothers in the previous 4 weeks:
  - Talking about life (e.g.: dating, social life)
  - Talking about personal problems
  - Worked on a school project

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Technology

	Cobb-Douglas (Authoritarian = 1)
Child Skills ($\alpha_{1,1}$)	0.517
	(0.0481)
Peer Skills ($\alpha_{2,1}$)	0.144
	(0.0226)
Investments ($\alpha_{3,1}$)	0.055
	(0.0520)
	CES (Authoritarian = 0)
Complementarity Parents vs. Peer ($\alpha_{3,0}$)	0.791
	(0.0507)
Share Self-Production ($\alpha_{1,0}$)	0.566
	(0.0173)
Share Peer Skills ($\alpha_{2,0}$)	0.384
	(0.0349)
Complementarity Self-Production vs. Parents-Peer ($\alpha_{4,0}$)	-1.734
	(0.2150)
CES Return to Scale ($\alpha_{5,0}$)	1.128
	(0.0619)
	Total Factor Productivity
TFP Constant (ψ_0)	0.399
	(0.0328)
TFP Age Trend (ψ_1)	0.019
	(0.0032)
TFP Parenting Style (ψ_2)	-0.300
	(0.0428)

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Parent's Preferences

Disutility of Investment (δ_1)	1 (Normalized) (-)
Disutility of Authoritarian: Intercept ($\delta_{2,0}$)	-2.503 (0.1931)
Disutility of Authoritarian: Heterogeneity by Neighborhood Income ($\delta_{2,1}$)	-0.080 (0.0098)
Child Skills (δ_3)	2.086 (0.3918)
Authoritarian $\times$ Child Skills (δ_4)	-0.196 (0.0222)

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Child's Preferences

Child i Skills (γ_1)	-0.189
	(0.0270)
Child j Skills (γ_2)	-0.202
	(0.0400)
Homophily (γ_3)	-0.261
	(0.0352)
Authoritarian (γ_4)	-0.538
	(0.1301)
Constant (γ_0)	-1.431
	(0.0368)

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Initial Conditions

	Mean (μ_e)	Standard Deviation (σ_e)	Population
Neighborhood 1	-0.55	0.87	269
Neighborhood 2	-0.28	0.98	307
Neighborhood 3	0.23	0.96	300
Neighborhood 4	0.59	0.84	210

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Cross-Checking

	(1)	(2)
	Authoritarian about Friends	
Best Friend is Bad Influence	0.066***	0.076***
	(0.022)	(0.022)
Mean Dep	0.119	0.119
Obs	7942	7942
Clusters	63	63
School F.E.	No	Yes

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Parenting Style and Skill Accumulation

	Next period child's skills		
	(1)	(2)	(3)
	All	Single-Mother	Intact
Child's GPA	0.564***	0.516***	0.598***
	(0.016)	(0.017)	(0.020)
Peers Skills	0.061***	0.064***	0.066***
	(0.009)	(0.014)	(0.012)
Intensive about Friends	0.024	-0.008	**0.045****
	(0.015)	(0.028)	(0.022)
Obs	9555	3292	4698
Clusters	114	110	113

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Parenting Style and Selection of Friends

	Next period peers quality			
	(1)	(2)	(3)	(4)
	Low-Income Neighborhood	Medium-Income Neighborhood	High-Income Neighborhood	All Neighb. Intact
Child's GPA	0.312***	0.246***	0.269***	0.259***
	(0.108)	(0.049)	(0.073)	(0.040)
Peers Skills	0.144	0.322***	0.210**	0.267***
	(0.103)	(0.049)	(0.095)	(0.047)
Intensive about Friends	0.299*	0.081	0.118	0.121*
	(0.162)	(0.063)	(0.161)	(0.061)
Obs	316	1134	582	2032
Clusters	33	43	71	104

- All models include school fixed effects

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Other Counterfactuals

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Aggregate					
	Mean	90–10 Ratio	10th Percentile	Gini	Author Parenting	Time Inv
No Inequality	6.80%	-40.90%	43.33%	-0.11	-0.06	0.07
No Between-Neighb. Inequality	-4.23%	-12.32%	2.34%	-0.03	0.01	0.00
No Within-Neighb. Inequality	10.94%	-13.82%	27.33%	-0.03	-0.07	0.06
Truncate Local Distrib. at 10th percent	8.32%	-6.68%	13.89%	-0.01	-0.03	0.00
Halving Cost of Parental Investments	27.45%	10.39%	19.17%	0.02	-0.03	0.16
	Panel B: Low-Income Neighborhood					
	Mean	90–10 Ratio	10th Percentile	Gini	Author Parenting	Time Inv
No Inequality	29.63%	-33.95%	64.11%	-0.09	-0.11	0.05
No Between-Neighb. Inequality	15.91%	-0.38%	15.28%	-0.00	-0.03	-0.02
No Within-Neighb. Inequality	7.40%	-32.51%	34.18%	-0.09	-0.08	0.05
Truncate Local Distrib. at 10th percent	6.45%	-11.20%	14.96%	-0.03	-0.04	0.01
Halving Cost of Parental Investments	25.15%	9.69%	17.91%	0.02	-0.03	0.16
	Panel C: High-Income Neighborhood					
	Mean	90–10 Ratio	10th Percentile	Gini	Author Parenting	Time Inv
No Inequality	-15.96%	-19.29%	-6.01%	-0.05	0.00	0.09
No Between-Neighb. Inequality	-25.47%	19.28%	-33.32%	0.04	0.08	0.02
No Within-Neighb. Inequality	11.58%	-19.85%	25.19%	-0.05	-0.03	0.04
Truncate Local Distrib. at 10th percent	8.72%	-8.23%	14.63%	-0.02	-0.02	-0.01
Halving Cost of Parental Investments	29.42%	6.24%	23.93%	0.01	-0.02	0.17

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Other Counterfactuals

	(1)	(2)	(3)	(4)	(5)	(6)
	Aggregate					
	Mean	90-10 Ratio	10th Percentile	Gini	Authorit.	Time Inv
No Inequality	6.77%	-39.41%	39.79%	-0.11	-0.07	0.07
No Between-Neighb. Inequality	-4.77%	-13.62%	2.53%	-0.03	0.01	0.00
No Within-Neighb. Inequality	10.96%	-13.25%	26.90%	-0.03	-0.07	0.06
Truncate Local Distrib. at 10th percent	8.30%	-5.64%	13.04%	-0.01	-0.04	0.00
Halving Cost of Parental Investments	27.84%	10.31%	19.29%	0.02	-0.02	0.16

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Other Counterfactuals

	(7)	(8)	(9)	(10)
	Low-Income Neighborhood		High-Income Neighborhood	
	Mean	10th Percentile	Mean	10th Percentile
No Inequality	26.76%	54.69%	-14.65%	-8.47%
No Between-Neighb. Inequality	12.23%	7.89%	-23.53%	-29.05%
No Within-Neighb. Inequality	6.47%	31.53%	9.95%	20.34%
Truncating Local Initial Distribution (at 10th percentile)	4.06%	11.95%	6.42%	13.02%
Reducing Cost of Parental Investments	24.26%	18.62%	27.18%	21.94%

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